

The Innovation Winter Is Coming: How the U.S.-China Trade War Endangers the World

KIMBERLY A. HOUSER*

TABLE OF CONTENTS

I.	INTRODUCTION	550
II.	BACKGROUND.....	554
	A. <i>What Is Artificial Intelligence?</i>	554
	B. <i>Why Is AI Growing So Fast Now?</i>	556
III.	GLOBALIZATION AND INTERDEPENDENCE.....	559
IV.	PROTECTIONISM AND REJECTIONISM	563
	A. <i>China</i>	565
	1. <i>Belt and Road Initiative</i>	566
	2. <i>Made in China 2025</i>	568
	3. <i>China's AI Development Plan</i>	570
	B. <i>United States</i>	572
	1. <i>Rationale for Trade War</i>	573
	a. <i>Intellectual Property Rights and Cybertheft</i>	574
	b. <i>Chinese Policies that Protect Chinese Businesses</i>	576
	c. <i>Direct Foreign Investment by China in U.S.</i> <i>Tech Companies</i>	578
	d. <i>Cybersecurity</i>	579

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2.	<i>Trade War Instigation</i>	581
a.	<i>Tariffs</i>	581
b.	<i>Executive Orders</i>	583
c.	<i>Regulations</i>	585
d.	<i>H-1B Visa Restrictions</i>	587
C.	<i>Trade War Harms</i>	588
1.	<i>5G</i>	589
2.	<i>Economy</i>	591
3.	<i>Democracy</i>	595
V.	THE FUTURE OF AI	596
A.	<i>Innovation Winter</i>	596
B.	<i>Technological Bifurcation</i>	598
C.	<i>Need for Coordinated Development, Cooperation, and Standards</i>	602
VI.	CONCLUSION	607

“The war for global leadership in artificial intelligence and machine learning is well underway, and the US is poised to lose perhaps the most important technology war in its history.”¹

“If you think this has a happy ending, you haven’t been paying attention.”

Ramsay Bolton to Theon Greyjoy – GOT season 3, episode 6²

I. INTRODUCTION

The progress of Artificial Intelligence (AI), which was created in the 1950s, has ebbed and flowed over the years as ancillary technological advances enabling its furtherance have appeared and then stalled.³ Although basic AI mechanisms are embedded in modern society in such a way that we are no longer surprised by accurate movie and song recommendations or when our car beeps to let us know we have drifted into another lane, the greatest advances are yet to come.⁴ The recent AI Spring stems from the availability of massive amounts of data from the internet, sensors, and

1. Steve Andriole, *Artificial Intelligence, China and the U.S. - How the U.S. Is Losing the Technology War*, FORBES (Nov. 9, 2018, 12:10 PM), <https://www.forbes.com/sites/steveandriole/2018/11/09/artificial-intelligence-china-and-the-us-how-the-us-is-losing-the-technology-war/#2a567e616195> [https://perma.cc/H6PE-YT8U].

2. *Game of Thrones: The Climb* (HBO television broadcast May 5, 2013).

3. See Tanya Lewis, *A Brief History of Artificial Intelligence*, LIVE SCI. (Dec. 4, 2014), <https://www.livescience.com/49007-history-of-artificial-intelligence.html> [perma.cc/VC4S-4BWG].

4. Aaron Smith & Janna Anderson, *Predictions for the State of AI and Robotics in 2025*, PEW RESEARCH CTR. (Aug. 6, 2014), <https://www.pewinternet.org/2014/08/06/predictions-for-the-state-of-ai-and-robotics-in-2025/> [perma.cc/A8KU-HV4K].

mobile phone usage; increased storage and processing capabilities due to advances in chips and cloud storage; and increased transmission and processing speeds.⁵ However, the future of AI rests on 5G and edge computing.⁶

AI innovation, especially the Internet of Things (IoT), requires a universal telecommunication infrastructure with massive processing speed and reduced latency that the previous iterations are incapable of providing.⁷ The importance of 5G to this “technological paradigm shift” cannot be overstated.⁸ The development of this infrastructure appears to be at risk as the United States and China refuse to acknowledge their interdependence and attempt to push forward without the other.⁹ The largest producer of

5. See *infra* Section II.B.

6. Sarah Yost, *Brave New World: Everything Gets Smarter when 5G and AI Combine*, ELEC. DESIGN (Feb. 11, 2019), <https://www.electronicdesign.com/industrial-automation/brave-new-world-everything-gets-smarter-when-5g-and-ai-combine> [perma.cc/7EMB-YK7P] (“5G provides the infrastructure and massive amounts of data that AI needs to be successful.”); Maria Hernandez, *What 5G Means for the Internet of Things*, UBIDOTS (Feb. 7, 2019), <https://ubidots.com/blog/what-5g-means-for-the-internet-of-things/> [perma.cc/FG4A-XW93]. A “5G platform will impact many industries including automotive, entertainment, agriculture, manufacturing and IT” as it is applied to new applications and improves many existing IoT applications. Jenny Hallmark, *The Future of Internet of Things*, SMB NATION (2016), <https://www.smbnation.com/analysis/2563-the-future-of-internet-of-things> [https://perma.cc/9XFC-WF2B]. Machina Research forecasts “IoT will account for one quarter of the global 41 million 5G connections in 2024.” *Machina Research Predicts 10 Million 5G Internet of Things Connections in 2024*, GARTNER (Feb. 18, 2016), <https://machinaresearch.com/news/machina-research-predicts-10-million-5g-internet-of-things-connections-in-2024/> [https://perma.cc/6L3K-SVVB].

7. Chen Lifang, *Get, Set for Faster Downloads! 5G Will be 100 times Faster than 4G*, FIN. EXPRESS (Nov. 19, 2018, 7:41 AM), <https://www.financialexpress.com/industry/get-set-for-faster-downloads-5g-will-be-100-times-faster-than-4g/1385793/> [perma.cc/97KL-U376] (noting that 5G will be up to 100 times faster than 4G with dramatically reduced latency). Latency is the time it takes for data to be sent from a device to where it is processed and back. Dave Schafer, *Bandwidth vs. Latency: What Is the Difference?*, HIGH SPEED INTERNET.COM (Dec. 23, 2019), <https://www.highspeedinternet.com/resources/bandwidth-vs-latency-what-is-the-difference> [https://perma.cc/Y77J-JLN6].

8. Marc Emmer, *This Technology Is About to Change the World—But No One Is Talking About It*, INC. (Aug. 10, 2018), <https://www.inc.com/marc-emmer/this-technology-is-about-to-change-world-but-no-one-is-talking-about-it.html> [perma.cc/87W4-3KF5] (explaining how 5G will enable holographic projection, health-care enabled devices, smart homes, smart cities, smart factories, and autonomous vehicles to name a few).

9. See Eric Auchard & Stephen Nellis, *What Is 5G and Who Are the Major Players?*, REUTERS (Mar. 15, 2018, 4:37 AM), <https://www.reuters.com/article/us-qualcomm-m-a-broadcom-5g/what-is-5g-and-who-are-the-major-players-idUSKCN1GR1IN> [perma.cc/VFK2-2USN].

5G networking equipment, Huawei, is based in China,¹⁰ and the second-largest producer of chips, Intel, is located in the United States.¹¹ The trade war has all but stopped the flow of goods between the two nations. Although it appears that the United States is feeling the brunt of the pain of this trade war, it will have a global impact,¹² not just on the economy and democracy, but on the future of AI itself.

The U.S. government has taken a hands-off approach to AI and 5G, relying on private industry to move these fields forward.¹³ The emergence of China as home to the top 5G networking equipment supplier¹⁴ and a growing leader in technology¹⁵ appears to have spurred the recent bout of tariffs and other protectionist activities by the United States.¹⁶ The previous four decades of economic cooperation between China and the United States was dealt a blow when President Trump instituted the first set of

10. Emily Feng & Amy Cheng, *China's Tech Giant Huawei Spans Much of the Globe Despite U.S. Efforts to Ban It*, NPR (Oct. 24, 2019, 2:30 PM), <https://www.npr.org/2019/10/24/759902041/chinas-tech-giant-huawei-spans-much-of-the-globe-despite-u-s-efforts-to-ban-it> [perma.cc/V3Y2-L8M4].

11. Justin Walton, *The World's Top 10 Semiconductor Companies*, INVESTOPEDIA (Jan. 12, 2020), <https://www.investopedia.com/articles/markets/012216/worlds-top-10-semiconductor-companies-tsmintc.asp> [perma.cc/29CN-CNDL]. In fact, six of the top ten largest microprocessor manufacturers are based in the United States. *Id.*

12. See, e.g., Debby Wu & Ian King, *U.S.-China Fight Over Chip Kingpin Rattles Tech Industry*, BLOOMBERG: QUINT (May 18, 2020, 6:36 AM), <https://www.bloombergquint.com/technology/global-chipmaking-kingpin-gets-dragged-into-u-s-china-trade-war> [https://perma.cc/EAN8-ZHPU] (exploring the impact of the fight between China's Huawei Technologies, Co. and the U.S. government over one of the world's largest chip manufacturers, the Taiwan Semiconductor Manufacturing Co.).

13. See Kai Ryssdal & Bridget Bodnar, *An Artificial Intelligence Battle Is Coming Between the U.S. and China*, MARKETPLACE (Mar. 6, 2019), <https://www.marketplace.org/2019/03/06/artificial-intelligence-battle-us-china/> [perma.cc/AN5D-BZGP]. According to Amy Webb, author of *The Big Nine: How the Tech Titans and Their Thinking Machines Could Warp Humanity*, “[w]e’ve had no national strategy on artificial intelligence or on any other number of important technologies and areas of science.” *Id.*

14. See Marcus Lu, *Visualized: Where 5G Will Change the World*, VISUAL CAPITALIST (Mar. 9, 2020), <https://www.visualcapitalist.com/visualized-where-5g-will-change-the-world/> [https://perma.cc/LT5T-VCHM].

15. Rob Waugh, *How China Is Leading the World in Tech Innovation (and What the West Can Learn from It)*, TELEGRAPH (Nov. 16, 2018, 5:30 PM), <https://www.telegraph.co.uk/connect/better-business/business-solutions/china-technology-innovation/> [perma.cc/4BST-2H5J] (noting that, despite reports to the contrary, China is succeeding as a leader in technology, especially mobile payments, fin tech, social media and AI). But see Alison DeNisco Rayome, *How China Tried and Failed to Win the AI Race: The Inside Story*, TECHREPUBLIC (Apr. 5, 2019, 4:00 AM), <https://www.techrepublic.com/article/how-china-tried-and-failed-to-win-the-ai-race-the-inside-story/> [perma.cc/2LDE-E2TY] (“Despite the ambitious plan and the hyped headlines, China is not as far along in its AI ventures as its state media would lead you to believe, said [Georg] Stieler,” “managing director of Stieler Enterprise Management Consulting China.”).

16. See *infra* Part III.

tariffs on Chinese goods in July 2018.¹⁷ Ignoring the benefits that trade with China has provided to the United States,¹⁸ the administration has upended international protocol and order.¹⁹ Despite assurances to the contrary, the United States will encounter difficulty in creating the infrastructure necessary for widespread 5G adoption because of its refusal to use 5G equipment from China.²⁰ In fact, because companies in the United States have sold off many of their hardware divisions to foreign entities, all of the top four 5G network equipment companies are located outside of the United States.²¹

This paper explores the interrelationship between 5G and AI and why the U.S. government's reliance on private industry and the trade war will result in an Innovation Winter. Part II briefly explains what AI is and what events led to the recent AI Spring. Part III explores globalization and the interconnectedness of China and the United States with respect to 5G technology and AI. Part IV discusses the trade war and how the United States has shifted its policy from globalization to protectionism and rejectionism, as well as the resulting harms. It additionally provides and refutes the rationales given by the United States for the trade war. Part V demonstrates how the trade war will lead to an Innovation Winter and why coordinated development and international standards are needed for the future benefit of the world. There is a very real risk that should the United States and China continue with this decoupling, the result could be a bifurcated internet with highly divergent standards, and technology with non-interchangeable components, forcing the rest of the world to pick a side.

17. Press Release, Office of the U.S. Trade Representative, USTR Issues Tariffs on Chinese Products in Response to Unfair Trade Practices (June 15, 2018), <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/june/ustr-issues-tariffs-chinese-products> [perma.cc/H98M-U2QS].

18. Press Release, U.S. Dep't of the Treasury, Benefits of Trade with China (May 24, 2007), <https://www.treasury.gov/press-center/press-releases/Pages/hp423.aspx> [perma.cc/28C8-JBGQ].

19. Amitrajeet A. Batabyal, *Rules-based Trade Made the World Rich. Trump's Policies May Make It Poorer*, CONVERSATION (June 10, 2018, 9:28 AM), <https://theconversation.com/rules-based-trade-made-the-world-rich-trumps-policies-may-make-it-poorer-97896> [perma.cc/V4GK-NBJS].

20. Brian Fung, *How China's Huawei Took the Lead Over U.S. Companies in 5G Technology*, WASH. POST (Apr. 10, 2019, 1:01 PM), <https://www.washingtonpost.com/technology/2019/04/10/us-spat-with-huawei-explained/?noredirect=on> [perma.cc/L6QT-4L5M].

21. *Id.*

II. BACKGROUND

A. What Is Artificial Intelligence?

Artificial intelligence (AI) is a transformative technology that holds promise for tremendous societal and economic benefit. AI has the potential to revolutionize how we live, work, learn, discover, and communicate. AI research can further our national priorities, including increased economic prosperity, improved educational opportunities and quality of life, and enhanced national and homeland security.²²

In its most basic form, AI is the use of a machine to perform tasks that can be performed by humans.²³ AI is a tool that can automate activities, extract knowledge from data, and make predictions.²⁴ It is used in movie recommendations on Netflix, creating directions on map applications, and even to summon a ride home using a smart phone app.²⁵ The potential benefits of AI are enormous despite the legitimate risks noted by scholars.²⁶

22. NETWORKING & INFO. TECH. RESEARCH & DEV. SUBCOMM., NAT'L SCI. & TECH. COUNCIL, THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN (2016) [hereinafter NSTC REPORT ON AI], https://www.nitrd.gov/pubs/national_ai_rd_strategic_plan.pdf [<https://perma.cc/M7JM-33K4>].

23. Lauri Donahue, *A Primer on Using Artificial Intelligence in the Legal Profession*, HARV. J. L. & TECH.: JOLT DIG. (Jan. 3, 2018), <https://jolt.law.harvard.edu/digest/a-primer-on-using-artificial-intelligence-in-the-legal-profession> [perma.cc/KZY9-VUJ6] (“‘Artificial Intelligence’ is the term used to describe how computers can perform tasks normally viewed as requiring human intelligence, such as recognizing speech and objects, making decisions based on data, and translating languages.”).

24. See Huimin Lu et al., *Brain Intelligence: Go Beyond Artificial Intelligence*, 23 MOBILE NETWORKS & APPLICATIONS 368, 368–75 (2018). The term AI is an umbrella for many different technologies, including predictive analytics, data mining, machine learning, artificial intelligence, neural nets, and deep learning. See *id.*

25. See Jacques Bughin, et al., *Artificial Intelligence: The Next Digital Frontier?* 20, 31, 45 (McKinsey Glob. Inst., Discussion Paper, June 2017), <https://www.mckinsey.com/~/media/mckinsey/industries/advanced%20electronics/our%20insights/how%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/mgi-artificial-intelligence-discussion-paper.ashx> [<https://perma.cc/A9Q4-YPF6>]. These are all examples of what is known as “weak AI” or “narrow AI”—a program designed to perform a task that a human can do. Harry Surden, *Artificial Intelligence and Law: An Overview*, 35 GA. ST. U. L. REV. 1305, 1309 & n.20, 1322 (2019). “General AI” or “Strong AI” as represented in robot movies does not yet exist. *Id.* at 1309. “Today’s AI systems cannot, nor are they necessarily designed to, match higher-order human abilities, such as abstract reasoning, concept comprehension, flexible understanding, general problem-solving skills, and the broad spectrum of other functions that are associated with human intelligence.” *Id.* (citing Jack Krupansky, *Untangling the Definitions of Artificial Intelligence, Machine Intelligence, and Machine Learning*, MEDIUM (June 13, 2017), <https://medium.com/@jackkrupansky/untangling-the-definitions-of-artificial-intelligence-machine-intelligence-and-machine-learning-7244882f04c7> [<https://perma.cc/RVZ4-88NP>]).

26. See generally ERIC SIEGEL, PREDICTIVE ANALYTICS: THE POWER TO PREDICT WHO WILL CLICK, BUY, LIE, OR DIE (rev. & updated ed. 2016) (describing how predictive analytics are currently being used by the government and business to identify preferences and risks, noting that the use of data about groups that have been historically discriminated

Companies have developed AI that can detect pathologies and make diagnoses faster and more accurately than medical professionals, help the blind with navigation, aid disaster relief, predict weather-related phenomena, and detect and address inequality.²⁷ AI is also being developed in the commercial arena to further automate the manufacturing process, develop self-driving cars, predict harvest outputs, provide chatbots for customer services, prevent fraud, and reduce energy and employment costs.²⁸ According to a 2018 McKinsey Report, AI has the potential to add \$13 trillion to current global economic output by 2030.²⁹ The future of AI's impact on a country's economic viability mandates not only that these countries plan for and adopt the necessary infrastructure for this technological revolution, but also ensure that its development proceeds responsibly.³⁰

against can result in discriminatory outcomes, and discussing the potential bias from the likelihood of errors contained in big data); CATHY O'NEIL, *WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY* (2015) (discussing potential risks of big data); VIKTOR MAYER-SCHÖNBERGER & KENNETH CUKIER, *BIG DATA: A REVOLUTION THAT WILL TRANSFORM HOW WE LIVE, WORK, AND THINK* (2013).

27. Michael Chui et al., *Applying Artificial Intelligence for Social Good*, MCKINSEY GLOBAL INST. (Nov. 28, 2018), <https://www.mckinsey.com/featured-insights/artificial-intelligence/applying-artificial-intelligence-for-social-good> [<https://perma.cc/9UMK-XPU8>]. See generally Kimberly A. Houser, *Can AI Solve the Diversity Problem in the Tech Industry?: Mitigating Noise and Bias in Employment Decision-Making*, 22 STAN. TECH. L. REV. 290 (2019) (discussing how AI can be used to detect bias in employment decisions and remedy the impact of unconscious bias and noise through the use of AI).

28. Guilhem Fabre, *China's Digital Transformation—Why is Artificial Intelligence a Priority for Chinese R&D?* 12 (Fondation Maison des Sciences de l'Homme, Working Paper No. 136, 2018), <https://halshs.archives-ouvertes.fr/halshs-01818508v2/document> [<https://perma.cc/T22T-KJMR>].

29. Jacques Bughin et al., *Notes from the AI Frontier: Modeling the Impact of AI on the World Economy*, MCKINSEY GLOBAL INST. (Sept. 4, 2018), <https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy> [<https://perma.cc/2FQ7-G5XW>].

30. See ANDREA RENDA, CTR. FOR EUROPEAN POLICY STUDIES, *ARTIFICIAL INTELLIGENCE: ETHICS, GOVERNANCE AND POLICY CHALLENGES* 27–35 (2019), <https://ssrn.com/abstract=3420810> [<https://perma.cc/3P73-T3WH>] (explaining the need for responsible, trustworthy AI); see also Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH 353, 355–56 (2016) (describing how AI has moved forward in the United States with virtually no government oversight).

B. Why Is AI Growing So Fast Now?

Once considered sci-fi technology, artificial intelligence is rapidly working its way into many facets of our daily lives and will accelerate further with the data avalanche coming from 5G.³¹

5G will drive artificial intelligence, Internet of Things, and change the world forever.³²

The recent AI Spring stems from a combination of technological advancements: availability of data, increased storage and computing power, and increased speed in the transmission of data.³³ Because the use of the internet and mobile devices has burgeoned, massive amounts of data can be collected and processed by the companies providing these devices and services.³⁴ This has created an incredible amount of data available for employing pattern recognition algorithms and creating learning sets for the development of AI.³⁵ For example, companies such as Facebook, Google, and Amazon in the United States—and Tencent, Baidu, and Alibaba in China—are able to review the topics clicked on, products purchased, and time spent on a website to predict—with startling accuracy at times—what a consumer will purchase next.³⁶ Ninety percent of today's data was created in the last two years.³⁷ The second advancement is the recent increase in storage and computer power. As chip size has decreased and computer storage capabilities have increased, most entities can now afford the type

31. Yost, *supra* note 6.

32. Emmer, *supra* note 8.

33. See Darrell M. West & John R. Allen, *How Artificial Intelligence Is Transforming the World*, BROOKINGS (Apr. 24, 2018), <https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/> [https://perma.cc/6YU8-DKQV].

34. Ejaz Ahmed et al., *Recent Advances and Challenges in Mobile Big Data*, IEEE COMM. MAG., Feb. 2018, at 102, 102, 104–05, <https://ieeexplore.ieee.org/document/8291122> [https://perma.cc/GX6G-TU3J]. It is estimated that global internet of things connections will reach 25 billion by 2025. Ian Dailey, *What 5G Means for Brands: 3 Takeaways from MWC*, VENTURE BEAT (Mar. 2, 2019, 10:25 AM), <https://venturebeat.com/2019/03/02/what-5g-means-for-brands-3-takeaways-from-mwc/> [https://perma.cc/J9W3-HHZC].

35. See Andy Patrizio, *Big Data vs. Artificial Intelligence*, DATAMATION (May 30, 2018), <https://www.datamation.com/big-data/big-data-vs.-artificial-intelligence.html> [https://perma.cc/4GEM-WD5D] (noting that deep learning requires vast amounts of data to process and learn from in the development of AI).

36. See Jack Morse, *Facebook Isn't the Only One with Too Much of Your Data. Just Ask Google and Amazon*, MASHABLE (Apr. 14, 2018), <https://mashable.com/2018/04/14/google-amazon-facebook-cambridge-analytica/> [https://perma.cc/67DF-BM3L].

37. Bernard Marr, *How Much Data Do We Create Every Day? The Mind-Blowing Stats Everyone Should Read*, FORBES (May 21, 2018, 12:42 AM), <https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/#559b8ddb60ba> [https://perma.cc/VK8L-ZBAJ].

and amount of computing power needed to conduct advanced analytics.³⁸ An entity need not invest in a massive computing infrastructure or data center, but can essentially lease space in an offsite storage facility, known as cloud storage.³⁹ These facilities, additionally, offer varying levels of solutions beyond storage, all the way up to processing data on behalf of the subscriber.⁴⁰ The final development is speed. Numerous technological advances have increased both communication and processing speed, including fiber optics and solid-state drives,⁴¹ however, the greatest potential for AI revolves around 5G technology and edge computing.⁴² Edge computing is the processing of data closer to the data source.⁴³ 5G technology is the next generation of radio transmissions that facilitate communication between devices, such as between your phone and your home's security system.⁴⁴ 5G speeds could be up to 100 times faster than previous iterations.⁴⁵ There are a number of challenges with 5G implementation that need to be addressed,⁴⁶ but the inability to obtain and install the necessary equipment

38. Harald Bauer, Pratap Ranade & Sid Tandon, *Big Data and the Opportunities It Creates for Semiconductor Players*, MCKINSEY ON SEMICONDUCTORS, Autumn 2012, at 46, 53–54 (2012), https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/semiconductors/issue%202%20autumn%202012/pdfs/big_data_and_the_opportunities_it_creates_for_semiconductor_players.ashx [<https://perma.cc/KU3W-V2XL>].

39. *What Is Cloud Computing? How Does 'The Cloud' Work?*, FASTMETRICS, <https://www.fastmetrics.com/blog/tech/what-is-cloud-computing/> [<https://perma.cc/52E8-RLL9>].

40. *See id.*

41. JOHN GALLAUGHER, INFORMATION SYSTEMS: A MANAGER'S GUIDE TO HARNESSING TECHNOLOGY 78–79 (2012), https://my.uopeople.edu/pluginfile.php/57436/mod_book/chapter/121629/BUS5114.Gallaugh.Information.Systems.A.Manager.Guide.to.Harness.Technology.pdf [<https://perma.cc/M4XU-GKYQ>]; *see also* Lifang, *supra* note 7 (“Scientists have known this since 1948, when an American mathematician named Claude Shannon determined that there is a limit to the speed at which data can be transmitted without error. That’s why every breakthrough in the telecommunications infrastructure—copper, optical fibre, wireless transmission—has been accompanied by parallel improvements in digital coding technology, ensuring that data didn’t get scrambled on their high-speed journey.”).

42. *See* Yost, *supra* note 6.

43. Xiang Sun & Nirwan Ansari, *EdgeIoT: Mobile Edge Computing for the Internet of Things*, IEEE COMM. MAG., Dec. 2016, at 22, 22, https://www.researchgate.net/profile/Xiang_Sun9/publication/312056813_EdgeIoT_Mobile_Edge_Computing_for_the_Internet_of_Things/links/5a73d761aca2720bc0dbddb2/EdgeIoT-Mobile-Edge-Computing-for-the-Internet-of-Things.pdf [<https://perma.cc/RSG3-ZPJ3>].

44. Chris Hoffman, *What Is 5G, and How Fast Will It Be?*, HOW-TO GEEK (Mar. 15, 2019, 11:47 PM), <https://www.howtogeek.com/340002/what-is-5g-and-how-fast-will-it-be/> [<https://perma.cc/C8YY-57GK>].

45. *Id.*

46. Michelle Yan & Antonio Villas-Boas, *5G Networks Will Be 10 Times Faster than 4G LTE, But We Shouldn’t Get Too Excited Yet*, BUS. INSIDER (Apr. 29, 2019, 2:36

for its widespread implementation is one of the immediate risks of the trade war.⁴⁷

In addition to the installation of 5G base stations⁴⁸ permitting fast communication between devices, edge computing can further reduce the latency in the transmission and processing of data.⁴⁹ Edge computing equipment can be installed in both devices and in, or adjacent to, the base stations.⁵⁰ By being able to process data closer to the source, latency in transmission is reduced.⁵¹ This is critical for the AI systems in self-driving cars, for example. If a child were to run out into the street chasing a ball, the difference between sending data to a cloud to process and processing data on the edge device in the vehicle or at a small cell posted next to the road could mean the difference between life and death. 5G provides the type of infrastructure that once installed will exponentially increase the utility of AI in the world.⁵² Unfortunately, this is all at risk with the move away from globalization and towards protectionism.

PM), <https://www.businessinsider.com/5g-high-speed-internet-cellular-network-issues-switch-2019-4> [<https://perma.cc/3J75-E4UA>].

47. See Nick Walko, *5G – More Expensive and Delayed Without Huawei Equipment*, WCCFTECH (Feb. 14, 2019), <https://wccfttech.com/5g-more-expensive-and-delayed-without-huawei-equipment/> [<https://perma.cc/YS87-6U96>] (noting that sourcing 5G components from Europe will be more expensive than using Chinese equipment and subject to delays).

48. Tuan Nguyen, *Small Cell Networks and the Evolution of 5G (Part 1)*, QORVO (May 17, 2017), <https://www.qorvo.com/design-hub/blog/small-cell-networks-and-the-evolution-of-5g> [<https://perma.cc/2Z5Y-TDAG>] (“Wireless infrastructure today includes many elements – macro base stations, metro cells, outdoor and indoor distributed antenna systems (or DAS), small cells and more.”). For the purposes herein, I will refer to the telecommunication networking equipment that is required for 5G as base stations or small cells. Depending on the frequency band used, base stations can either be installed on current cell phone towers for 5G using lower frequency bands or will need to be placed much closer together for 5G on high frequency bands. See *id.* Because the United States is looking to rely on these higher frequency mmWaves initially, the infrastructure will require highly densified small cells. *Id.*

49. YUN CHAO HU ET AL., EUROPEAN TELECOMM. STANDARDS INST, MOBILE EDGE COMPUTING: A KEY TECHNOLOGY TOWARDS 5G, at 4 (.2015), https://yucianga.info/wp-content/uploads/2015/11/Ref02-2015-09-etsi_wp11_mec_a_key_technology_towards_5g.pdf [<https://perma.cc/E2BF-UQD9>].

50. Scott Fulton III, *What Is Edge Computing? Here’s Why the Edge Matters and Where It’s Headed*, ZDNET (Aug. 9, 2019, 12:17 AM), <https://www.zdnet.com/article/where-the-edge-is-in-edge-computing-why-it-matters-and-how-we-use-it/> [<https://perma.cc/A6M5-WE47>].

51. *Id.*

52. See *infra* Section IV.C.1.

III. GLOBALIZATION AND INTERDEPENDENCE

Globalization is the . . . interdependence of the world's economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information.⁵³

Before discussing how the trade war is impacting 5G and AI, it is important to understand the concept of globalization. Globalization is international cooperation through advances in communication, technology and transportation.⁵⁴ After World War II (WWII), the United States took a major role in promoting globalization by reviving international trade and investment.⁵⁵ The idea was to encourage cooperation and peace among countries through free trade and rules established by international organizations, such as the North American Treaty Organization (NATO) and later by the World Trade Organization (WTO).⁵⁶ As a result of initiatives put forth by the former Chinese leader Deng Xiaoping in 1978, China began to open up to foreign investment and permit Chinese industries to privatize.⁵⁷ These new steps into globalization allowed China to develop a middle

53. Melina Kolb, *What Is Globalization?*, PETERSON INST. FOR INT'L ECON. (Feb 4, 2019), <https://piie.com/microsites/globalization/what-is-globalization.html> [<https://perma.cc/S5QG-W2PC>].

54. Brandon Levy, *The Role of Globalization in Economic Development*, SSRN 137 (Sept. 14, 2012), <https://ssrn.com/abstract=2233648> [<https://perma.cc/PE79-CS83>].

55. See HENRY KISSINGER, *WORLD ORDER* 276 (2014). Although the United States has historically taken the role of international peacekeeper, the current administration seems intent on pursuing a path of instigation and retaliation. See Anne Gearan & John Hudson, *Trump's Strong-Arm Foreign Policy Tactics Create Tensions with U.S. Friends and Foes*, WASH. POST (Jan. 19, 2020, 3:30 PM), https://www.washingtonpost.com/politics/trumps-strong-arm-foreign-policy-tactics-create-tensions-with-both-us-friends-and-foes/2020/01/18/ddb76364-3991-11ea-bb7b-265f4554af6d_story.html [<https://perma.cc/LV4B-6E2S>]; Ali Wyne, *What Role Will the United States Play in the World?*, WORLD ECON. F. (Apr. 26, 2018), <https://www.weforum.org/agenda/2018/04/what-role-the-united-states/> [<https://perma.cc/6AP7-KV9N>]. We are only now beginning to recognize the negative impact on the world order that the current administration has had, but many recognize the harm to international relations that the trade war has caused. The advances in the relationship between the two nations from Nixon through Obama have been obliterated by the current administration's trade war. See generally KISSINGER, *supra*, at 225–33 (explaining China's ideology and agreements with previous U.S. administrations).

56. Kolb, *supra* note 53.

57. Levy, *supra* note 54, at 140.

class with money to spend, making it a market to which U.S. companies could sell goods and services.⁵⁸

When the United States was still in a position of economic and technological prominence,⁵⁹ both countries embraced the rewards from their interdependence.⁶⁰ As China became more of an economic and security rival,⁶¹ however, the United States began to institute protectionist measures.⁶² China responded in kind and both sides began justifying their rivalry with accusations of various wrongdoings.⁶³ Although the countries initially celebrated their “deep integration” as increasing both “peace and

58. Nathan Gardels, *The U.S.-China Tech Battle Is Make-or-Break*, WASH. POST (Dec. 19, 2018, 8:47 AM), <https://www.washingtonpost.com/news/theworldpost/wp/2018/12/19/china-tech/?noredirect=on> [<https://perma.cc/3GKP-XPNV>].

59. Gordon Adams, *A New World Is Dawning, and the US Will No Longer Lead It*, CONVERSATION (June 26, 2018, 6:40 AM), <https://theconversation.com/a-new-world-is-dawning-and-the-us-will-no-longer-lead-it-98362> [<https://perma.cc/7NNN-PMZT>] (“Not only do China and Russia contest America’s global role, a growing number of other countries are asserting an independent and increasingly influential role in regional economic and security developments.”).

60. Anthea Roberts, Henrique Choer Moraes & Victor Ferguson, *Toward a Geoeconomic Order in International Trade and Investment*, 22 J. INT’L ECON. L. 655, 662 (2019).

61. WAYNE MORRISON, CONG. RESEARCH SERV., RL33534, CHINA’S ECONOMIC RISE: HISTORY, TRENDS, CHALLENGES, AND IMPLICATIONS FOR THE UNITED STATES 1 (2019), <https://fas.org/sgp/crs/row/RL33534.pdf> [<https://perma.cc/G6FQ-KUBQ>] (“From 1979 (when economic reforms began) to 2017, China’s real gross domestic product (GDP) grew at an average annual rate of nearly 10%. According to the World Bank, China has ‘experienced the fastest sustained expansion by a major economy in history—and has lifted more than 800 million people out of poverty.’” (quoting *China Overview*, WORLD BANK, <https://web.archive.org/web/20170327015624/http://www.worldbank.org/en/country/china/overview> [<https://perma.cc/M7HL-S4ZV>])); see also *China*, OBSERVATORY ECON. COMPLEXITY, <https://oec.world/en/profile/country/chn/> [<https://perma.cc/U4X2-W2S3>] (noting that China is the world’s largest export economy in the world with the top categories including broadcasting equipment, computers, office machine parts, integrated circuits, and telephones). However, there is disagreement as to the success of the Chinese AI movement. See sources cited *supra* note 15 and accompanying text.

62. See Stewart M. Patrick, *Trump Is Repeating the Mistakes of America’s Interwar Isolationists*, WORLD POL. REV. (Mar. 18, 2019), <https://www.worldpoliticsreview.com/articles/27658/trump-is-repeating-the-mistakes-of-america-s-interwar-isolationists> [<https://perma.cc/76UX-K3P4>].

63. See Roberts, Moraes & Ferguson, *supra* note 60, at 664. The United States has expressed concerns over a Chinese built 5G infrastructure that could give China access to sensitive data and the recent breakthroughs that China has made in AI that could “be used to power economic innovation and military advances.” *Id.* China has accused U.S.-originated semiconductors of containing “backdoors,” intentional vulnerabilities that can be exploited for intelligence and military purposes. JAMES A. LEWIS, CTR. FOR STRATEGIC & INT’L STUDIES, LEARNING THE SUPERIOR TECHNIQUES OF THE BARBARIANS: CHINA’S PURSUIT OF SEMICONDUCTOR INDEPENDENCE 1 (2019), https://csis-prod.s3.amazonaws.com/s3fs-public/publication/190115_Lewis_Semiconductor_v6.pdf?2RjrNO6aAFbzEhlUTZNMnxkAjeVuTGtl [<https://perma.cc/9ZQ7-UF9F>].

prosperity,” the current U.S. administration began blaming this relationship as the cause of its own internal economic woes.⁶⁴

China’s rise to technological prominence through an integrated strategy that has increased its economic power is now viewed as a threat by the current U.S. administration.⁶⁵ Although China has created and promoted a number of economic initiatives, the most relevant here are the Belt and Road Initiative, Made in China 2025, and the AI Development Plan.⁶⁶ In combination, these have made China a legitimate challenger to U.S. economic and technology supremacy. Rather than understanding and working within this new paradigm, the United States chose to detach from globalization and embrace protectionism.⁶⁷ This has resulted in the institution of a series of tariffs and trade barriers aimed at China, but negatively impacting U.S. trade with many of its partners.⁶⁸ Although many have called out the United States for its recent actions undermining the WTO, withdrawal from multilateral treaties, and instigation of a trade war with China,⁶⁹ little attention has been brought to how this might impact the developing field of artificial intelligence.

64. See, e.g., BENJAMIN SHOBERT, *BLAMING CHINA: IT MIGHT FEEL GOOD BUT IT WON’T FIX AMERICA’S ECONOMY* 77–106 (2018).

65. Carl Ciovacco, *Understanding the China Threat*, NAT’L INT. (Nov. 29, 2018), <https://nationalinterest.org/feature/understanding-china-threat-37502> [perma.cc/J7DA-ZFAE].

66. See *infra* Section IV.A.

67. See Patrick, *supra* note 62 (discussing the Trump Administration’s concerns with globalism and resurrection of isolationism).

68. Joseph Parilla & Max Bouchet, *Which US Communities Are Most Affected by Chinese, EU, and NAFTA Retaliatory Tariffs?*, BROOKINGS (Oct. 2018), <https://www.brookings.edu/research/which-us-communities-are-most-affected-by-chinese-eu-and-nafta-retaliatory-tariffs/> [https://perma.cc/TPB4-GA2K] (discussing retaliatory tariffs against the United States by China, the EU, Mexico, and Canada).

69. See, e.g., Rachel Brewster, *The Trump Administration and the Future of the WTO*, 44 YALE J. INT’L L. ONLINE 6, 6–7 (2018), https://cpb-us-w2.wpmucdn.com/campuspress.yale.edu/dist/8/1581/files/2019/02/2_Brewster_YJIL-Symposium_Future-of-the-WTO_12.04.18-Intzgagg.pdf [https://perma.cc/D5LM-UNG5] (“The Trump administration’s attacks on the WTO, in particular, represent a shock to the norms and understandings essential to the agreement, not just a strike against certain trading partners or discrete policies.”); see also Gregory Shaffer, *A Tragedy in the Making? The Decline of Law and the Return of Power in International Trade Relations*, 44 YALE J. INT’L L. ONLINE 37, 37 (2018), https://cpb-us-w2.wpmucdn.com/campuspress.yale.edu/dist/8/1581/files/2019/02/5_Shaffer_YJIL-Symposium_A-Tragedy-in-the-Making_12.07.18-23keh7s.pdf [https://perma.cc/T8EC-K7T6] (“The United States created the WTO and its dispute settlement system. Now the United States is undoing it. The result could be a long-term decline of multilateralism, coupled with a new—potentially more devastating—form of cold war conflict. This will undermine cooperation to address urgent transnational problems.”).

Although industry and academia in the United States and China have been working together for several decades in the pursuit of technological advancement in AI, those collaborations are now at risk.⁷⁰ The Microsoft Research Asia Lab (MSRA) was founded in Beijing in 1988 and has produced numerous advances in AI.⁷¹ IBM also has an AI research center in China,⁷² as does Google.⁷³ Fei-Fei Li, Google's chief scientist for AI and machine learning, stated at the center's opening: "I believe AI and its benefits have no borders. Whether a breakthrough occurs in Silicon Valley, Beijing or anywhere else, it has the potential to make everyone's life better for the entire world."⁷⁴ During her testimony before Congress, Helen Toner, Director of Strategy at Georgetown University's Center for Security and Emerging Technology, predicted that restricting China-U.S. collaboration would slow down research progress at U.S. universities and corporations, damage the United States' standing as a technology leader, and "reduce [its] market share in AI-enabled products and platforms."⁷⁵ As AI develops, "[g]lobal governance and international cooperation will be increasingly important to guide the safe and beneficial development of AI while

70. See, e.g., Stephen Chen, *Chinese, US Scientists Develop AI Technology to Help Detect Submarines in Uncharted Waters*, SOUTH CHINA MORNING POST (Aug. 31, 2019, 9:00 AM), <https://www.scmp.com/news/china/science/article/3025096/chinese-us-scientists-develop-ai-technology-help-detect> [<https://perma.cc/5MTR-VK2P>] (describing a joint collaboration of Chinese and American scientists that recently developed an AI system capable of detecting objects in uncharted waters, which could help in detecting crashed aircrafts, submarines, and whales).

71. Terri Coles, *Can Cross-Border Cooperation Between U.S., China Keep Artificial Intelligence Benefits Coming?*, ITPRO TODAY (Oct. 8, 2018), <https://www.itprotoday.com/artificial-intelligence/can-cross-border-cooperation-between-us-china-keep-artificial-intelligence> [<https://perma.cc/68P4-3NGF>].

72. *IBM Research – China: About Us*, IBM, <https://www.research.ibm.com/labs/china/> [<https://perma.cc/G88W-L9ZJ>].

73. Patrick Caughill, *Google Opened an AI Research Center in Beijing*, FUTURISM (Dec. 14, 2017), <https://futurism.com/google-opened-research-center-beijing> [<https://perma.cc/D2Q8-TEP8>]. Google has three AI research centers in China—"the Google AI China Center in Beijing . . . and partnerships with China's two premier educational institutions, Peking University and Tsinghua University." Gordon Chang, *America Can Stop China from Dominating Artificial Intelligence—And Should*, GATESTONE INST. INT'L POL'Y COUNCIL (Aug. 17, 2019, 5:00 AM), <https://www.gatestoneinstitute.org/14731/america-can-stop-china-from-dominating-artificial> [<https://perma.cc/Y9L9-HKEK>].

74. Caughill, *supra* note 73.

75. *U.S. Scientists, Policy Advisors Oppose Restrictions on Collaboration with China*, CHINA PLUS (June 8, 2019, 9:03 PM), <http://chinaplus.cri.cn/news/china/9/20190608/300220.html> [<https://perma.cc/Z7RX-CFRR>]. Other experts giving testimony in front of Congress indicated that American research has relied on foreign-born individuals and called for the end of intimidation of Chinese scientists in the United States. *Id.*

reducing race conditions and national and global security threats.”⁷⁶ The current move away from globalization will forestall advances in AI, which rely on 5G as well as the installation of the needed infrastructure itself.⁷⁷

IV. PROTECTIONISM AND REJECTIONISM

The Trump Administration is carrying out a new form of American rejectionism powered by four horsemen of economic instability: first, the rejection of the international rule of law; second, the rejection of open markets; third, the rejection of economic peace in favour of perpetual economic war; and fourth, the rejection of the global interest.⁷⁸

Trade protectionism is a national policy designed to “protect[] domestic industries from unfair competition from foreign ones.”⁷⁹ The term “rejectionism,” used by scholar Steve Charnovitz of George Washington University, reflects the actions of the current administration in rejecting open trade and the rule of international law.⁸⁰ It is a step well beyond traditional protectionism resulting in an apparent rejection of the concept of globalization itself. Recent actions by President Trump are not just an attack on the trade policies of China, but on its allies, enemies, and the

76. *AI Policy Challenges and Recommendations*, FUTURE OF LIFE INST., <https://futureoflife.org/ai-policy-challenges-and-recommendations/#Governance> [<https://perma.cc/9KSR-F43W>].

77. Although this article focuses on the trade war’s impact on the future of artificial intelligence and the United States’ position as a technological leader, some are concerned that it may also be a precursor to actual war. See, e.g., Daniel Drezner, *Will Today’s Global Trade Wars Lead to World War III?*, REASON (May 2019), <https://reason.com/2019/04/04/will-todays-global-trade-wars/> [<https://perma.cc/RSR2-WAZ2>]. When countries no longer rely economically upon one another, there is less of an incentive to keep the peace. *Id.*

78. Steve Charnovitz, *How American Rejectionism Undermines International Economic Law*, 10 TRADE L. & DEV. 226, 226 (2018).

79. Kimberly Amadeo, *Trade Protectionism Methods With Examples, Pros, and Cons*, BALANCE (Dec. 14, 2019), <https://www.thebalance.com/what-is-trade-protectionism-3305896> [<https://perma.cc/M395-EFDZ>]; see also Brewster, *supra* note 69, at 11 (explaining how the United States has created a “strategy of rejecting the WTO’s bindings as legitimate, attempting to undermine the WTO’s rule of law system, and embracing a return to unilateralism and power-based bargaining”).

80. Charnovitz, *supra* note 78, at 226.

international world order.⁸¹ After decades of international cooperation, the U.S. government has shifted to a new model of protectionism.⁸²

The WTO is the premier international trade regime creating international trade rules and arbitrating disputes with an extremely high level of compliance.⁸³ The founding premise of the WTO is “open trade for the benefit of all.”⁸⁴ As part of his new protectionist scheme, President Trump has repeatedly threatened to withdraw from this organization, which, among other things could have the effect of moving China into a more prominent leadership role within the organization.⁸⁵ Additionally, Trump has refused to fill the vacancies on the WTO Appellate Board, repudiated multilateral agreements, and instituted both improper unilateral trade sanctions on China and a series of tariffs on imports affecting many countries.⁸⁶ Ironically, these actions have put China in the role of “chief defender of an open global trading system, with some observers predicting that China is indeed headed towards replacing the dominant United States in global economic governance.”⁸⁷ There are a number of consequences resulting from this rejectionism, including the disruption of supply chains, decreased trade and foreign investment, state market fluctuations, and increased costs for consumers. However, most relevant here is the impact on technological goods, services, and intellectual property.⁸⁸ Trade barriers not only damage economic growth and international cooperation but serve to pit former allies against one another due to economic concerns as will be discussed herein.⁸⁹

81. See Chad P. Bown & Douglas A. Irwin, *Trump's Assault on the Global Trading System and why Decoupling from China Will Change Everything*, FOREIGN AFF. (Aug. 12, 2019, 12:00 AM), <https://www.foreignaffairs.com/articles/asia/2019-08-12/trumps-assault-global-trading-system> [<https://perma.cc/5FSQ-VCGS>].

82. See David A. Andelman, *Trump Is Taking Us Back to Depression-Era Trade Policy*, CNN BUSINESS (Sept. 1, 2019, 7:15 AM), <https://www.cnn.com/2019/08/30/perspectives/smoot-hawley-tariff-act-trump-trade/index.html> [<https://perma.cc/38UB-2WHT>].

83. Brewster, *supra* note 69, at 7, 9.

84. *What Is the WTO?*, WORLD TRADE ORG., https://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm [<https://perma.cc/VC5A-9HVC>].

85. Pedro Nicolaci da Costa & Cathleen Cimino-Isaacs, *Would a US Exit from the WTO Unravel Global Trade?*, WORLD ECON. F. (Aug. 4, 2016), <https://www.weforum.org/agenda/2016/08/would-a-us-exit-from-the-wto-unravel-global-trade/> [<https://perma.cc/VU9P-JXBC>] (“US withdrawal from the WTO would hand leadership of the world trading system to China.”).

86. Brewster, *supra* note 69, at 8–10.

87. Marcia Don Harpaz, *China and the WTO: On a Path to Leadership?*, in HANDBOOK ON THE INTERNATIONAL POLITICAL ECONOMY OF CHINA 260, 264 (Zeng Ka ed., 2018).

88. See Linda Yueh, *How a US-China Trade War Would Hurt Us All*, GUARDIAN (Apr. 5, 2018, 4:54 AM), <https://www.theguardian.com/commentisfree/2018/apr/05/us-china-trade-war-supply-chains-consumers> [<https://perma.cc/GV2H-7MPH>].

89. See Kolb, *supra* note 53.

The current move towards decoupling fails to account for the interdependency of these regions and is especially harmful to technological advances. The problem is that firms in every country rely on foreign technology and suppliers.⁹⁰ Much of the EU's 4G infrastructure relies on Chinese-made equipment with EU telecom providers having entered into long-term partnerships with these Chinese companies.⁹¹ Additionally, much of the rural United States is covered by 3G and 4G systems comprised of Chinese components from Huawei and ZTE.⁹² Consequently, the new U.S. restrictions on the importation of hardware and the export of technology will impair future development in the United States and abroad.⁹³ The trade war will slow down 5G installation worldwide as well as greatly increase costs in the United States and for any other country refusing to do business with China.⁹⁴ The following subparts outline China's economic rise and its strategic plan for becoming a leader in AI innovation by 2030, the United States' failure of policy for AI and 5G, its instigation of a trade war, and the resulting harms.

A. China

Chinese President Xi Jinping's signature project, the multi-trillion dollar "Belt and Road Initiative" (BRI) stretches across Asia, the Middle East, Africa, and Europe, and represents the largest infrastructure project in history. Constructing

90. See Koen de Backer & Norihiko Yamano, *International Comparative Evidence on Global Value Chains* 6 (Org. for Econ. Co-Operation & Dev., Sci., Tech. & Indus. Working Paper No. 2012/3, 2012), https://www.oecd-ilibrary.org/science-and-technology/international-comparative-evidence-on-global-value-chains_5k9bb2vcwv5j-en [<https://perma.cc/UMQ6-VQFH>].

91. See Leonid Bershidsky, *A Huawei Ban Makes Little Sense for Europe*, BLOOMBERG OPINION (Feb. 1, 2019, 4:50 AM), <https://www.bloomberg.com/opinion/articles/2019-02-01/huawei-telecom-equipment-ban-makes-little-sense-for-europe> [<https://perma.cc/CG4B-6226>].

92. Zen Soo, *Trump's Huawei Ban Will Hit Rural US Carriers the Hardest As Replacing Equipment Will Cost 'Millions'*, SOUTH CHINA MORNING POST (Mar. 4, 2019, 7:03 AM) ("About 25 per cent of Rural Wireless Association (RWA) members use telecoms equipment from prohibited Chinese companies named in the NDAA, the Washington DC-based trade association said in its comments to the FCC.").

93. See *infra* Section IV.C.1.

94. See Arjun Kharpal, *Here's How Trump's Latest Executive Order Could Affect Huawei*, CNBC (May 15, 2019, 10:26 PM), <https://www.cnbc.com/2019/05/16/huawei-us-5g-block-after-trump-executive-order.html> [<https://perma.cc/B2CM-6XAT>]. According to a Huawei company statement, "[r]estricting Huawei from doing business in the US will not make the US more secure or stronger; instead, this will only serve to limit the US to inferior yet more expensive alternatives, leaving the US lagging behind in 5G deployment." *Id.*

a comprehensive trade network for Chinese goods, BRI offers a platform for China's long-term strategic shift around advanced technologies. This includes electric vehicles (EV), telecommunications, robotics, artificial intelligence (AI), semiconductors, clean energy technology, advanced electrical equipment, rail infrastructure and maritime engineering.⁹⁵

After China began opening up its economy to foreign investment in 1978, cooperation grew between China and the United States.⁹⁶ When China joined the WTO in 2001, it began to cut tariffs and remove trade barriers, slowly opening up its market as well.⁹⁷ Over time, China became one of the main importers of U.S. goods and services.⁹⁸ In an effort to move away from manufacturing towards becoming a high-tech provider, China has created long-term strategic plans to meet its goal of becoming a world leader in AI.⁹⁹ China has demonstrated an understanding of how technology has shifted “the nature of power with emerging economies gaining a competitive advantage.”¹⁰⁰ Part of China's strategy to become an economic superpower is to leverage this geotechnical shift and move from being an emerging market to expanding into emerging markets.¹⁰¹ The following is a description of strategic plans instituted by China in this regard: the Belt and Road Initiative, Made in China 2025, and the Next Generation AI Development Plan.

1. Belt and Road Initiative

While the United States has been decreasing its role as a global leader in the promotion of free trade and globalization, China has sought to use this as an opportunity to increase its prominence in the world through its Belt and Road Initiative.¹⁰² The Belt and Road Initiative (BRI) was established in 2013 to expand China's economic power in the world by increasing

95. Daniel Araya, *China's Grand Strategy*, FORBES (Jan. 14, 2019, 11:28 AM), <https://www.forbes.com/sites/danielaraya/2019/01/14/chinas-grand-strategy/#197f92941f18> [<https://perma.cc/4QZH-W7E5>].

96. See MORRISON, *supra* note 61, at 1, 4. See generally KISSINGER, *supra* note 55, at 212–33 (explaining China's ideology and agreements with various U.S. administrations).

97. Kolb, *supra* note 53.

98. *The People's Republic of China*, OFF. U.S. TRADE REPRESENTATIVE, <https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china> [<https://perma.cc/F2J3-YWB8>].

99. See Waugh, *supra* note 15. However, there is disagreement as to the success of the Chinese AI movement. See, e.g., sources cited *supra* note 15 and accompanying text.

100. Araya, *supra* note 95.

101. *Id.*

102. See Joshua P. Meltzer, *China's One Belt One Road Initiative: A View from the United States*, BROOKINGS (June 19, 2017), <https://www.brookings.edu/research/chinas-one-belt-one-road-initiative-a-view-from-the-united-states/> [<https://perma.cc/DVM3-DVMV>].

exports and helping other countries build their infrastructure.¹⁰³ President Xi set aside \$113 billion for this project and has met with other countries to encourage them to join in this initiative.¹⁰⁴ China is seeking to be the primary supplier to over sixty countries in terms of infrastructure, including roads, bridges, pipelines, ports, railways, power plants, and the infrastructure for 5G telecommunications equipment.¹⁰⁵

China's BRI is an attempt to increase trade with specific partners in Europe, Asia, and Africa.¹⁰⁶ The Belt refers to the Silk Road Economic Belt and the Road refers to the Maritime Silk Road.¹⁰⁷ The BRI loosely tracks the known route of Marco Polo.¹⁰⁸ China has identified sixty-four target nations which, together with China, comprise "62% of the world's population and 30% of its economic output."¹⁰⁹ The multi-nation initiatives include pipelines, railways, but of particular relevance—telecoms.¹¹⁰ The Digital Silk Road will construct communications networks across Asia, Europe, and Africa.¹¹¹ China is planning on building "fiber optic cables, international trunk passageways, mobile structures and e-commerce links" in the countries connected to the BRI.¹¹² This is enormously attractive to developing nations lacking the money, technology, and current infrastructure to manage this

103. *How Will the Belt and Road Initiative Advance China's Interests?*, CHINAPOWER (May 8, 2017), <https://chinapower.csis.org/china-belt-and-road-initiative/> [https://perma.cc/CN3D-XDV4].

104. *See* Zheping Huang, *Your Guide to Understanding OBOR, China's New Silk Road Plan*, QUARTZ (May 15, 2017), <https://qz.com/983460/obor-an-extremely-simple-guide-to-understanding-chinas-one-belt-one-road-forum-for-its-new-silk-road/> [https://perma.cc/P79C-DUVQ].

105. *Id.*; *see also* Susan Crawford, *China Will Likely Corner the 5G Market—and the US Has No Plan*, WIRED (Feb. 20, 2019, 7:00 AM), <https://www.wired.com/story/china-will-likely-corner-5g-market-us-no-plan/> [https://perma.cc/FQV7-HQJJ].

106. *See* Huang, *supra* note 104.

107. *Id.*

108. GABRIEL WONG, SIMON BOOKER & GUILLAUME BARTHE-DEJEAN, PRICEWATER HOUSECOOPERS, CHINA AND BELT & ROAD INFRASTRUCTURE 5 (2017), <https://www.pwchk.com/en/consulting/br-watch-infrastructure.pdf> [https://perma.cc/CG53-AFZG].

109. Huang, *supra* note 104.

110. *See* WONG, BOOKER & BARTHE-DEJEAN, *supra* note 108, at 3.

111. *See* Andrew Kitson & Kenny Liew, *China Doubles Down on Its Digital Silk Road*, RECONNECTING ASIA (Nov. 14, 2019), <https://reconnectingasia.csis.org/analysis/entries/china-doubles-down-its-digital-silk-road/> [https://perma.cc/8LV5-GRUC].

112. Nyshka Chandran, *Surveillance Fears Cloud China's 'Digital Silk Road'*, CNBC (July 11, 2018, 10:13 PM), <https://www.cnbc.com/2018/07/11/risks-of-chinas-digital-silk-road-surveillance-coercion.html> [https://perma.cc/89MZ-UZEF].

on their own.¹¹³ It may also serve to prevent the United States from entering these markets due to Chinese exclusivity agreements.¹¹⁴

China began planning for 5G in 2013 with the creation of an advisory board to oversee the national strategy and rollout.¹¹⁵ In addition to being on track to provide investment and infrastructure for nearly 65% of the world's global population, through its BRI plan to place fiber-optic cables alongside trans-Eurasian rail lines, it is also on track to roll out 5G and fiber-optic connections reaching 80% of China's population.¹¹⁶ China's plan for 5G includes standardization of equipment, massive R&D investment in the development of new technology, support for industries that manufacture the infrastructure, and test beds for 5G innovations.¹¹⁷ Instead of creating its own standards for 5G, China officially ratified the interim 5G non-standalone standards set by 3GPP, a collaboration of telecom standards boards, in 2017.¹¹⁸ Additionally, China has chosen to rely primarily on the midrange band, 3 GHz to 6 GHz, for its 5G spectrum.¹¹⁹

2. Made in China 2025

In 2015, President Xi initiated the Made in China 2025 (MIC2025) strategic plan designed to increase China's competitiveness in high-tech industries and reduce their reliance on foreign technology.¹²⁰ While China was formerly viewed as a "copycat" manufacturer, its shift to high-tech

113. See *Belt and Road Initiative Explained: How China Is Looking Beyond Borders*, SOUTH CHINA MORNING POST (Apr. 26, 2019), <https://multimedia.scmp.com/news/china/article/3007692/belt-and-road/index.html> [<https://perma.cc/683T-2D5G>].

114. Crawford, *supra* note 105.

115. Josh Chin, *The Internet, Divided Between the U.S. and China, Has Become a Battleground*, WALL ST. J. (Feb. 9, 2019, 12:00 AM), <https://www.wsj.com/articles/the-internet-divided-between-the-u-s-and-china-has-become-a-battleground-11549688420> [<https://perma.cc/A5WD-XQ8T>].

116. Crawford, *supra* note 105.

117. ERNST & YOUNG, CHINA IS POISED TO WIN THE 5G RACE 4–8 (2018), [https://www.ey.com/Publication/vwLUAssets/ey-china-is-poised-to-win-the-5g-race-en/\\$FILE/ey-china-is-poised-to-win-the-5g-race-en.pdf](https://www.ey.com/Publication/vwLUAssets/ey-china-is-poised-to-win-the-5g-race-en/$FILE/ey-china-is-poised-to-win-the-5g-race-en.pdf) [<https://perma.cc/TS8Z-EYA2>].

118. *Id.* at 5.

119. *Id.* at 28–30. China will also utilize the higher spectrum to target hot spots but is willing to open up bands as needed. See *id.* at 9, 28–29. The United States, however, has opened up the higher spectrums for 5G, which require an enormously high density of cell stations and has so far failed to open up the desirable midrange bands for 5G. *Id.* at 16, 28, 30, 33.

120. See Alex Lockie, *Trump Said Xi Jinping Abandoned a Signature Economic Initiative Because He Told Him It Was Insulting*, BUS. INSIDER (June 10, 2019, 9:29 AM), <https://www.businessinsider.com/trump-xi-jinpings-made-in-china-2025-insult-and-cancelled-2019-6> [<https://perma.cc/6X75-DFZZ>]. China is transitioning from a manufacturing giant to a next-generation information technology leader. MORRISON, *supra* note 61, at 36.

products has been highly successful.¹²¹ In 2018, for example, Huawei filed for more patents with the World Intellectual Property Organization than any other company in the world.¹²² China's Alibaba Group and Tencent Holdings "lead the world in e-commerce, mobile payments, social media, and online gaming."¹²³ Part of the reason for these companies' success is the large local market due to the rising of the new middle class, the speed with which the Chinese adopt new technology, and the relatively closed trade borders which keep many foreign competitors out, as well as government subsidies to industry.¹²⁴ Chinese tech companies are also quickly expanding abroad into gaming, ride-sharing and R&D with investments in American, Indian, and Singaporean companies, as well as centers in San Mateo, California; Bellevue, Washington; Moscow; Tel Aviv; and Singapore.¹²⁵

As part of the MIC2025 goal of decreasing reliance on foreign-sourced chips, President Xi allocated \$150 billion in public and private funds to raise domestic chip production to 50% by 2020 and to be a legitimate world chip maker by 2030.¹²⁶ China relies on imports for 84% of its semiconductor

121. Clay Chandler, *Why China Is Emerging as a Tech Superpower to Rival the U.S.*, FORTUNE (Nov. 21, 2017, 3:30 AM), <https://fortune.com/2017/11/21/china-innovation-dji/> [<https://perma.cc/YQ4M-4P3C>].

122. See Tom Miles, *Huawei Leads Asian Domination of U.N. Patent Applications in 2018*, REUTERS (Mar. 18, 2019, 4:04 PM), <https://www.reuters.com/article/us-usa-china-ip/huawei-leads-asian-domination-of-u-n-patent-applications-in-2018-idUSKCN1QZ2PP> [<https://perma.cc/U5MT-LF4>].

123. Chandler, *supra* note 121. "China is now among the world's top three markets globally for venture capital in digital technologies including virtual reality, autonomous vehicles, 3D printing, drones, and artificial intelligence. And about a third of the world's 262 'unicorns' (startups valued at more than a billion dollars) hail from China, according to McKinsey & Co., and account for 43% of the global value of such companies." *Id.*

124. See *id.*; Kimberly Amadeo, *China's Economy and Its Effect on the U.S. Economy*, BALANCE (Dec. 20, 2019), <https://www.thebalance.com/china-economy-facts-effect-on-us-economy-3306345> [<https://perma.cc/ZZU5-DHEP>]; Adam Jourdan et al., *Factbox: Barrier to Entry – China's Restrictions on U.S. Imports*, REUTERS (Mar. 14, 2018, 12:38 AM), <https://www.reuters.com/article/us-usa-trump-china-factbox/factbox-barrier-to-entry-chinas-restrictions-on-u-s-imports-idUSKCN1GQ0PQ> [<https://perma.cc/R5DP-Y7H8>].

125. Chandler, *supra* note 121.

126. *Id.* China seems to be making headway in increasing local production of 5G chips. See James Kynge & Mercedes Ruehl, *China Accelerates 5G Chip Plans*, FIN. TIMES (Aug. 7, 2019), <https://www.ft.com/content/547560a8-b8f7-11e9-96bd-8e884d3ea203> [<https://perma.cc/FR23-EBXC>]. Initially two years behind Qualcomm in terms of production, it appears that Chinese Unisoc has shortened this gap to six months. *Id.*

needs.¹²⁷ Huawei, Xiaomi, and Alibaba Funding are developing custom chips with funding from MIC2025.¹²⁸ MIC2025 has been labeled as “unfair” by the current U.S. administration.¹²⁹

3. China's AI Development Plan

In 2017, China created its Next Generation AI Development Plan (AIDP) with the goal of becoming a world leader in AI technology by 2030.¹³⁰ The plan includes strategic investment, purchases of foreign companies with needed technological know-how, and billions in start-up funding.¹³¹ The existing Ministry of Science and Technology and new AI Plan Promotion Office are authorized to coordinate AI-related projects and make recommendations for government sponsorship.¹³² Additionally, 240 companies and governmental organizations have created an AI Alliance, which will “promote integration of AI resources.”¹³³ President Xi has suggested that the leader in AI will be at the forefront of global military and economic power.¹³⁴ Although the AIDP focuses on the commercialization of AI, it also highlights China's desire to be a leader in global governance of AI.¹³⁵ The plan also notes the need for agreed-upon international

127. Puja Tayal, *China Accelerates Its Semiconductor Self-Sufficiency Efforts*, MKT. REALIST (June 6, 2019), <https://marketrealist.com/2019/06/china-accelerates-its-semiconductor-self-sufficiency-efforts/> [<https://perma.cc/H9CD-N949>].

128. *See id.*

129. Jane Cai, *Why China's Subsidised State-Owned Enterprises Anger US, Europe – And Its Own Private Companies*, SOUTH CHINA MORNING POST (Feb. 21, 2019, 6:00 AM), <https://www.scmp.com/news/china/diplomacy/article/2184707/why-chinas-subsidised-state-owned-enterprises-anger-us-europe> [<https://perma.cc/A7ZW-5RFF>]. *See discussion infra* Section IV.B.1.

130. Graham Webster et al., *Full Translation: China's 'New Generation Artificial Intelligence Development Plan' (2017)*, NEW AM. (Aug. 1, 2017), <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/> [<https://perma.cc/GE9F-USQM>]. Note that translators differ on whether it is titled “New” or “Next.” *Id.*

131. *See id.*

132. *See AI Policy – China*, FUTURE LIFE INST., <https://futureoflife.org/ai-policy-china/> [<https://perma.cc/6ZNC-LTCH>].

133. Cheng Yu, *China Calls for AI Alliance*, CHINA DAILY (Oct. 13, 2017, 8:36 PM), http://www.chinadaily.com.cn/business/2017-10/13/content_33216440.htm [<https://perma.cc/7B5L-DNVW>].

134. Gregory C. Allen, *Understanding China's AI Strategy*, CTR. FOR NEW AM. SECURITY (Feb. 6, 2019), <https://www.cnas.org/publications/reports/understanding-chinas-ai-strategy#fn1> [<https://perma.cc/78WP-P8UL>].

135. *Id.*

standards and cooperation in setting rules for international security and potential military uses.¹³⁶

While China has already shown its ability to ramp up its technology industries, especially telecommunications networking equipment, it has become laser-focused on AI. Toutiao, for example, a start-up which uses AI to create curated news feeds, has raised over \$1 billion in investments.¹³⁷ Additionally, Baidu, Tencent and Alibaba were named China's "AI National Team" to spur development in eight AI product categories, including self-driving cars.¹³⁸ China is also focusing on building a comprehensive AI infrastructure, which is most likely the reason for its superiority in 5G technology.¹³⁹

China recognizes the enormous potential of AI and has been fostering it with a national strategy. It has made its AIDP a high priority for its government and private industry and has instituted multiple initiatives to further its goal of becoming a world leader in AI. The U.S. strategy is largely reactive. Instead of developing and funding a comprehensive plan for AI, the current administration has relied on private industry to move it forward, cut off needed suppliers of components, and made the recruitment of AI talent more difficult.¹⁴⁰

136. *Id.* (noting that although government and industry in China are concerned about the potential threat to national security that AI poses, they agree that militarization is inevitable).

137. Chandler, *supra* note 121. Toutiao's parent company, Bytedance, which owns TikTok, is valued at over \$78 billion. Yingzhi Yang & Brenda Goh, *China Orders ByteDance's Toutiao to Fix Search, Saying National Hero Smeared*, REUTERS (Nov. 11, 2019, 9:29 PM), <https://www.reuters.com/article/us-china-bytedance/china-orders-bytedances-toutiao-to-fix-search-saying-national-hero-smeared-idUSKBN1XM0G1> [<https://perma.cc/6HSJ-LZ8E>].

138. Sophie-Charlotte Fischer, *Artificial Intelligence: China's High-Tech Ambitions*, CTR. FOR SECURITY STUD. 2–3 (Feb. 2018), <https://ethz.ch/content/dam/ethz/special-interest/gess/cis/center-for-securities-studies/pdfs/CSSAnalyse220-EN.pdf> [<https://perma.cc/48XE-G9Q2>].

139. *See id.* at 3; *see also* CK Tan, *China Mobile and Huawei Switch on First Piece of 5G Network*, NIKKEI ASIAN REV. (June 29, 2019, 12:55 AM), <https://asia.nikkei.com/Spotlight/5G-networks/China-Mobile-and-Huawei-switch-on-first-piece-of-5G-network> [<https://perma.cc/22H8-4T4B>] (noting that China has been working on the installation of the 5G network since 2016 and will begin the commercial roll out in October 2019 with its 50,000 base stations).

140. *See infra* Section IV.B.

B. United States

[T]he Trump administration's trade policies give China a path to rewrite global trade rules. China is and will be increasingly important to the future of global trade because of its expanding market size, but the Trump administration's actions have weakened international institutions that would have provided a globally supported set of constraints to channel this increased power.¹⁴¹

In 2016 while President Obama was still in office, the U.S. government laid out a comprehensive AI strategy that included significant government investment in AI research and called for “collaboration among researchers to address the ethical, legal, and societal implications of AI.”¹⁴² The plan also addressed AI for social good, ensuring the security and trustworthiness of AI systems, developing high quality data sets, AI research centers, developing standards, and improving the AI workforce.¹⁴³ The official policy built on previous task force work during Obama's eight years in office.¹⁴⁴ Of particular significance is the understanding that government funding is crucial for the development and guidance of AI.¹⁴⁵ The strategy laid out in this report was never implemented by the Trump Administration.¹⁴⁶ In 2017, Treasury Secretary Steven Mnuchin opined that job loss due to AI was another 50 to 100 years out, drastically underestimating the state

141. Brewster, *supra* note 69, at 7.

142. Brian Higgins, *Obama, Trump, and the Regulation of Artificial Intelligence*, ARTIFICIAL INTELLIGENCE TECH. & L. (June 6, 2018), <http://aitechnologylaw.com/2018/06/obama-trump-regulation-of-artificial-intelligence/> [<https://perma.cc/9X9Z-8Z6Y>].

143. See generally COMM. ON TECH., NAT'L SCI. & TECH. COUNCIL, PREPARING FOR THE FUTURE OF ARTIFICIAL INTELLIGENCE (2016) [hereinafter COMM. ON TECH.] https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf [<https://perma.cc/2CLW-HQ7Q>].

144. See *id.* at 25–26. During the Obama Administration, there was significant attention to the future of AI. “In 2015, the U.S. Government's investment in unclassified R&D in AI-related technologies was approximately \$1.1 billion.” *Id.* at 25; NSTC REPORT ON AI, *supra* note 22, at 6.

Other R&D strategic plans and initiatives of relevance to this AI R&D Strategic Plan include the Federal Big Data Research and Development Strategic Plan, the Federal Cybersecurity Research and Development Strategic Plan, the National Privacy Research Strategy, the National Nanotechnology Initiative Strategic Plan, the National Strategic Computing Initiative, the Brain Research through Advancing Innovative Neurotechnologies Initiative, and the National Robotics Initiative. NSTC REPORT ON AI, *supra* note 22, at 6–7 (citations omitted).

145. See COMM. ON TECH., *supra* note 143, at 26 (“Recommendation 13: The Federal government should prioritize basic and long-term AI research. The Nation as a whole would benefit from a steady increase in Federal and private-sector AI R&D, with a particular emphasis on basic research and long-term, high-risk research initiatives. Because basic and long-term research especially are areas where the private sector is not likely to invest, Federal investments will be important for R&D in these areas.”).

146. See Shirin Ghaffary, *Trump's Executive Order on AI, Explained*, VOX (Feb. 13, 2019, 10:40 AM), <https://www.vox.com/2019/2/13/18222433/trump-executive-order-ai-explained> [<https://perma.cc/7Z4U-5WC5>].

of AI technology, at the same time China was allocating \$150 billion to the AI industry.¹⁴⁷ Although the White House issued the American AI Initiative in 2019, it provides no new funding and seems to ask federal agencies to reallocate their budget requests to include AI projects.¹⁴⁸ This lack of a true strategy to guide and fund the development of AI is further compounded by the trade war initiated by President Trump. In fact, some have suggested that it is the realization that the United States is falling behind China in AI that prompted the trade war.¹⁴⁹

1. Rationale for Trade War

A trade war occurs when one country imposes tariffs on another, ostensibly to protect local industry from unfair foreign trade practices, and in return the affected country retaliates with tariffs of their own. The initiation of the trade war by President Trump was spurred by his belief that the current trade deficit of \$419 billion with China, up from \$376 billion in 2017, is the result of “unfair trade practices” by China.¹⁵⁰ There are two problems with this assertion. First, this figure does not take into account global supply chains.¹⁵¹ Second, many economists agree that

147. Nicholas Thompson & Ian Bremmer, *The AI Cold War That Threatens Us All*, WIRED (Oct. 23, 2018, 6:00 AM), <https://www.wired.com/story/ai-cold-war-china-could-doom-us-all/> [https://perma.cc/2AD9-Y3M5].

148. See Exec. Order No. 13,859, 84 Fed. Reg. 3967, 3968 (Feb. 11, 2019). The 2020 budget requests by federal agencies include \$1 billion for AI research, but private industry has criticized this amount as being wholly insufficient. Sara Castellanos, *Executives Say \$1 Billion for AI Research Isn't Enough*, WALL ST. J. (Sept. 10, 2019), <https://www.wsj.com/articles/executives-say-1-billion-for-ai-research-isnt-enough-11568153863> [https://perma.cc/A59A-UHJW].

149. See Aidan Yao, *Trade War? No, the US and China Are Vying for Technological Supremacy, and the Markets Are Catching on*, SOUTH CHINA MORNING POST (June 6, 2019, 1:00 AM), <https://www.scmp.com/comment/opinion/article/3013064/trade-war-no-us-and-china-are-vying-technological-supremacy-and> [https://perma.cc/L3NA-KA8T]; cf. Michael Martina & Kevin Yao, *Amid Crises, Frayed U.S. Ties Give China's Xi Political Cover at Home*, REUTERS (Aug. 16, 2019, 2:24 AM), https://www.reuters.com/article/us-china-politics-xi-analysis/amid-crises-frayed-u-s-ties-give-chinas-xi-political-cover-at-home-idUSKCN1V60RX?utm_source=applenews [https://perma.cc/Q9AJ-TJ3D] (“[R]ight now in China, the rising consensus is that the U.S. is trying to contain China no matter what we do.”).

150. WAYNE M. MORRISON, CONG. RESEARCH SERV., IF10030, U.S.-CHINA TRADE ISSUES 1–2 (2019), <https://fas.org/srg/crs/row/IF10030.pdf> [https://perma.cc/R3W4-KWX3].

151. See Joel W. Schoen, *The Apple iPhone Shows that Trump Is Misreading Trade Deficits and What They Mean*, CNBC (June 19, 2018, 12:47 PM), <https://www.cnbc.com/2018/06/19/trump-is-wrong-on-tariffs-and-trade-just-look-at-his-iphone.html> [https://perma.cc/

a trade deficit is a function of “low domestic savings relative to its investment needs, rather than the result of foreign trade barriers.”¹⁵² With respect to trade deficits, George P. Shultz, former U.S. Secretary of Labor, Treasury and State, and Martin Feldman, Professor of Economics at Harvard, and former Chair of the U.S. Council on Economic Advisers, explains: “‘If a country consumes more than it produces, it must import more than it exports. That’s not a rip-off[;] that’s arithmetic.’ [T]he trade deficit cannot be ‘fixed’ by taking measures that close the deficit with one or a few countries.”¹⁵³

The U.S. administration has justified its unilateral actions citing: (1) intellectual property rights and cybertheft, (2) Chinese policies that protect Chinese businesses, (3) direct foreign investment by China in U.S. tech companies, and (4) cybersecurity.¹⁵⁴

a. Intellectual Property Rights and Cybertheft

Numerous officials in the Trump Administration have expressed concerns that China is involved in theft of intellectual property (IP) from U.S. companies.¹⁵⁵ The assertion is that China uses espionage and cyberattacks to obtain American IP, fails to enforce American IP rights in China, and engages in forced technology transfers.¹⁵⁶ Espionage and cybertheft accusations have long been asserted against China by the United States.¹⁵⁷

U93B-Q3EF]. In 2018, the United States imported \$236.4 billion of computers, electronics, and electrical equipment from China, which contain parts made elsewhere that are not factored into the \$419 billion figure. See Jeffry Bartash, *Why the U.S.-China Trade Deficit Is So Huge: Here’s All the Stuff America Imports*, MKT. WATCH (June 27, 2019, 11:10 AM), <https://www.marketwatch.com/story/heres-all-the-stuff-the-us-imports-from-china-thats-causing-a-huge-trade-deficit-2018-03-23> [https://perma.cc/W3FR-HUPY]. To use the example of an iPhone, of the \$1,000 price, \$370 represents the cost of making the phone, but only \$30–60 actually goes to China; the rest goes to the suppliers of the components, such as Samsung in South Korea, Toshiba in Japan, and SK Hynix in South Korea. Schoen, *supra*. However, the entire \$370 is allocated as a Chinese export to the United States; this artificially inflates the deficit with China. *Id.*

152. MORRISON, *supra* note 150, at 1.

153. Thomas J. Schoenbaum & Daniel C.K. Chow, *The Perils of Economic Nationalism and a Proposed Pathway to Trade Harmony*, 30 STAN. L. & POL’Y REV. 115, 121 (2019) (quoting George P. Shultz & Martin Feldstein, *Everything You Need to Know About Trade Economics, in 70 Words*, WASH. POST (May 5, 2017, 4:52 PM), https://www.washingtonpost.com/opinions/everything-you-need-to-know-about-trade-economics-in-70-words/2017/05/05/a2b76a02-2f80-11e7-9dec-764dc781686f_story.html?utm_term=.0f3ea6627bfb [https://perma.cc/5YRU-ME9N]).

154. MORRISON, *supra* note 150, at 1–2.

155. *Id.* at 1.

156. See *Cyber Espionage and the Theft of U.S. Intellectual Property and Technology: Hearing Before the Subcomm. on Oversight & Investigations of the Comm. on Energy & Commerce*, 113 Cong. 6–7 (2013) (statement of Hon. Tim Murphy).

157. See, e.g., Angela Mia Beam, *Piracy of American Intellectual Property in China*, 4 J. INT’L L. & PRAC. 335 (1995). In 2015, the United States and China agreed to proscribe

The evidence for the assertion that China engages in Forced Technology Transfers (FTT) appears to be a survey of 434 companies doing business in China where 21% indicated that they “felt pressure to transfer technology in exchange for market access.”¹⁵⁸ According to Peter Drysdale, a professor at the Australian National University:

All catching-up economies, including in the US, have acquired the technologies of more technologically advanced economies to engineer their industrial growth. Most of it is not stolen.

Most technology is purchased directly or through purchasing advanced machinery and equipment and it is learned. In the process, technology is adapted and it is also created. China is no different.¹⁵⁹

While acknowledging that there may be some actual instances of forced technology transfers, Sourabh Gupta, a senior policy specialist with the Institute for China-America Studies in Washington, indicated that if these allegations were true, an action could have been brought to the WTO, implying that China’s policies regarding technology transfers is in line with international commitments.¹⁶⁰ With respect to IP enforcement, a report by Santa Clara University School of Law indicates that foreign firms filing patent infringement cases in China actually won 70% of the time.¹⁶¹ The allegations of the U.S. government may be overstated. It should be noted that most AI programming languages created by U.S. tech companies are open source, meaning that companies anywhere in the world could build off of them.¹⁶² It is also possible that the Chinese market is so attractive

industrial espionage, which, according to cybersecurity companies, resulted in a steep decline in Chinese espionage and cyberattacks to obtain American IP in 2016; however, there is concern that it may be on the rise again due to the trade war. Adam Segal, *A New Old Threat: Countering the Return of Chinese Industrial Cyber Espionage*, COUNCIL ON FOREIGN REL. (Dec. 6, 2018), <https://www.cfr.org/report/threat-chinese-espionage> [<https://perma.cc/Y9JN-AT5E>].

158. Jane Cai & Keegan Elmer, *Is the US Right to Cry Foul About Forced Technology Transfer to Do Business in China – And What Is Beijing’s Position?*, SOUTH CHINA MORNING POST (Jan. 10, 2019, 11:32 PM), <https://www.scmp.com/news/china/diplomacy/article/2181528/us-right-cry-foul-about-forced-technology-transfer-do-business> [<https://perma.cc/B2ZU-LCPY>].

159. *Id.*

160. *Id.*

161. Brian Love, Christian Helmers & Markus Eberhardt, *Patent Litigation in China: Protecting Rights or the Local Economy?*, 18 VAND. J. ENT. & TECH. L. 713, 740 (2016).

162. See Kayla Matthews, *Why Nearly All Major Tech Companies Are Open-Sourcing Their AI Technology*, BORN2INVEST (Nov. 7, 2018), <https://born2invest.com/articles/major-tech-companies-open-sourcing-ai-technology/> [<https://perma.cc/PV6A-4SKK>].

to U.S. companies because of its size that technology transfers are considered the cost of doing business there.¹⁶³ Recently, China's Huawei indicated that the United States "had launched cyber-attacks to infiltrate its networks and was threatening its employees."¹⁶⁴ Cyberattacks and espionage are very difficult to prove, and as such these threats by both sides are impossible to verify.¹⁶⁵ Because of the difficulty in proving the source of a cyberattack or espionage, no one can really determine with the technology available today the extent of behind the scenes cybertheft between the United States and China.

b. Chinese Policies that Protect Chinese Businesses

As part of MIC2025, the Chinese government has provided funding, favorable loans, tax breaks, and other subsidies to industries such as "[n]ext generation IT; high-end numerical control machinery and robotics; aerospace and aviation equipment; maritime engineering equipment and high-tech maritime vessel manufacturing; advanced rail equipment; energy-saving vehicles and NEVs; electrical equipment; agricultural machinery and equipment; new materials; and biopharmaceuticals and high-performance medical devices."¹⁶⁶ President Trump has stated that the Chinese government's

163. These are complicated issues with no clear answer. For a full discussion, see Lee G. Branstetter, *China's Forced Technology Transfer Problem—And What to Do About It* (Peterson Inst. for Int'l Econ., Policy Brief No. PB 18-13, 2018), <https://www.piie.com/system/files/documents/pb18-13.pdf> [<https://perma.cc/A7DH-Q3JE>].

164. *Huawei Accuses US of Cyber-Attacks and Threats to Staff*, BBC NEWS (Sept. 4, 2019), <https://www.bbc.com/news/business-49574890> [<https://perma.cc/ZB5R-Z6K9>].

165. Both the United States and China deny accusations of espionage. See, e.g., Sam Bocetta, *Chinese State Sponsored Hacking*, REAL CLEAR DEFENSE (Nov. 23, 2017), https://www.realcleardefense.com/articles/2017/11/23/chinese_state_sponsored_hacking_112675.html [<https://perma.cc/T6FF-6JLD>]; Rogier Creemers, *Why the U.S.' Cyber Sanctions Against China Will Have Little Effect*, CHINA US FOCUS (Sept. 7, 2015), <https://www.chinausfocus.com/peace-security/why-the-u-s-cyber-sanctions-against-china-will-have-little-effect> [<https://perma.cc/MH66-2BHH>]; Philip Wen, *China Denies 'Slandorous' Economic Espionage Charges from U.S., Allies*, REUTERS (Dec. 20, 2018, 4:59 PM) <https://www.reuters.com/article/us-china-cyber-usa-ministry/china-denies-slandorous-economic-espionage-charges-from-u-s-allies-idUSKCN1OK03Y> [<https://perma.cc/C268-9W4V>]. The largest global cyberattack in history is believed to have originated from technology developed by the U.S. National Security Agency. Chris Graham, *NHS Cyber Attack: Everything You Need to Know About 'Biggest Ransomware' Offensive in History*, TELEGRAPH (May 20, 2017, 1:36 AM), <https://www.telegraph.co.uk/news/2017/05/13/nhs-cyber-attack-everything-need-know-biggest-ransomware-offensive/> [<https://perma.cc/LAU3-TKJ2>].

166. EUROPEAN CHAMBER OF COMMERCE IN CHINA, *CHINA MANUFACTURING 2025: PUTTING INDUSTRIAL POLICY AHEAD OF MARKET FORCES* 1 n.1, 16–20 (2017), http://docs.dpaq.de/12007-european_chamber_cm2025-en.pdf [<https://perma.cc/DFH2-H9JA>].

subsidies of various industries give them an unfair advantage.¹⁶⁷ Of course, the U.S. government also subsidizes industries such as oil, agriculture, and ethanol.¹⁶⁸ Although there is disagreement on the impact of Chinese subsidies to local firms and their impact on the United States, it does seem that it permits U.S. consumers the ability to purchase products at lower prices than available elsewhere.¹⁶⁹ In fact, according to a U.S.-China Business Council survey, even with China's tariffs, 78% of U.S. companies have indicated that importing from China was either cheaper or the same as importing from other countries, and 97% stated that their Chinese operations were profitable.¹⁷⁰ The real unstated but underlying concern is that China's subsidies will permit it to supplant the United States as the world's primary supplier of high-tech goods.¹⁷¹ Although the United States could have brought these complaints to the WTO, it instead chose to institute unilateral sanctions against China.¹⁷² In response China filed a complaint with the WTO.¹⁷³ On July 16, 2019, the WTO ruled that the U.S. sanctions on China with respect to subsidized goods were not compliant with WTO anti-subsidy rules.¹⁷⁴ Although the United States has tried to spin this as a win, the

167. See Keith Bradsher & Ana Swanson, *U.S.-China Trade Talks Stumble on Beijing's Spending at Home*, N.Y. TIMES (May 12, 2019), <https://www.nytimes.com/2019/05/12/business/china-trump-trade-subsidies.html> [<https://perma.cc/4BRP-7HTQ>].

168. Kimberly Amadeo, *Can Trump Bring Back American Jobs?*, BALANCE (June 25, 2019), <https://www.thebalance.com/trump-and-jobs-4114173> [<https://perma.cc/BW7C-E9RB>].

169. See Mark J. Perry, *China's Subsidies Are Unfair and Harm Americans, Right?*, AM. ENTERPRISE INST.: CARPE DIEM (Feb. 20, 2019), <http://www.aei.org/publication/chinas-subsidies-are-unfair-and-harm-americans-right/> [<https://perma.cc/J4BU-ZW7J>].

170. Kenneth Rapoza, *U.S. Companies: China Unfair, but We Don't Really Care*, FORBES (Aug. 30, 2019, 7:00 AM), <https://www.forbes.com/sites/kenrapoza/2019/08/30/us-companies-china-unfair-but-we-dont-really-care/#a2ed0654adf9> [<https://perma.cc/F493-8HU5>].

171. See Michael Martina & David Lawder, *Exclusive: China Offers To End Market-Distorting Subsidies but Won't Say how*, REUTERS (Feb. 14, 2019, 1:38 PM), <https://www.reuters.com/article/us-usa-trade-china-subsidies-exclusive/exclusive-china-offers-to-end-market-distorting-subsidies-but-wont-say-how-idUSKCN1Q32X6> [<https://perma.cc/KWD6-39L8>].

172. Zeeshan Aleem, *Why Trump's Plan To Ignore the World Trade Organization Isn't as Reckless as It Sounds*, VOX (Mar. 8, 2017, 8:20 AM), <https://www.vox.com/policy-and-politics/2017/3/8/14766228/trump-trade-wto> [<https://perma.cc/55UE-RP39>].

173. See Ana Swanson, *W.T.O. Allows China to Impose Trade Sanctions on U.S. Goods*, N.Y. TIMES (Nov. 1, 2019), <https://www.nytimes.com/2019/11/01/business/wto-china-us-trade.html> [<https://perma.cc/838H-BZZQ>].

174. See *id.*; Paul Wiseman, *Trump Administration Blasts WTO Ruling on China*, SEATTLE TIMES (July 16, 2019, 12:34 PM), <https://www.seattletimes.com/business/trump->

WTO does make clear that it considers the U.S. sanctions as violative of international law.¹⁷⁵

c. Direct Foreign Investment by China in U.S. Tech Companies

Foreign direct investment (FDI) is a common way for corporations to “acquire new products and technologies.”¹⁷⁶ The MIC2025 plan utilizes outbound FDI in companies located in the United States.¹⁷⁷ The Rhodium Group, a private advisory firm, estimates China’s investment in the United States at around \$140 billion and U.S. investment in China at \$256 billion.¹⁷⁸ It is not just China that acquires new technology through FDI; companies all over the world, including U.S. companies, acquire technology directly or indirectly through FDI.¹⁷⁹ In fact, the United States, not China, is the world’s largest foreign direct investor in the world.¹⁸⁰ However, concerns over Chinese investment in tech companies led to the enactment of the Foreign Investment Risk Review Modernization Act, which expands the types of investments by foreign entities in U.S. companies that the U.S. government must preapprove.¹⁸¹ According to the U.S. Department of Commerce, FDI into the United States has resulted in 7.4 million jobs in the United States with an average salary of

administration-blasts-wto-ruling-on-china/ [https://perma.cc/9R5T-2E68]. See generally Appellate Body Report, *United States—Countervailing Duty Measures on Certain Products from China*, WTO Doc. WT/DS437/AB/RW (adopted July 16, 2019).

175. Don Weiland, *WTO Rules Against US in Tariff Dispute with China*, FIN. TIMES (July 16, 2019), <https://www.ft.com/content/131a55ea-a84a-11e9-984c-fac8325aaa04> [https://perma.cc/BVT2-5MB5]. Rather than comply with the WTO ruling, the current U.S. administration threatened to apply additional sanctions. See *id.*

176. Justin Kuepper, *Foreign Direct Investment*, BALANCE (June 25, 2019), <https://www.thebalance.com/what-is-foreign-direct-investment-1979197> [https://perma.cc/9L6X-F5CU] (explaining both the benefits and risks of FDI).

177. See James McBride & Andrew Chatzky, *Is ‘Made in China 2025’ a Threat to Global Trade?*, COUNCIL ON FOREIGN REL.: BACKGROUNDER (May 13, 2019), <https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade> [https://perma.cc/9ZH6-D2A5] (“Chinese companies, both private and state-backed, have been encouraged to invest in foreign companies, notably semiconductor firms, to gain access to advanced technology. The value of Chinese acquisitions in the United States peaked in 2016 at over \$45 billion.”).

178. MORRISON, *supra* note 150, at 1–2.

179. See U.N. Conference on Trade and Development, *World Investment Report 2019: Special Economic Zones*, at 60–61, U.N. Doc. UNCTAD/WIR/2019 (June 12, 2019), https://unctad.org/en/PublicationsLibrary/wir2019_en.pdf [https://perma.cc/U8YR-ARWC].

180. Jonathan Masters & James McBride, *Foreign Investment and U.S. National Security*, COUNCIL ON FOREIGN REL.: BACKGROUNDER (Aug. 28, 2018), <https://www.cfr.org/backgrounder/foreign-investment-and-us-national-security> [https://perma.cc/C7UB-X8Y7].

181. See JAMES L. JACKSON & CATHLEEN D. CIMINO-ISAACS, CONG. RESEARCH SERV., IF10952, CFIUS REFORM: FOREIGN INVESTMENT NATIONAL SECURITY REVIEWS 1 (2020), <https://fas.org/sgp/crs/natsec/IF10952.pdf> [https://perma.cc/KX6X-T2R9]; *infra* Section IV.B.2.c.

\$81,000 from foreign-owned firms.¹⁸² Additionally, the prevention of FDI by China in Silicon Valley will harm AI start-ups who rely on this money.¹⁸³

d. Cybersecurity

Because China is a major supplier of 5G hardware, concerns have been expressed about the ability of the Chinese government to conduct surveillance or potentially interrupt communications as a wartime strategy.¹⁸⁴ In fact, both the United States and China fear espionage from the other,¹⁸⁵ ignoring the fact that espionage is already occurring¹⁸⁶ and parts made in the United States already are embedded in Chinese tech while Chinese parts are already embedded in U.S. tech.¹⁸⁷ The accusations against China's surveillance state ignore widespread U.S. surveillance of both citizens at home and foreign actors abroad.¹⁸⁸ In 2018, the U.S.'s National Security Agency targeted 164,770 foreign citizens with warrantless surveillance—permitted under

182. *Benefits of Foreign Direct Investment (FDI)*, SELECTUSA, <https://www.selectusa.gov/FDI-Benefits> [<https://perma.cc/PYX2-9A3J>].

183. See Elizabeth Dwoskin, *China Is Flooding Silicon Valley with Cash. Here's What Can Go Wrong*, WASH. POST (Aug. 6, 2016), https://www.washingtonpost.com/business/economy/new-wave-of-chinese-start-up-investments-comes-with-complications/2016/08/05/2051db0e-505d-11e6-aa14-e0c1087f7583_story.html [<https://perma.cc/SW5H-R4VZ>].

184. See David E. Sanger, *Trump Wants to Wall Off Huawei, but the Digital World Briddles at Barriers*, N.Y. TIMES (May 27, 2019), <https://www.nytimes.com/2019/05/27/us/politics/us-huawei-berlin-wall.html> [<https://perma.cc/4MLL-RZ24>].

185. Gardels, *supra* note 58.

186. See Ryan Duffy, *Fighting Chinese Cyber-Espionage Could Cost U.S. 5G Dominance*, CYBERSCOOP (July 30, 2018), <https://www.cyberscoop.com/5g-network-huawei-zte-us-telecom/> [<https://perma.cc/YP89-Q67P>]. “‘You might argue that the United States wrote the book on using a commercial presence in the internet backbone in other countries for espionage, but China will write the 5G chapter,’ said” “Will Carter, deputy director of the technology policy program at the Center for Strategic and International Studies (CSIS), a D.C. think tank.” *Id.*

187. See Chris Mills Rodrigo, *China Orders Government Offices to Remove Foreign Hardware and Software*, HILL (Dec. 9, 2019, 12:03 PM), <https://thehill.com/policy/technology/473673-china-orders-government-offices-to-remove-foreign-hardware-and-software> [<https://perma.cc/V88Z-ZDKE>]; Kate Fazzini, *Chinese Spy Chips Are Found in Hardware Used by Apple, Amazon, Bloomberg Says; Apple, AWS Say No Way*, CNBC (Oct. 4, 2018, 6:15 AM), <https://www.cnbc.com/2018/10/04/chinese-spy-chips-are-said-to-be-found-in-hardware-used-by-apple-amazon-apple-denies-the-bloomberg-businessweek-report.html> [<https://perma.cc/R6DC-AHBX>].

188. See *NSA Surveillance*, ACLU, <https://www.aclu.org/issues/national-security/privacy-and-surveillance/nsa-surveillance> [<https://perma.cc/T6FT-PJWA>].

Section 702 of the Foreign Intelligence Surveillance Act.¹⁸⁹ At a recent cybersecurity conference, Senator Ron Wyden indicated that U.S. telecommunications companies were, in fact, helping the U.S. government to spy on its own citizens.¹⁹⁰ Additionally, all aspects of telecommunication networks contain security risks.¹⁹¹ While 5G creates new ones,¹⁹² security measures are being developed to address these.¹⁹³ Regardless of the equipment provider, any network is subject to hacking.¹⁹⁴

While the legitimacy to the complaints made by the United States can be debated,¹⁹⁵ what is a fact is that the current administration has chosen

189. See Charlie Osborne, *NSA Surveillance of Foreign Nationals Surges*, ZDNET (May 1, 2019, 5:01 AM), <https://www.zdnet.com/article/nsa-surveillance-of-foreign-nationals-surges/> [https://perma.cc/F43A-8ZGJ]. On August 15, 2019, President Trump asked Congress to permanently authorize the NSA mass surveillance program exposed by Edward Snowden in 2013. See Jake Johnson, *Alarm as Trump Requests Permanent Reauthorization of NSA Mass Spying Program Exposed by Snowden*, COMMON DREAMS (Aug. 16, 2019), <https://www.commondreams.org/news/2019/08/16/alarm-trump-requests-permanent-reauthorization-nsa-mass-spying-program-exposed> [https://perma.cc/NEZ3-GY3S].

190. Paul Wagenseil, *US Senator Says Wireless Carriers Helping Trump Build 'Surveillance State'*, TOM'S GUIDE (Aug. 12, 2019), <https://www.tomsguide.com/news/us-senator-says-wireless-carriers-helping-trump-build-surveillance-state> [https://perma.cc/88VK-PSEA].

191. See, e.g., Catalin Cimpanu, *Researchers Find Security Flaws in 40 Kernel Drivers from 20 Vendors*, ZDNET (Aug. 10, 2019, 10:45 PM), <https://www.zdnet.com/article/researchers-find-security-flaws-in-40-kernel-drivers-from-20-vendors/> [https://perma.cc/53TZ-X57Z]. Security flaws can be found in hardware regardless of where it originated. See *id.* For example, at a cybersecurity conference in August 2019, design flaws were found in commonly used software made by a number of companies, including U.S. companies such as Intel, AMD, and Nvidia, in addition to Huawei. *Id.* When the security flaws were revealed, Intel and Huawei immediately issued updates. *Id.*

192. CYBERSECURITY & INFRASTRUCTURE SEC. AGENCY, DEP'T OF HOMELAND SEC., OVERVIEW OF RISKS INTRODUCED BY 5G ADOPTION IN THE UNITED STATES 1 (2019), https://www.cisa.gov/sites/default/files/publications/19_0731_cisa_5th-generation-mobile-networks-overview_0.pdf [https://perma.cc/BRW7-X6ZJ].

193. See, e.g., SERDAR VURAL ET AL., DCMS PHASE 1 5G TESTBEDS & TRIALS PROGRAMME, 5G NETWORK ARCHITECTURE AND SECURITY 2 (2018), https://uk5g.org/media/uploads/resource_files/5G_Architecture_and_Security_technical_report_-_04Dec18.pdf [https://perma.cc/64BB-HÜLJ].

194. See Eric Johnson, *Every Telecom Company Can Be Hacked and "Everybody Should Be Suspect," Huawei USA's Chief Security Officer Says*, VOX (Aug. 27, 2019, 3:10 PM), <https://www.vox.com/recode/2019/8/27/20835463/huawei-andy-purdy-security-cso-cybersecurity-trump-trade-china-kara-swisher-recode-decode-podcast> [https://perma.cc/2ELD-QZ5L] ("Back when Edward Snowden released information about the Prism program that was allowing the US government to spy all over the world, there was a situation where the US government was using Cisco equipment to spy elsewhere in the world,' Purdy said. 'There was a question, well, did Cisco let them or did the US government hack into Cisco products? It doesn't matter.'").

195. For a detailed discussion on the legitimacy of the U.S. complaints against China, see Steve Charnovitz, *Grading Trump's China Trade Strategy* 3 (George Washington Univ. Law Sch. Pub. Law Research, Paper No. 2019-26, 2019), <https://ssrn.com/abstract=3393083> [https://perma.cc/HLG8-N3TU].

to bypass the normal route of addressing trade disputes through the WTO.¹⁹⁶ By unilaterally taking action against China and disregarding international trade norms, the United States has backed itself into a corner and is losing the respect of the rest of the world.¹⁹⁷ The following are a brief summary of the various actions the U.S. government has taken against China and China's responses.

2. Trade War Instigation

a. Tariffs

In 2017 at President Trump's urging, the United State Trade Representative began an investigation into China's trade practices under Section 301 of the Trade Act of 1974.¹⁹⁸ On March 22, 2018, President Trump released a memo alleging that China had violated Section 301 with forced technology transfers, theft of U.S. intellectual property, discriminatory practices, and foreign direct investment, which justified the imposition of a 25% tariff on approximately \$50 billion of Chinese imports.¹⁹⁹ The United States then imposed four additional rounds of tariffs in 2018 and 2019 on approximately \$360 billion of Chinese goods.²⁰⁰ China responded

196. See Brewster, *supra* note 69, at 6.

197. See John Gramlich & Kat Devlin, *More People Around the World See U.S. Power and Influence as a 'Major Threat' to Their Country*, PEW RESEARCH CTR.: FACT TANK (Feb. 14, 2019), <https://www.pewresearch.org/fact-tank/2019/02/14/more-people-around-the-world-see-u-s-power-and-influence-as-a-major-threat-to-their-country/> [<https://perma.cc/2V46-T8NS>]. Between 2013 and 2018, the world's confidence in the U.S. President fell from 70% to 28%. *Id.* Additionally, while the United States keeps raising tariffs, the rest of the world is reducing them, forming new free trade partnerships, with China reducing tariffs to other countries. Veronique De Rugy, *Trump Is Losing His Own Trade War*, REASON (July 4, 2019, 12:01 AM), <https://reason.com/2019/07/04/trump-is-losing-his-own-trade-war/> [<https://perma.cc/RT4H-2BP4>].

198. KAREN M. SUTTER, CONG. RESEARCH SERV., IF11284, U.S.-CHINA TRADE AND ECONOMIC RELATIONS: OVERVIEW 1 (2019), <https://fas.org/sgp/crs/row/IF11284.pdf> [<https://perma.cc/LTU7-YA79>].

199. Actions by the United States Related to the Section 301 Investigation of China's Laws, Policies, Practices, or Actions Related to Technology Transfer, Intellectual Property, and Innovation, 83 Fed. Reg. 13,099, 13,099 (Mar. 22, 2018); Jacob Pramuk, *Trump to Slap 25% Tariffs on Up to \$50 Billion of Chinese Goods; China Retaliates*, CNBC (June 15, 2018, 8:05 AM), <https://www.cnbc.com/2018/06/15/trump-administration-to-slap-a-25-percent-tariff-on-50-billion-of-chinese-goods-threatens-more.html> [<https://perma.cc/NP3H-XKFZ>].

200. *A Quick Guide to the US-China Trade War*, BBC NEWS (Dec. 16, 2019), <https://www.bbc.com/news/business-45899310> [<https://perma.cc/NV2R-M7LF>].

with tariffs on \$110 billion of American goods.²⁰¹ The tit for tat continued with China responding in kind to each round of tariffs set by the United States.²⁰² China also initiated WTO action against the United States on August 14, 2018, alleging violations of WTO Agreements,²⁰³ a second action on August 23, 2018 after trade talks stalled yet again regarding the United States' new round of Section 301 tariffs,²⁰⁴ and a third one on September 1, 2019 regarding the set of tariffs that became effective that day.²⁰⁵ Interestingly, the United States responded to all three of these actions by stating that they were exempt from WTO rules because the tariffs were "necessary to protect public morals," which is typically asserted with respect to trade restrictions on gambling and animal rights.²⁰⁶

President Trump decided not to meet with President Xi in February 2019,²⁰⁷ although representatives of the countries continued to meet from February 2019 through July 2019.²⁰⁸ Despite announcing progress at the July 30–31, 2019 trade negotiation talks between Trump and Xi, on August 1, 2019, Trump moved forward with the final round of tariffs that would affect virtually all Chinese goods.²⁰⁹ After China threatened to take

201. *Id.*

202. *See id.*

203. Joe McDonald, *China Files WTO Challenge to US Tariffs on Solar Panels*, AP News (Aug. 14, 2018), <https://apnews.com/385dfd35eb3f41068a73a81a2ad2219a/China-files-WTO-challenge-to-US-tariffs-on-solar-panels> [https://perma.cc/GB3Z-SC26].

204. Chad P. Bown & Melina Kolb, *Trump's Trade War Timeline: An Up-to-Date Guide*, PETERSON INST. FOR INT'L ECON. (Dec. 13, 2019, 12:00 PM), <https://www.piie.com/blogs/trade-investment-policy-watch/trump-trade-war-china-date-guide> [https://perma.cc/3AUF-XH76].

205. Meg Shen & Tom Miles, *China Lodges Tariff Case at WTO Against the U.S.*, REUTERS (Sept. 2, 2019, 6:14 AM), <https://www.reuters.com/article/us-usa-trade-china-wto/china-lodges-tariff-case-at-wto-against-the-u-s-idUSKCN1VN1CM> [https://perma.cc/3B7X-GZCW].

206. *Id.*

207. Alan Rappeport, *Trump Will Not Meet President Xi Jinping of China Before Trade Deal Deadline*, N.Y. TIMES (Feb. 7, 2019), <https://www.nytimes.com/2019/02/07/us/politics/trump-xi-jinping-china-trade.html> [https://perma.cc/3U2A-FF9K]. Trump and Xi did eventually meet on June 29, 2019 at the G-20 summit in Osaka, Japan. Ryan Hass, *What the US and China Each Got Out of the Trump-Xi Meeting in Japan*, BROOKINGS: ORDER FROM CHAOS (July 1, 2019), <https://www.brookings.edu/blog/order-from-chaos/2019/07/01/what-the-us-and-china-each-got-out-of-the-trump-xi-meeting-in-japan/> [https://perma.cc/2YDB-YG3L].

208. *See* Dorcus Wong & Alexander Chipman Koty, *The US-China Trade War: A Timeline*, CHINA BRIEFING (May 13, 2020), <https://www.china-briefing.com/news/the-us-china-trade-war-a-timeline/> [https://perma.cc/K368-JYCG].

209. *See* Yun Li, *Trump Says US Will Impose 10% Tariffs on Another \$300 Billion of Chinese Goods Starting Sept. 1*, CNBC (Aug. 1, 2019, 1:29 PM), <https://www.cnbc.com/2019/08/01/trump-says-us-will-impose-10percent-tariffs-on-300-billion-of-chinese-goods-starting-september-1.html> [https://perma.cc/X627-P2YS]. On August 5, 2019, the United States also initiated an action with the International Monetary Fund against China

“necessary countermeasures” if President Trump enacted the proposed tariffs on September 1, 2019, Trump agreed to delay some of them until mid-December 2019.²¹⁰ President Trump has repeatedly stated that he believes tariffs will reduce the deficit²¹¹ and create jobs.²¹²

b. Executive Orders

On May 15, 2019, Trump issued an emergency executive order effectively banning U.S. companies from using Chinese telecom equipment.²¹³ The

claiming that it is a currency manipulator. See Press Release, U.S. Dep’t of the Treasury, Treasury Designates China as a Currency Manipulator (Aug. 5, 2019), <https://home.treasury.gov/news/press-releases/sm751> [<https://perma.cc/KT6G-FV68>].

210. Taylor Telford & Thomas Heath, *China Promises ‘Countermeasures’ in Trade War, Unmoved by U.S. Tariff Delay*, WASH. POST (Aug. 15, 2019, 3:27 PM), <https://www.washingtonpost.com/business/2019/08/15/china-promises-countermeasures-trade-war-unmoved-by-us-tariff-delay/> [<https://perma.cc/7RGB-88NG>]. The United States has also refused to appoint new judges to the WTO Appellate Body leaving it unable to resolve disputes under the WTO’s General Agreement on Tariffs and Trade (GATT). Charnovitz, *supra* note 195, at 3. For a detailed account of all actions taken by the U.S. administration against China as a part of this trade war, see Schoenbaum & Chow, *supra* note 153, at 129–42.

211. See, e.g., Ana Swanson, *Trump Vowed to Shrink the Trade Gap. It Keeps Growing*, N.Y. TIMES (Nov. 5, 2019), <https://www.nytimes.com/2019/11/05/us/politics/us-trade-deficit.html> [<https://perma.cc/C8QN-GAPR>]. Contrary to his assertion, the trade war has actually increased the deficit because of reduced exports to China. Katia Dmitrieva, *U.S. Trade Gap Surged to \$621 Billion in 2018, 10-Year High*, BLOOMBERG (Mar. 6, 2019, 5:30 AM), <https://www.bloomberg.com/news/articles/2019-03-06/u-s-trade-gap-surged-to-621-billion-in-2018-highest-in-decade> [<https://perma.cc/3QSH-F3JV>]; see also Frank Tang, *US-China Trade War Will Not Reduce Trade Deficit, IMF Finds, in Rebuke of Donald Trump’s Tariff Policies*, SOUTH CHINA MORNING POST (Apr. 3, 2019, 10:15 PM), <https://www.scmp.com/economy/china-economy/article/3004532/us-china-trade-war-will-not-reduce-trade-deficit-imf-finds> [<https://perma.cc/3A6R-7TPD>] (discussing the IMF’s report indicating that tariffs will not reduce a country’s trade deficit).

212. Amadeo, *supra* note 168. Unfortunately, U.S. companies that are being forced out of China by U.S. tariffs are not relocating to the United States, but rather are expending funds to build new plants in other areas of the world where labor costs are low, such as Taiwan and Thailand. Debby Wu, *Trump Trade War Is Splitting Tech Manufacturers Along U.S.-China Lines*, L.A. TIMES (Aug. 15, 2019, 3:33 PM), <https://www.latimes.com/business/technology/story/2019-08-15/trump-trade-war-has-tech-manufacturers-splitting-along-us-china-lines> [<https://perma.cc/23KK-FRCQ>].

213. See Tamer A. Soliman, *U.S. Commerce Department Proposes Sweeping New Rules for National Security Review of US Information and Communications Technology or Services Transactions*, MAYER BROWN (Dec. 2, 2019), <https://www.mayerbrown.com/en/perspectives-events/publications/2019/12/us-department-of-commerce-proposes-rule-for-securing-the-nations-information-and-communications-technology-and-services-supply->

order may act as a de facto ban on the trade of communications technology between the United States and China.²¹⁴ On May 16, 2019, the U.S. Department of Commerce placed Huawei on its banned “entity list.”²¹⁵ This action poses a serious threat to the U.S. economy as Huawei bought over \$11 billion in equipment and services from U.S. companies last year alone.²¹⁶ The stated reasons for its placement on the entity list is that the use of Chinese equipment could result in China spying on the United States and that by allowing U.S. companies to sell components to China, they are effectively transferring U.S.-made technology to the Chinese government.²¹⁷ Among other harms, this order will damage small and rural U.S. wireless carriers as they rely on Chinese equipment due to its favorable price point.²¹⁸ The order requires the Secretary of Commerce to establish guidelines for implementation, but it is uncertain if the federal government will provide adequate assistance to these small and rural carriers to replace their equipment.²¹⁹

China responded by issuing a white paper on June 2, 2019, denouncing the “unilateral and protectionist measures” and the United States’ failure to honor agreements made during the trade discussions.²²⁰ In what appears

chain [<https://perma.cc/E5SD-N4UW>] (discussing the effect of the U.S. Department of Commerce’s proposed rule in response to Trump’s executive order).

214. See Fung, *supra* note 20.

215. Wong & Koty, *supra* note 208. In anticipation of the executive order, Huawei has been stockpiling needed components and working on developing its own operation system if it is no longer able to purchase components from Microsoft and Google. Naushad K. Cherrayil, *Trump’s Huawei Ban a ‘Double-Edged Sword’*, TECHRADAR (May 20, 2019), <https://www.techradar.com/news/trumps-huawei-ban-a-double-edged-sword> [<https://perma.cc/377R-K9SY>].

216. Louise Lucas, James Kynge & Sue-Lin Wong, *Huawei Warns Ban Set to Hurt 1,200 US Suppliers*, FIN. TIMES (May 29, 2019), <https://www.ft.com/content/84603f22-81d9-11e9-9935-ad75bb96c849> [<https://perma.cc/S3FA-XJX4>].

217. See Fung, *supra* note 20.

218. See *id.* “The Rural Wireless Association, a trade group that represents 55 small carriers, estimates that it would cost its members \$800 million to \$1 billion to replace equipment from Huawei and ZTE, China’s other maker of networking gear.” Cecilia Kang, *Huawei Ban Threatens Wireless Service in Rural Areas*, N.Y. TIMES (May 25, 2019), <https://www.nytimes.com/2019/05/25/technology/huawei-rural-wireless-service.html> [<https://perma.cc/VL48-NJ79>]. A number of these rural telecoms chose Huawei because of their ability to customize their equipment and “charge 20 to 30 percent less than competitors.” *Id.* This presents the additional harm of allowing the larger carriers—who do not rely on Huawei—to further increase their market share to the disadvantage of these small carriers and consumers. *Id.*

219. See Exec. Order No. 13,873, 84 Fed. Reg. 22,689 (May 15, 2019) (noting nothing about whether the government will provide assistance to small carriers); see also Fung, *supra* note 20; *infra* Section IV.C.1 (describing the trade wars’ harms to rural communities and small carriers).

220. *China Publishes White Paper on Trade Consultations, Revealing US Backtracking*, XINHUANET (June 2, 2019, 6:01 PM), http://www.xinhuanet.com/english/2019-06/02/c_

to be a response to U.S. tech companies explaining to Trump the damage the ban is having on their companies and the economy as a whole, Trump agreed to exempt 110 products from tariffs for one year.²²¹ Additionally, the Secretary of Commerce indicated that licenses would be issued to companies selling to Huawei where there was no security threat.²²²

c. Regulations

In addition to the tariffs and executive order, the new 2018 Foreign Investment Risk Review Modernization Act (FIRRMA)²²³ has vastly restricted Chinese investment in U.S. AI companies. Although the Act does not call out China specifically, it addresses concerns raised by the administration regarding foreign direct investment in U.S. tech companies and updates the 2007 law.²²⁴ Scholars have commented that rather than protecting U.S. interests, the FIRRMA may actually harm the development of AI in the United States by decreasing funding available for such projects and causing AI research centers to relocate outside of the United States.²²⁵ The Chinese have strategically pursued investment in tech companies to gain access to advanced AI technology.²²⁶ This provides advantages to both the United States and China.²²⁷ These U.S. companies receive start-up capital and China receives access to new technologies that are not yet available

138111006.htm [https://perma.cc/UZ7W-PGGQ]. To find China's position on the China-US Economic and Trade Consultations, see STATE COUNCIL INFO. OFFICE, PEOPLE'S REPUBLIC OF CHINA, CHINA'S POSITION ON THE CHINA-US ECONOMIC AND TRADE CONSULTATIONS (2019), http://www.xinhuanet.com/english/2019-06/02/c_138110404.htm [https://perma.cc/3FF5-JT5Z].

221. Wong & Koty, *supra* note 208.

222. *Id.*

223. Foreign Investment Risk Review Modernization Act of 2018, Pub. L. No. 115-232, §§ 1701–28, 132 Stat. 2174 (2018).

224. JACKSON & CIMINO-ISAACS, *supra* note 181, at 1.

225. Justin Shields, *Smart Machines and Smarter Policy: Foreign Investment Regulation, National Security, and Technology Transfer in the Age of Artificial Intelligence*, 51 J. MARSHALL L. REV. 279, 299–300 (2018). As a result of new U.S. restrictions, China may choose to focus on partnerships and investments with European entities. *Id.* at 300.

226. See *id.* at 286 (noting that Chinese tech giants, such as Tencent and Baidu, as well as Chinese venture capitalist firms, have heavily invested in Silicon Valley).

227. China invested \$3 billion in Silicon Valley start-ups in 2018 before FIRRMA went into effect; that money has now dried up. See Heather Somerville, *Chinese Tech Investors Flee Silicon Valley as Trump Tightens Scrutiny*, REUTERS (Jan. 6, 2019, 10:04 PM), <https://www.reuters.com/article/us-venture-china-regulation-insight/chinese-tech-investors-flee-silicon-valley-as-trump-tightens-scrutiny-idUSKCN1P10CB> [https://perma.cc/V735-CQHE].

in their country.²²⁸ In addition to slowing down start-up funding for AI in the United States, another concern is that because the U.S. government does not invest in the development of these technologies, it is primarily left to private industry.²²⁹ As a result, the Department of Defense obtains its technology from the private sector as opposed to developing needed technology itself.²³⁰

Another harm resulting from these new regulations is the impact on U.S.-China collaboration. Twenty-five percent of U.S. graduate students in STEM fields are Chinese foreign nationals.²³¹ China and the United States have a long history of cooperation in the development of tech,²³² which is now at risk. The technology transfers complained of by the United States are a result of the field's very nature.²³³ Developments occur in both commercial and academic outlets with both American and Chinese participation.²³⁴ Just as the Chinese government seeks to advance its economic and military

228. See Edmund Amann & Swati Virmani, *Foreign Direct Investment and Reverse Technology Spillovers: The Effect on Total Factor Productivity*, 2014 OECD J. ECON. STUD. 129, 135 (2015).

229. See Alaina J. Harkness et. al., *The State of Tech Policy, One Year into the Trump Administration*, BROOKINGS (Jan. 30, 2018), <https://www.brookings.edu/blog/techtank/2018/01/30/the-state-of-tech-policy-one-year-into-the-trump-administration/> [<https://perma.cc/TZ27-9Z99>]. This failure of funding by the U.S. government is another example of a failure of tech policy. In addition to the lack of expert advisers on technology issues due to recent emptying of these high-level positions, Brookings experts noted how this lack of tech knowledge in the federal government is a threat to national security and how the federal government is more intent on dismantling policy than creating it. See *id.*

230. David R. Fitzgerald, Comment, *Leaving the Back Door Open: How Export Control Reform's Deregulation May Harm America's Security*, 15 N.C. J.L. & TECH. ONLINE 65, 69 (2014). Although the U.S. military formerly led in technological innovation, the current reliance on private industry and open source AI is a threat to national security as these technological developments are available to governments outside of the United States for purchase or development. See *id.*

231. See MICHAEL BROWN & PAVNEET SINGH, DEF. INNOVATION UNIT EXPERIMENTAL, CHINA'S TECHNOLOGY TRANSFER STRATEGY: HOW CHINESE INVESTMENTS IN EMERGING TECHNOLOGY ENABLE A STRATEGIC COMPETITOR TO ACCESS THE CROWN JEWELS OF U.S. INNOVATION 3 (2018), [https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_\(1\).pdf](https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf) [<https://perma.cc/QRH5-PH7Z>] (noting that 25% of graduate students at U.S. universities are comprised of Chinese nationals in STEM fields).

232. See THOMAS FINGAR & BANNING GARETT, ATLANTIC COUNCIL, CHINA-US COOPERATION: KEY TO A GLOBAL FUTURE 1-5 (2013), https://www.atlanticcouncil.org/wp-content/uploads/2013/09/China-US_Cooperation_Key_to_the_Global_Future_WEB.pdf [<https://perma.cc/Y8NP-EXH7>]. In 2013, both countries celebrated their relationship in a report issued by the China-US Joint Working Group on China-US cooperation. See generally *id.* For a discussion regarding collaboration due to globalization, see *supra* Part III.

233. See Evan Zimmerman, Comment, *The Foreign Investment Risk Review Modernization Act: How CFIUS Became a Tech Office*, 34 BERKELEY TECH. L.J. 1267, 1292-95 (2019).

234. See *id.* at 1292.

position, so does the United States. The changes to CFIUS (the Committee on Foreign Investment in the United States) made by FISA (the Foreign Investment & National Security Act of 2007) require a mandatory investigation when the foreign entity involved is state-owned, as many Chinese entities are.²³⁵

Because a lot of U.S. tech start-ups rely on Chinese investment, any restriction on such investment will slow down these developments, potentially impacting the U.S. economy.²³⁶ Additionally, such restrictions will impact the flow of Chinese technical developments back into the United States.²³⁷ According to the U.S. National Science and Technology Council, China leads the world in “deep learning” journal publications.²³⁸ In response to FIRRMA, China has announced the creation of its own “technological security management list”, which would allow China to contain its technology within its borders and strengthen its current firewall.²³⁹

d. H-1B Visa Restrictions

Another major concern for U.S. tech companies in particular is the reduction of H-1B visas available for foreign workers. As a part of the Buy American and Hire American Executive Order,²⁴⁰ the United States has dramatically reduced the ability of foreign workers to obtain permission to come to the United States.²⁴¹ Due to these visa concerns, more Chinese

235. Shields, *supra* note 225, at 293.

236. See *id.* at 297. “Start-up fundraising in Silicon Valley wouldn’t function without Chinese money.” Dwoskin, *supra* note 183; see also Zimmerman, *supra* note 233, at 1302 (“Also critical is [U.S.] government investment in core R&D, which has stagnated. Though CFIUS’s professed aims relate to international investment, by potentially restricting capital inflows it also functions as a domestic policy in a suite of restrictions that further diminish American competitiveness.” (citing J. JOHN WU, INFO. TECH. & INNOVATION FOUND., WHY U.S. BUSINESS R&D IS NOT AS STRONG AS IT APPEARS 4 (2018), http://www2.itif.org/2018-us-business-rd.pdf?_ga=2.120341130.366752258.1590686982-74679620.1590686982 [<https://perma.cc/N474-858R>])).

237. See Shields, *supra* note 225, at 299.

238. See NSTC REPORT ON AI, *supra* note 22, at 13.

239. *China May Restrict Tech Access in Spiraling Trade War with US*, CNBC (June 9, 2019, 12:55 PM), <https://www.cnbc.com/2019/06/09/china-may-restrict-tech-access-in-spiraling-trade-war-with-us.html> [<https://perma.cc/F45X-CU3B>].

240. Exec. Order No. 13,788, 82 Fed. Reg. 18,837, 18,837 (Apr. 18, 2017).

241. Eric Rosenbach & Aditi Kumar, *To Win the AI Race, Open America’s Doors*, HILL (Apr. 24, 2019, 12:00 PM), <https://thehill.com/opinion/technology/440280-to-win>

students are choosing the UK, Canada, and Australia over the United States for their studies.²⁴² This is hitting the tech industry harder than most because companies such as Amazon, Microsoft, Google and Intel are among the top employers of approved H-1B applicants.²⁴³ The Nature Index, which tracks affiliations on high-quality scientific papers, indicates that China and the United States are top collaborators to one another,²⁴⁴ but experts warn that restricting access to visas will actually harm the United States in scientific advancements.²⁴⁵ It is also likely that due to an AI talent shortage, U.S. tech companies may need to move their research labs abroad.²⁴⁶

Overall, the United States has instituted a number of actions directed against China, to which China has retaliated, benefiting neither country. In fact, the trade war is not just harming the United States and China but has the potential to impede AI advances around the world.

C. Trade War Harms

[T]here is a significant risk that the current trade war between the US and China represents the start of a wider backlash to globalisation that ultimately leads to the disintegration of the liberal rules-based system that has governed the cross-border flow of goods, capital and labour over the past 70 years. It's even possible that this might lead to an eventual Balkanisation of the global economy, with US-

the-ai-race-open-americas-doors [<https://perma.cc/3NXQ-C42F>] (noting that petitions for H-1B visas fell 15% in 2018, the first decline in the past five years).

242. Celia Chen, *Trade War Turning Chinese Students Off the US, with Many Opting for UK, Canada and Australia, Says Payments Firm*, SOUTH CHINA MORNING POST (May 28, 2019, 7:00 AM), <https://www.scmp.com/tech/policy/article/3011956/trade-war-turning-chinese-students-us-many-opting-uk-canada-and> [<https://perma.cc/GE42-WY9N>]. U.S. universities have also asked Congress to address the visa crisis due to its impact on the ability to obtain and retain scholars. Adria Schwarber, *Universities Disturbed by Visa Delays*, AM. INST. PHYSICS (Sept. 13, 2019), <https://www.aip.org/fyi/2019/universities-disturbed-visa-delays> [<https://perma.cc/8C2H-58UJ>].

243. Andy J. Semotiuk, *Recent Changes to the H1B Visa Program and What Is Coming in 2019*, FORBES (Jan. 2, 2019, 9:35 AM), <https://www.forbes.com/sites/andysemotiuk/2019/01/02/recent-changes-to-the-h1b-visa-program-and-what-is-coming-in-2019/#789d4f1e4a81> [<https://perma.cc/4X6K-D3QL>].

244. See *Connected World: Patterns of International Collaboration Captured by the Nature Index*, NATURE INDEX, <https://www.natureindex.com/country-outputs/collaboration-graph> [<https://perma.cc/TF6D-XMXD>].

245. U.S. Scientists, *Policy Advisors Oppose Restrictions on Collaboration with China*, *supra* note 75. “If Americans wish[] to retain their place at the pinnacle, they should avoid the temptations of nativism, and recall their history of diversity, and the benefits to innovation it has brought.” James Liang, *US-China Tech Race Could Be Decided by Population Management as Superpowers Battle for Talent*, SOUTH CHINA MORNING POST (July 20, 2019, 7:00 AM), <https://www.scmp.com/economy/china-economy/article/3019262/us-china-tech-war-could-be-decided-population-management> [<https://perma.cc/397K-G35U>].

246. Rosenbach & Kumar, *supra* note 241.

and China-led spheres of influence, each with separate payment systems, regulatory standards and technological platforms.²⁴⁷

There is much fallout from the trade war including the slow-down of 5G infrastructure installations, damage to the economy, and potential damage to democracy both due to AI use by authoritarian countries and the United States moving away from international agreement and procedures for resolving disagreements.

I. 5G

As indicated above, Huawei is the top supplier of 5G network equipment in the world.²⁴⁸ The U.S. government's war on Huawei is slowing down the installation of 5G technology both in the United States and the EU.²⁴⁹ The 5G infrastructure is needed for AI because of its speed and low latency.²⁵⁰ Because of the ban on Chinese-made components for the installation of the 5G network in the United States, carriers who have committed to building out this infrastructure are in a quandary over where they will get the equipment and how much more it will cost.²⁵¹ China and the EU dominate with two-thirds of the market.²⁵² According to the Pentagon's advisory board, not only is the Chinese equipment much less expensive than that

247. Neil Shearing, *The End of the World as We Know It?*, CAP. ECON.: CHIEF ECONOMIST'S NOTE (Aug. 5, 2019), <https://www.capitaleconomics.com/blog/the-end-of-the-world-as-we-know-it/> [https://perma.cc/32GM-GM8Z].

248. See Charlie Campbell, *Inside the Controversial Company Helping China Control the Future of the Internet*, TIME (May 23, 2019), <https://time.com/5594366/5g-internet-race-huawei/> [https://perma.cc/Y4BE-5J7V].

Huawei . . . has spent \$2 billion over 10 years to ensure it is in the best position to be the architect of global 5G technology. The company has already signed contracts to provide 5G equipment with 40 international carriers and shipped over 70,000 5G base stations, or short-range transceivers.

Id.

249. See Thomas Duesterberg, *Problems and Prospects for 5G Deployment in the United States*, FORBES (Apr. 30, 2019, 4:22 PM), <https://www.forbes.com/sites/thomasduesterberg/2019/04/30/problems-and-prospects-for-5g-deployment-in-the-united-states/#3af5b10e312e> [https://perma.cc/3C8H-PSB6].

250. William Lehr, *Future of Broadband Competition in a 5G World 6* (Aug. 15, 2018) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3240191 [https://perma.cc/8YCE-GNZ8].

251. See Jeremy Hsu, *How the U.S. Can Prepare to Live in China's 5G World*, IEEE SPECTRUM (Apr. 23, 2019, 8:30 PM), <https://spectrum.ieee.org/tech-talk/telecom/standards/how-america-can-prepare-to-live-in-chinas-5g-world> [https://perma.cc/ADA5-7UWD].

252. See Fung, *supra* note 20.

which can be obtained from Europe, it is also reported to be of superior quality and functionality.²⁵³ Additionally, equipment sourced from Europe cannot be installed on top of Chinese equipment due to a lack of interoperability.²⁵⁴ Nokia and Ericsson have both indicated an inability to meet Huawei's pricing.²⁵⁵ This is of special concern to the rural areas of the United States where there is less incentive to upgrade telecommunications from 4G to 5G because of the enormous costs without the accompanying benefit.²⁵⁶ The cost to upgrade to European base stations in U.S. rural areas is estimated to be up to \$1 billion.²⁵⁷ This means that "basic communications could disappear from poorly served communities."²⁵⁸ In addition, it is unclear if rural telecom providers in the United States will need to rip out Chinese-made equipment that is currently installed.²⁵⁹ There is no U.S.-based company that can provide the necessary equipment for widespread 5G small cell and base station installations.²⁶⁰

Again, China is not unscathed by the trade war. Although China is ahead by eighteen months in the rollout of 5G by some estimates²⁶¹ and five years by others,²⁶² China is impacted because of the trade war's prohibition of sales by U.S. chip manufacturers to Chinese companies.²⁶³ Although China's AIDP acknowledged the need to develop its semiconductor industry in order to reduce reliance on U.S.-made chips, reports disagree on whether their locally sourced chips are sufficient for the advanced processing

253. See Hsu, *supra* note 251.

254. See Duesterberg, *supra* note 249.

255. Tarmo Virki & Angela Moon, *Exclusive: In Push to Replace Huawei, Rural U.S. Carriers Are Talking with Nokia and Ericsson*, REUTERS (June 25, 2019, 7:36 AM), <https://www.reuters.com/article/us-huawei-tech-usa-nokia-ericsson-exclus/exclusive-in-push-to-replace-huawei-rural-u-s-carriers-are-talking-with-nokia-and-ericsson-idUSKCN1TQ1VV> [<https://perma.cc/N4XT-8547>].

256. See *id.*

257. *Id.*

258. *Id.* (noting that the lack of return on investment for the installation of a 5G infrastructure may delay or prevent upgrades outside densely populated urban areas).

259. See *id.*

260. See Fung, *supra* note 20. Former U.S.-based Lucent was merged with France's Alcatel and later bought out by Finland's Nokia. Zen Soo, *How US Went from Telecoms Leader to 5G Also-Ran Without Challenger to China's Huawei*, SOUTH CHINA MORNING POST (Apr. 2, 2019, 10:00 PM), <https://www.scmp.com/tech/enterprises/article/3004325/how-us-went-telecoms-leader-5g-also-ran-without-challenger-chinas> [<https://perma.cc/HAF3-4372>]. In 2010, Nokia purchased U.S.-based Motorola leaving no major U.S. supplier of telecommunication hardware. See *id.*

261. Campbell, *supra* note 248.

262. See Hsu, *supra* note 251.

263. Victoria Song, *Chinese Chipmakers Say It's Not Possible to Hit Goals Imposed by State Without American Tech*, GIZMODO (June 25, 2019, 11:58 AM), <https://gizmodo.com/chinese-chipmakers-say-its-not-possible-to-hit-goals-im-1835837342> [<https://perma.cc/QKD4-UM26>].

needs of AI.²⁶⁴ It does seem that with their stockpiling and sourcing from Taiwan and Korea, they will be able to meet their chip needs, at least in the near future, for the installation of their 5G infrastructure.²⁶⁵

2. *Economy*

The current U.S. trade policy is a complete abdication of the past role America played in globalization and economic security.²⁶⁶ By moving towards protectionism, and rejecting the norms associated with international trade, the United States is ignoring international law and abandoning its role since the end of WWII in promoting globalization and engaging in a multilateral system of trading and investment.²⁶⁷ This new policy singles out China but impacts the global economy due to its tariff impacting the EU, Canada, and Mexico, among others, and the seeming randomness of actions initiated by the current administration.²⁶⁸ Predictability and consistency are important to the global economy.²⁶⁹ World economic experts agree that due to the trade war between the United States and China, among

264. See Iris Deng, *Building China's Own Chip Industry Will Be a Costly 10-Year Marathon, Former Intel China MD Says*, SOUTH CHINA MORNING POST (May 29, 2019, 6:00 AM), <https://www.scmp.com/tech/science-research/article/3012140/building-chinas-own-chip-industry-will-be-costly-10-year> [<https://perma.cc/B5GP-EB59>] (explaining that reports indicate that it will take China ten years to catch up with semiconductor technology, which it previously sourced from the United States).

265. See Brad Setser, *Did Huawei's Chip Stockpiling Bring China's 2018 Trade Surplus Down?*, COUNCIL ON FOREIGN REL. (June 12, 2019), <https://www.cfr.org/blog/did-huaweis-chip-stockpiling-bring-chinas-2018-trade-surplus-down> [perma.cc/PF8T-ZNJX].

266. Schoenbaum & Chow, *supra* note 153, at 116–17, 128 (“Upon taking office, in his inaugural address, January 20, 2017, President Trump made clear his intention to shift American policy toward international trade. He announced a new ‘America First’ trade policy as follows: ‘We must protect our borders from the ravages of other countries making our products, stealing our companies, and destroying our jobs. Protection will lead to great prosperity and strength.’” (quoting President Donald J. Trump, Inaugural Address (Jan. 20, 2017), <https://www.whitehouse.gov/briefings-statements/the-inaugural-address/> [<https://perma.cc/59ZT-EE8V>])).

267. *Id.* at 117.

268. See Elaina Plott, *Trump's Two Crutches*, ATLANTIC (June 4, 2019), <https://www.theatlantic.com/politics/archive/2019/06/trump-tariffs-mexico/590950/> [<https://perma.cc/3AC4-6U5B>].

269. See Sasha Vakulina, *Uncertainty and Trade Tensions Slow Down the Global Economy*, EURONEWS (June 13, 2019), <https://www.euronews.com/2019/06/12/uncertainty-and-trade-tensions-slow-down-the-global-economy> [<https://perma.cc/LCB4-4M9Z>].

other factors, economic growth in the world economy will decrease.²⁷⁰ Although the stated reasons for the institution of tariffs was to protect national security and improve the balance of trade, neither has been accomplished, and in fact, national security is at greater risk now more than ever,²⁷¹ and the deficit may only get worse.²⁷²

With respect to the tariffs instituted due to the trade war, rather than improving the trade deficit, goods exports from the United States to China declined by \$22 billion from 2017 to 2019.²⁷³ Because of the Trump Administration's ban on sales to Huawei and requirement of government approval to sell to companies in China, the U.S. computer chip industry is being hit especially hard.²⁷⁴ Intel, Qualcomm, and AMD have all indicated that the U.S. imposed restrictions are harming their sales figures.²⁷⁵ Although these companies have urged the White House to resolve its issues with China, it has instead indicated a desire to impose additional tariffs on Chinese goods.²⁷⁶ Although the tariffs impacting laptops and smartphones have been temporarily stalled, the uncertainty in the field is "creat[ing] anxiety across our customer supply chains" as indicated by Intel's CEO and U.S. tech companies' stock prices.²⁷⁷ The five largest tech companies in the United States, Microsoft, Amazon, Apple, Facebook, and Alphabet, lost a combined \$162 billion in market value as a result of the continuing trade

270. *Predictions for the Global Economy in 2019 from 13 Experts*, FOCUSECON. (Jan. 17, 2019), <https://www.focus-economics.com/blog/global-economy-predictions-2019-13-experts> [<https://perma.cc/J58X-S7ME>].

271. See Ali Wyne, *The Security Risks of a Trade War with China*, FOREIGN AFF. (Aug. 6, 2018), <https://www.foreignaffairs.com/articles/china/2018-08-06/security-risks-trade-war-china> [<https://perma.cc/VJZ6-8QC5>] ("Up until recently, the two nations' economic ties had served as an effective brake on escalating strategic distrust. A China less constrained by and invested in economic ties with the United States could pose a substantially greater challenge to U.S. foreign policy. For all the Trump Administration's frustrations with managing interdependence, the consequences of decoupling could mean even bigger headaches.").

272. Desmond Lachman, *Make America's Deficits Great Again*, HILL (July 9, 2019, 3:00 PM), <https://thehill.com/opinion/finance/452045-make-americas-deficits-great-again> [<https://perma.cc/R38U-TVZW>].

273. Paulo Santos, *The U.S. Is Most Affected by the Trade War*, SEEKING ALPHA (July 14, 2019, 10:03 PM), <https://seekingalpha.com/article/4274868-u-s-affected-trade-war> [<https://perma.cc/UD7X-TX6J>]; US-China Bus. Council, 2020 State Export Report 2 (2020), https://www.uschina.org/sites/default/files/2020_state_export_report_full_report_1.pdf [<https://perma.cc/JD4A-VQD3>].

274. See Clare Duffy, *The Trade War with China Is Coming for the American Computer Industry*, CNN (Aug. 2, 2019, 12:29 AM), <https://www.cnn.com/2019/08/02/tech/chipmakers-huawei-ban/index.html> [<https://perma.cc/DAM2-HMYP>].

275. *Id.*

276. *Id.*

277. *Id.*

war between the United States and China.²⁷⁸ It has been reported that the Huawei ban has caused “extensive layoffs” in the United States by Huawei.²⁷⁹

Although China’s decline in exports to the United States is significantly less severe than U.S. exports to China, China is also feeling the effect of the trade war.²⁸⁰ As such, China is seeking to expand into other markets to replace its loss of exports to the United States.²⁸¹ China’s exports to other countries during the first half of 2019, however, only increased 2.1%.²⁸² Because of the potential reduction in the U.S. market, China has initiated discussion with Japan and South Korea, both U.S. allies, in creating a free-trade zone across the Asia-Pacific region.²⁸³

The current U.S. administration’s confusing and reactionary trade policy has not only left many in the tech field scratching their heads, but

278. Jonathan Shieber, *Tech Stocks Walloped as China Retaliates in the Latest Salvo of Its Trade War with the US*, TECHCRUNCH (Aug. 5, 2019, 1:34 PM), <https://techcrunch.com/2019/08/05/tech-stocks-walloped-as-china-retaliates-in-the-latest-salvo-of-its-trade-war-with-the-u-s/> [https://perma.cc/X8GC-E9QL]. On July 22, 2019, representatives from the major U.S. tech companies, Intel, Qualcomm, Google, Microsoft, Broadcom, and Micron, met with the Trump Administration on the confusion regarding their ability to sell components in China. Michael Grothaus, *Tech Companies Will Meet at the White House Today to Discuss Huawei Ban*, FAST COMPANY (July 22, 2019), <https://www.fastcompany.com/90379730/tech-companies-will-meet-at-the-white-house-today-to-discuss-huawei-ban> [https://perma.cc/UVJ6-4UYL].

279. Zak Doffman, *Huawei Blacklisting Is Forcing ‘Extensive Layoffs’ In U.S.: Report*, FORBES (July 14, 2019, 2:20 AM), <https://www.forbes.com/sites/zakdoffman/2019/07/14/huawei-blacklisting-now-forcing-extensive-layoffs-in-u-s-reports/#447b594667e9> [perma.cc/X9VD-LPNA].

280. See Keith Bradsher, *China’s Economic Growth Slows as Challenges Mount*, N.Y. TIMES (Oct. 17, 2019), <https://www.nytimes.com/2019/10/17/business/china-economic-growth.html> [https://perma.cc/P3RE-64U4].

281. See Qian Chen, *Once Ambitious to Expand into the US, Some Chinese Firms Are Now Scaling Back*, CNBC (Nov. 24, 2019, 7:01 PM), <https://www.cnbc.com/2019/11/25/chinese-firms-look-for-expansion-to-middle-east-europe-asia-amid-trade-war.html> [https://perma.cc/3UVZ-R6LZ]. Although the BRI will vastly increase the market for the sale of Chinese goods, it is still in the infrastructure rollout stage and will take years for the emerging markets to fully develop. See Chris Devonshire-Ellis, *The Emerging Markets in China’s Belt & Road Initiative*, SILK ROAD BRIEFING (Aug. 30, 2019), <https://www.silkroadbriefing.com/news/2019/08/30/emerging-markets-chinas-belt-road-initiative/> [https://perma.cc/CWM4-UPMS]. That said, it does appear that the BRI worth in bilateral trade currently falls between \$500 billion and \$1.4 trillion. See *id.*

282. Keith Bradsher, *China Needs New Places to Sell Its Mountain of Stuff*, N.Y. TIMES (July 26, 2019), <https://www.nytimes.com/2019/07/26/business/china-trade-war-us-rcep.html> [https://perma.cc/2KEL-YVT3].

283. *Id.*

economists as well.²⁸⁴ In terms of economic loss to the United States, leading economists have reported that consumers have paid the entire \$68.8 billion in President Trump's tariffs.²⁸⁵ The inverted yield curve in the bond market has been noted as a warning sign of a coming recession.²⁸⁶ Additionally, the trade war is causing currency devaluations, and if left unchecked, could result in additional protectionist measures around the world and further harm to global economic growth.²⁸⁷ What scholars do agree upon is that even if the trade war is halted, which is unlikely, the damage done is very well permanent.²⁸⁸

284. Many tech companies have indicated confusion as to which companies are on the export ban list and which products are included. Duffy, *supra* note 274. Although Intel and Micron have both indicated that they have resumed shipments to Chinese firms on the banned entity list, others have not. *Id.* Some in the administration specifically blame the trade war on the tanking stock market in the United States. Bess Levin, *Everyone in the White House Thinks Trump's Trade War Sucks*, VANITY FAIR: HIVE (Aug. 15, 2019), <https://www.vanityfair.com/news/2019/08/donald-trump-trade-war-white-house-detractors> [<https://perma.cc/Q3RJ-ETKT>] (quoting Kayla Tausche & Jeff Cox, *Trump, Navarro Are the Only Officials in the White House Blaming the Fed for Volatility*, *Sources Say*, CNBC (Aug. 15, 2019, 10:27 AM), <https://www.cnbc.com/2019/08/15/trump-navarro-only-white-house-officials-blaming-volatility-on-fed.html> [<https://perma.cc/5J6W-B5FG>]).

285. Michael Hiltzik, *Column: Trump's Trade War Is Politically Motivated, yet Hurts Consumers and GOP Voters, Study Shows*, L.A. TIMES (Mar. 4, 2019, 12:35 PM), <https://www.latimes.com/business/hiltzik/la-fi-hiltzik-trump-trade-war-20190304-story.html> [<https://perma.cc/6CEZ-ZPJV>] ("The authors, Pablo D. Fajgelbaum of UCLA, Pinelopi K. Goldberg of Yale and the World Bank (where she is chief economist), Patrick J. Kennedy of UC Berkeley and Amit K. Khandelwal of Columbia, [of the study] pegged the annual economic loss from Trump's tariffs at \$68.8 billion, or about 0.37% of gross domestic product, chiefly because of higher-cost imports. Gains to some domestic producers who benefited from protective tariffs cut the overall loss to \$6.4 billion, or .03% of GDP.").

286. Neil Irwin, *Global Economic Trouble Is Brewing, and the Trade War Is Only Part of It*, N.Y. TIMES (Aug. 14, 2019), <https://www.nytimes.com/2019/08/14/upshot/global-economic-trouble-is-brewing-and-the-trade-war-is-only-part-of-it.html> [perma.cc/BZL5-3N6C] ("The world is ambling toward an economic morass of the sort that no mere presidential tweet can fix."). The Dow dropped 900 points on August 5, 2019, ostensibly due to President Trump's threat of new tariffs. Shieber, *supra* note 278.

287. *See id.*

288. Efraim Berkovich, Marshall W. Meyer & Mary E. Lovely, *What Are the Long-term Costs of the China-U.S. Trade War?*, KNOWLEDGE@WHARTON (Aug. 6, 2019), <https://knowledge.wharton.upenn.edu/article/u-s-china-tariffs/> [<https://perma.cc/XUW9-YB9A>] ("U.S. companies will also see their global competitiveness eroding with the tariff war. 'The rest of the world will continue to enjoy lower-priced inputs, and our companies are going to have to compete with them,' said Mary E. Lovely, professor of economics at Syracuse University's Maxwell School of Citizenship and Public Affairs; she is also a senior fellow at the Peterson Institute for International Affairs. 'That really ties one of their hands behind their back. This is doing permanent damage to the U.S. economy.'").

3. Democracy

In addition to slowing down the installation of 5G infrastructure, reducing trade, and harming the global economy, the trade war also has the potential to destabilize democracy worldwide.²⁸⁹ The tariffs imposed by the United States undermine the law of the World Trade Organization.²⁹⁰ At the G20 Summit in Osaka in June 2019, leaders from the EU decried the damage to the global economy that the U.S.-China trade war is causing.²⁹¹ By engaging in unilateral acts rather than using international dispute resolution

289. See Charnovitz, *supra* note 78 at 226–28 (“The Trump Administration is carrying out a new form of American rejectionism powered by four horsemen of economic instability: first, the rejection of the international rule of law; second, the rejection of open markets; third, the rejection of economic peace in favour of perpetual economic war; and fourth, the rejection of the global interest. The analysis herein shows how these four rejectionist policies are harming the United States, other countries, and the global order.”).

290. See Ernst-Ulrich Petersmann, *The 2018 American and Chinese Trade Wars Risk Undermining the World Trading System and Constitutional Democracies* 1–4 (European Univ. Inst. Dep’t of Law, Working Paper No. LAW 2018/17, 2018), <https://ssrn.com/abstract=3275188> [perma.cc/GD8S-8RYW].

As tariffs tax and restrict domestic citizens and redistribute their income, illegal import tariffs (e.g. as imposed by US President Trump) – and the collective undermining of the WTO Appellate Body and dispute settlement system – also run counter to the democratic mandates given by parliaments when they approved the 1994 WTO Agreement and incorporated it into domestic legal systems, as illustrated by trade laws and policies in the USA (section II) and in the European Union (EU, section III). Multilevel governance of global public goods (PGs) – like the WTO trading system, which has helped to lift billions of people out of poverty by promoting unprecedented economic welfare, transnational rule of law and compulsory third-party dispute settlements – cannot remain effective if citizens and democratic institutions fail to hold their governments democratically and legally accountable for violating ‘PGs treaties’ (section IV). This contribution uses the example of the USA and the EU for arguing that constitutional democracies – including Asian democracies like India, Korea and Japan – must adopt more specific trade legislation protecting the WTO legal system. Multilevel governance of transnational PGs requires empowering citizens, parliaments and courts of justice to limit populist abuses of trade policy powers to tax and restrict citizens in manifestly illegal ways reducing general consumer welfare, non-discriminatory competition and rule of law.

Id. at Abstract.

291. Kristin Huang, *G20: Europe Tells US and China Their Trade War Is Harming Global Economy*, SOUTH CHINA MORNING POST (June 28, 2019, 12:21 PM), <https://www.scmp.com/news/china/diplomacy/article/3016454/europe-tells-us-and-china-their-trade-war-harming-global> [https://perma.cc/GD8S-8RYW].

mechanisms, the entire democratic process is at risk.²⁹² By blocking appointments to the WTO Appellate Board, the United States demonstrates its lack of respect for international order, which could have far reaching effects.²⁹³ Without a fully-functioning Appellate Board, there is no method for international trade dispute resolution that affects all members.²⁹⁴ There is also a concern that if the Chinese model of AI becomes the de facto model, it could lead to adoption of mass surveillance and control by authoritarian regimes.²⁹⁵

V. THE FUTURE OF AI

A. *Innovation Winter*

We're heading for a global innovation winter—a politically driven reduction in the financial and human capital available to drive the next generation of emerging technologies.²⁹⁶

Contrary to conflicting reports on “who” is winning the AI race, the fact is there is no winner, there is no leader, and the current state of affairs will slow down, potentially crippling, the development of this important field. In addition to the factors described earlier impacting AI, the trade war between the United States and China has placed obstacles in its way which could take years to remove.²⁹⁷ Smart cars, smart cities, smart homes, smart factories, and connected medical devices require the speed that 5G offers and the low latency that edge computing will provide.²⁹⁸ While varying rationales have been cited for this trade war, it does appear that the United States is trying to slow down China's expansion into this field and impede

292. See Geraldo Vidigal, *Westphalia Strikes Back: The 2018 Trade Wars and the Threat to the WTO Regime* 27–32 (Amsterdam Law Sch. Legal Studies, Research Paper No. 2018-31, 2018), <http://dx.doi.org/10.2139/ssrn.3259127> [<https://perma.cc/SJG7-Q9K9>].

293. *Id.* at 2, 42–45.

294. *Id.* at 2.

295. Steven Feldstein, *The Road to Digital Unfreedom: How Artificial Intelligence Is Reshaping Repression*, J. DEMOCRACY, Jan. 2019, at 40, 41–46. *But see* H. AKIN UNVER, CTR. FOR ECON. & FOREIGN POLICY STUDIES, ARTIFICIAL INTELLIGENCE, AUTHORITARIANISM AND THE FUTURE OF POLITICAL SYSTEMS 1, 16 (2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3331635 [<https://perma.cc/65XN-5U3Q>] (explaining how algorithms are increasingly shaping political decision-making, potentially subverting free will in both democratic and authoritarian regimes).

296. Ian Bremmer & Cliff Kupchan, *Risk 6: Innovation Winter*, EURASIA GROUP (Jan. 7, 2019), <https://www.eurasiagroup.net/live-post/risk-6-innovation-winter> [<https://perma.cc/4RFE-MRCQ>].

297. See Shields, *supra* note 225, at 297.

298. See Lehr, *supra* note 250, at 4–8; *see also* Jeremy Horwitz, *5G's Secret Weapon Will Be Low Latency, Empowering Next-Gen VR and Gaming*, VENTURE BEAT (Mar. 2, 2018, 8:08 AM), <https://venturebeat.com/2018/03/02/5gs-secret-weapon-will-be-low-latency-empowering-next-gen-vr-and-gaming/> [<https://perma.cc/8F8B-WK3X>].

its ability to provide 5G networking equipment to the rest of the world.²⁹⁹ The U.S. government has repeatedly demonstrated its lack of understanding of technology³⁰⁰ and has moved away from funding R&D, leaving it to private industry to drive this field.³⁰¹ For example, in 2017 Amazon and Google spent \$16.1 billion and \$13.9 billion respectively on AI development whereas the total budgets for federal agencies in 2019 totaled just \$5.3 billion.³⁰² Although the United States was the clear leader in 4G technology, it does not have the current ability to lead in 5G.³⁰³ Unfortunately, this technology is the key to practical application of AI.³⁰⁴ Recognizing its failure, the United States has sought to slow down China's expansion claiming unfair trade practices and potential espionage.³⁰⁵ By putting Huawei, and other Chinese companies, on a trade blacklist and encouraging the EU to do the same, the United States has done a great

299. See Reshma Kapadia, *The U.S. and China's Next Battle Won't Be Won with Tariffs*, BARRON'S (May 15, 2020, 7:05 PM), <https://www.barrons.com/articles/5g-networks-have-become-a-new-front-in-u-s-china-trade-war-51589583930> [https://perma.cc/V33U-UUP3].

China has already made US \$180 billion in capital expenditures for 5G deployment over the past five years, installing about 350,000 5G-operable base stations, which is nearly 10 times the number currently deployed in the United States. . . . This head start will also give China an early lead in developing and deploying smarter cities, self-driving cars, and automated factories, says the Eurasia Group report. The opportunity to test new applications and use cases could in turn attract business from other countries that are looking to supply their own citizens with similar 5G-enabled applications and services.

Hsu, *supra* note 251.

300. Nancy Scola, *On Democrats' Wish List: Tech Help for a Clueless Congress*, POLITICO (Dec. 29, 2018, 7:05 AM), <https://www.politico.com/story/2018/12/29/democrats-technology-congress-1074187> [https://perma.cc/AE8G-YFGK].

301. Walter Isaacson, *How America Risks Losing Its Innovation Edge*, TIME (Jan. 3, 2019), <https://time.com/longform/america-innovation/> [https://perma.cc/PES4-HP2S] ("In the 1960s, around 70 percent of total R&D was federally funded, with 30 percent coming from the private sector. Now those figures are reversed.").

302. See YOAV SHOHAM ET AL., ARTIFICIAL INTELLIGENCE INDEX: 2018 ANNUAL REPORT 58 (2018), <http://cdn.aiindex.org/2018/AI%20Index%202018%20Annual%20Report.pdf> [https://perma.cc/37PD-42ZE].

303. See Marguerite Reardon, *How 5G Got Tied Up in a Trade War Between Trump and China*, CNET (July 15, 2019, 7:30 AM), <https://www.cnet.com/news/how-5g-got-tied-up-in-a-trade-war-between-trump-and-china/?curator=MediaREDEF> [https://perma.cc/LB5Q-5KHB].

304. Ben Yu, *The Convergence of 5G and AI: A Venture Capitalist's View*, VENTURE BEAT (Mar. 31, 2019, 8:45 AM), <https://venturebeat.com/2019/03/31/the-convergence-of-5g-and-ai-a-venture-capitalists-view/> [https://perma.cc/G5AS-2HVV].

305. See *supra* Section IV.B.2.

disservice to the world in terms of slowing down the potential social and economic good that could result from advances in AI.³⁰⁶

China, on the other hand, has placed enormous investment in both AI and infrastructure, not just in China, but throughout the world.³⁰⁷ Although China and the United States enjoyed the benefits of their interdependence previously, by attempting to isolate China from the rest of the world, the United States will cause harm to all, especially to itself.³⁰⁸ It is critical at this juncture that worldwide cooperation in the development of standards for both 5G technology and responsible AI be developed so that all companies and governments in all countries can participate. Global interconnection is not only an important business goal, it also will drastically improve conditions for underdeveloped countries as it opens new markets and improves economic conditions there.³⁰⁹ However, the future of AI is now at risk due to the split between the United States and China.

B. Technological Bifurcation

The U.S. feud with Huawei risks bifurcating 5G's rollout into two distinct blocs—nations that embrace Chinese 5G and those that reject it wholesale—hampering global connectivity and hurting the bottom lines of companies forced to choose. Technology consultant Stephanie Hare says the lack of trust between the world's No. 1 and No. 2 economies means every other country is being forced to

306. See Karla Lant, *7 Reasons You Should Embrace, Not Fear, Artificial Intelligence*, FUTURISM (Mar. 31, 2017), <https://futurism.com/7-reasons-you-should-embrace-not-fear-artificial-intelligence> [<https://perma.cc/6JD6-M7MA>].

307. Reardon, *supra* note 303.

308. Scott Moore, *The US Needs to Engage China on Tech—or Risk Isolating Itself*, WIRED (Dec. 19, 2018, 9:00 AM), <https://www.wired.com/story/why-the-us-needs-to-engage-china-on-tech/> [<https://perma.cc/W8HM-6FU2>] (“Scientific and technological progress are rarely the product of a single nation—witness this year’s Nobel Prizes, most of which were jointly awarded to researchers from multiple countries. Like it or not, China is becoming a bigger player in the digital economy across the globe, thanks in part to export-oriented strategies like the ‘digital Silk Road.’ If Washington continues down its current path of trying to build an alternative bloc, it is likely to confine itself, rather than China.”)

309. Oliver Pickup, *Instant Diagnosis by Smartphone: How Artificial Intelligence Can Save Lives*, TELEGRAPH (Aug. 8, 2016, 11:45 AM), <https://www.telegraph.co.uk/business/tata-communications/artificial-intelligence-in-developing-countries/> [<https://perma.cc/X9G5-ARL6>]. Africa appears to be in the throes of the beginning of a digital revolution with emerging internationally recognized tech hubs. Alex Liu, *Africa's Future Is Innovation Rather than Industrialization*, WORLD ECON. F. (Sept. 1, 2019), <https://www.weforum.org/agenda/2019/09/africa-innovation-rather-than-industrialization/> [<https://perma.cc/WYN6-842K>]. As this market grows, China is in the position to benefit as it has advanced the 5G infrastructure there, permitting this digital revolution. W. Gyude Moore, *African Countries Should Stay Loyal to China's Troubled Huawei—Regardless of Trump*, QUARTZ AFRICA (May 27, 2019), <https://qz.com/africa/1629078/africa-will-stay-loyal-to-chinas-huawei-regardless-of-trump/> [<https://perma.cc/U69H-F9YB>].

choose sides, based on its own interests. “There can be no sitting on the fence here.”³¹⁰

The decoupling of the United States and China not only has the potential to create two separate 5G technologies and infrastructures, it increases the risk of two separate internets, two separate AI tracks, and two separate systems of trade.³¹¹ If a country in the EU built out its telecommunication infrastructure as part of the Chinese BRI,³¹² U.S. made devices would not be compatible there locking residents of those countries into Chinese tech and out of U.S. tech.³¹³ With Africa and South America signing on to the BRI, these markets could be closed off permanently to the United States³¹⁴ With respect to 5G, both Nokia and Ericsson in Europe have considered setting up two separate units, one for the United States and one for China.³¹⁵ There is also some concern that the internet will be split into two—one for China and one for the United States, again forcing all other countries to choose.³¹⁶ Preventing China from accessing components and technology in the United States could actually speed up China’s innovation resulting in “a bifurcation into a Chinese-led internet and a non-Chinese internet

310. Campbell, *supra* note 248.

311. See Bown & Irwin, *supra* note 81 (“The Trump administration’s attacks on the WTO and the expansive legal rationalizations it has given for many of its protectionist actions threaten to pull apart the unified global trading system. And on China, it has become clear that the administration is bent on severing, not fixing, the relationship. The separation of the world’s two largest economies would trigger a global realignment. Other countries would be forced to choose between rival trade blocs.”).

312. In 2004, Huawei entered its first major contract with a European provider for €230 million. Zen Soo & Li Tao, *How Huawei Went from Small-Time Trader in Shenzhen to World’s Biggest Telecoms Equipment Supplier*, SOUTH CHINA MORNING POST (Feb. 18, 2019, 9:30 AM), <https://www.scmp.com/tech/big-tech/article/2186494/how-huawei-went-small-time-trader-shenzhen-worlds-biggest-telecoms> [<https://perma.cc/9HJT-RRAM>].

313. *US-China Trade War Risks Global Technology Split*, FIN. TIMES (June 12, 2019), <https://www.ft.com/content/0e6c322e-8c4e-11e9-a1c1-51bf8f989972> [<https://perma.cc/B3QD-7HE8>].

314. See Danny Crichton, *China Splits the Internet While the U.S. Dithers*, TECHCRUNCH (Sept. 24, 2018, 12:19 PM), <https://techcrunch.com/2018/09/24/china-splits-the-internet-while-the-u-s-dithers/> [<https://perma.cc/NY5S-6U7Z>].

315. Anna Isaac, *Exclusive: Nokia and Ericsson Plan Emergency Break-Up over Trade War and Security Fears*, TELEGRAPH (June 8, 2019, 10:00 PM), <https://www.telegraph.co.uk/business/2019/06/08/exclusive-nokia-and-ericsson-plan-emergency-break-up-trade-war/> [<https://perma.cc/YDD2-JRJR>].

316. Daniel Bases, *US Focus on Blocking China’s 5G Technology Misses Bigger Manufacturing Risk*, SOUTH CHINA MORNING POST (Apr. 12, 2019, 10:05 AM), <https://www.scmp.com/tech/big-tech/article/3005805/us-focus-blocking-chinas-5g-technology-misses-bigger-manufacturing> [<https://perma.cc/8PLL-MXP2>].

led by America.”³¹⁷ China could “start developing its own protocols, its own standards for domain name creation and transfer, its own entry points and distribution systems, and most importantly, its own rules and regulations[,]” which would then be adopted by nations running on a Chinese infrastructure.³¹⁸ If the United States denies U.S. tech companies access to China, AI will be developing off two different sets of data—one that the United States can access and the other that only China can access—resulting in algorithms that will not work across markets.³¹⁹ “According to a McKinsey Global Institute study, [countries] that promote open data sources and data sharing are the ones most likely to see AI advances.”³²⁰ The trade war is increasing the risk that technological developments will not be interoperable based on the bifurcation of U.S. and Chinese systems.³²¹

As a result of the current U.S. administration’s policy of isolating China, “[t]he world may well be headed towards a system where most commercially significant countries are pressed to align with one or another of these giants.”³²² The trade war has already resulted in Chinese companies developing their own operating systems and semiconductors for their telecommunication devices.³²³ Not only does this provide Chinese companies

317. David Silverberg, *How China-US Rivalry Is Dividing the Internet*, BBC NEWS (Dec. 3, 2019), <https://www.bbc.com/news/business-50570838> [<https://perma.cc/5HLZ-D9A7>]. It is unlikely that the United States will be the winner if the rest of the world is forced to choose. In April 2019, the United States pressed its European and Latin American allies to sign a letter of condemnation regarding the Chinese BRI, but according to a European diplomat present at the meeting, “[n]o one was willing to go along with it.” Noah Barkin, *The U.S. Is Losing Europe in Its Battle with China*, ATLANTIC (June 4, 2019), <https://www.theatlantic.com/international/archive/2019/06/united-states-needs-europe-against-china/590887/> [<https://perma.cc/T8SM-JWKF>].

318. Anna Johansson, *The Internet Is Due for a Split. Here’s What You Need to Know*, NEXT WEB (Oct. 4, 2018), <https://thenextweb.com/contributors/2018/10/04/the-internet-is-due-for-a-split-heres-what-you-need-to-know/> [<https://perma.cc/9RQV-R4W4>].

319. Wesley Rahn, *Is Google Selling Out for Access to China’s Massive Tech Market?*, DEUTSCHE WELLE (Oct. 19, 2018), <https://www.dw.com/en/is-google-selling-out-for-access-to-chinas-massive-tech-market/a-45961894> [<https://perma.cc/WDU7-LEK6>].

320. West & Allen, *supra* note 33.

321. Although China keeps a tight rein on cross border transfers, countries that side with China may also limit U.S. access to data. See Alan Beattie, *Data Protectionism: The Growing Menace to Global Business*, FIN. TIMES (May 13, 2018), <https://www.ft.com/content/6f0f41e4-47de-11e8-8ee8-cae73aab7ccb> [<https://perma.cc/SRB6-TMT2>].

322. Craig VanGrasstek, *The Trade Policy of the United States Under the Trump Administration* 18 (European Univ. Inst. Robert Schuman Ctr. for Advanced Studies Global Governance Programme, Working Paper No. RSCAS 2019/11, 2019), <https://ssrn.com/abstract=3330577> [<https://perma.cc/T66A-YWDG>].

323. See, e.g., Jon Porter, *Huawei’s New Operating System Is Called HarmonyOS*, VERGE (Aug. 9, 2019, 3:24 AM), <https://www.theverge.com/2019/8/9/20798251/huawei-harmonyos-hongmengos-smartphones-internet-of-things-operating-system-android> [<https://perma.cc/A7Q9-CJNY>]. Huawei recently announced the creation of its own

the ability to withstand a protracted trade war longer than the United States would be able to, it also gives China additional products to market worldwide. On the other hand, U.S. tech companies are reeling from the trade war. It is estimated that export controls put in place by the Trump Administration could cause a loss of \$14 to \$56 billion in sales and 18,000 to 74,000 jobs over the next five years in the United States.³²⁴ Collaboration among academics is already decreasing.³²⁵ While the more technologically advanced nations will have a choice, underdeveloped countries will most likely align with the Chinese.³²⁶

The United States' desire to isolate China will also impact the setting of global standards for 5G technology. This will have the most serious effect on the United States itself because, although it was a leader in 4G technology, it will have no influence in 5G standards due to the lack of industry there specializing in 5G network equipment.³²⁷ Because Huawei has the most

operating system, HarmonyOS, to replace its reliance on U.S.-originated Android. *Id.* Huawei is also working on AI chipsets named Ascend 910. Jack Gold, *Huawei's Big Move from Component Maker to AI Service Provider*, VENTURE BEAT (Aug. 24, 2019, 10:25 AM), <https://venturebeat.com/2019/08/24/huaweis-big-move-from-component-maker-to-ai-service-provider/> [<https://perma.cc/5N95-34GR>]. This represents a move from being a component provider to that of a full-service supplier of AI technology. *Id.*

324. Robert D. Atkinson, *Why Limiting U.S. Tech Exports to Chinese Companies Like Huawei Is a Risky Strategy*, INFO. TECH. & INNOVATION FOUND. (May 23, 2019), <https://itif.org/publications/2019/05/23/why-limiting-us-tech-exports-chinese-companies-huawei-risky-strategy> [<https://perma.cc/GX8D-69ZA>].

325. See Sarah O'Meara, *AI Researchers in China Want to Keep the Global-Sharing Culture Alive*, NATURE (May 29, 2019), <https://www.nature.com/articles/d41586-019-01681-x> [<https://perma.cc/Y6HX-HVZW>].

326. See Thompson & Bremmer, *supra* note 147.

The world's nations can commit to American technology: buying Apple phones, using Google search, driving Teslas, and managing a fleet of personal robots made by a startup in Seattle. Or they can commit to China: using the equivalents built by Alibaba and Tencent, connecting through the 5G network constructed by Huawei and ZTE, and driving autonomous cars built by Baidu. The choice is a fraught one. If you are a poor country that lacks the capacity to build your own data network, you're going to feel loyalty to whoever helps lay the pipes at low cost. It will all seem uncomfortably close to the arms and security pacts that defined the Cold War.

Id.

327. See Klint Finley, *Does It Matter if China Beats the US to Build a 5G Network?*, WIRED (June 6, 2018, 7:00 AM), <https://www.wired.com/story/does-it-matter-if-china-beats-the-us-to-build-a-5g-network/> [<https://perma.cc/SCQ7-PHGX>].

patents for 5G technology,³²⁸ it is seeking to be the leader in developing standards.³²⁹ China's White Paper on AI Standardization indicates that China considers AI standards to be the key to "seizing a new round of technological dominance."³³⁰

C. Need for Coordinated Development, Cooperation, and Standards

As indicated above, advancements in AI in the United States have been funded and guided primarily by private industry advancing commercial pursuits.³³¹ Recently, academics and NGOs have begun forming initiatives to support the responsible development of AI.³³² Because the United States has reduced government support for technological innovation,³³³ it is falling behind in being able to influence 5G and AI standards in international organizations.³³⁴ The proposed 2020 budget contained reductions in almost every category of R&D, including an 11% reduction in the budget for

328. Katharina Buchholz, *Huawei Is Leading the 5G Patent Race*, STATISTA (Feb. 25, 2020), <https://www.statista.com/chart/20095/companies-with-most-5g-patent-families-and-patent-families-applications/> [https://perma.cc/76DK-NUU4].

329. Kaveh Waddell, *The Global Race Between China and U.S. to Set the Rules for AI*, AXIOS (July 14, 2019), <https://www.axios.com/artificial-intelligence-china-united-states-5bea5020-c5c6-4527-8d25-7bf0036f6384.html> [https://perma.cc/WKD3-W2RL].

330. *Id.* (quoting Jeffrey Ding & Paul Triolo, *Translation: Excerpts from China's 'White Paper on Artificial Intelligence Standardization'*, NEW AM. (June 20, 2018), <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-excerpts-chinas-white-paper-artificial-intelligence-standardization/> [https://perma.cc/KHT9-KM69]). If the United States is unable to contribute to the telecommunication's global standards body, the 3GPP Board, it will have no influence over the standards set, greatly reducing the marketability of U.S. originated 5G tech. Louise Lucas, *Standards Body Warns on US Blacklisting of Huawei*, FIN. TIMES (June 9, 2019), <https://www.ft.com/content/7e510cc0-88ea-11e9-97ea-05ac2431f453> [https://perma.cc/Z5LK-QKCB].

331. See Will Knight, *Here's How the US Needs to Prepare for the Age of Artificial Intelligence*, MIT TECH. REV. (Apr. 6, 2018), <https://www.technologyreview.com/s/610379/heres-how-the-us-needs-to-prepare-for-the-age-of-artificial-intelligence/> [https://perma.cc/D57H-H6F9].

332. See, e.g., Amy Adams, *Stanford University Launches the Institute for Human-Centered Artificial Intelligence*, STAN. NEWS (Mar. 18, 2019), https://news.stanford.edu/2019/03/18/stanford_university_launches_human-centered_ai/ [https://perma.cc/S9Y7-AD3J]; Mia Dand, *12 Organizations Saving Humanity from the Dark Side of AI*, MEDIUM (Sept. 27, 2018), <https://medium.com/datadriveninvestor/12-organizations-saving-humanity-from-the-dark-side-of-ai-bce8c9da1ea5> [https://perma.cc/2Q69-LQYG]. These include the Future of Life Institute at Oxford, the Stanford Institute for Human Centered AI, and the IEEE's Global Initiative on Ethics of Autonomous and Intelligence Systems. See Adams, *supra*; Dand, *supra*.

333. Isaacson, *supra* note 301. A 2017 Atlantic Council "report noted, 'federal R&D spending has shrunk significantly over the last few decades; once the world leader, the United States now ranks twelfth in government-funded R&D spending as a percentage of GDP.'" *Id.*

334. See *supra* notes 327–30 and accompanying text.

the National Science Foundation's funding of research.³³⁵ The rationale is that "there is no need for an AI moonshot, and that minimizing government interference is the best way to make sure the technology flourishes."³³⁶ As China expands its global influence, the United States is retreating due to the trade war and misaligned policies.

A widespread 5G infrastructure is necessary for AI implementation in various fields, such as smart cities, self-driving cars, smart factories, and medical equipment.³³⁷ Due to the diminution of U.S. dominance in the telecommunications industry, the United States is no longer able to drive standards allowing for software and hardware interchangeability.³³⁸ As a result, standards will be set by companies and governments in the EU and China.³³⁹ Previous generations of telecommunications companies faced this problem when the United States failed to adopt standards after the deregulation of the telecommunications industry in 1996.³⁴⁰ Although the EU adopted the GSM mobile network standard in 1987 and China in 1997, the United States permitted individual carriers to determine their own standard resulting in carriers with noninterchangeable systems.³⁴¹ As a consequence,

335. See OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, ANALYTICAL PERSPECTIVES: BUDGET OF THE U.S. GOVERNMENT, FISCAL YEAR 2020, at 268 (2019), <https://www.govinfo.gov/content/pkg/BUDGET-2020-PER/pdf/BUDGET-2020-PER.pdf> [<https://perma.cc/4BLJ-4DB9>].

336. Knight, *supra* note 331.

337. See *supra* note 298 and accompanying text.

338. Soo, *supra* note 260.

339. See Finley, *supra* note 327. In 2018, two of the top four 5G networking equipment companies were in China and the other two in the EU. Stefan Pongratz, *Key Takeaways – Worldwide Telecom Equipment Market 2018*, DELL'ORO GROUP (Mar. 4, 2019), <https://www.delloro.com/telecom-equipment-market-2018-2/> [<https://perma.cc/L479-V74G>]; see also Gisela Grieger, European Parliamentary Research Serv., *5G in the EU and Chinese Telecoms Suppliers*, at 1, PE 637.912 (Apr. 2019), [https://www.europarl.europa.eu/RegData/etudes/ATAG/2019/637912/EPRS_ATA\(2019\)637912_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/ATAG/2019/637912/EPRS_ATA(2019)637912_EN.pdf) [<https://perma.cc/U89G-R2Q8>].

340. See Soo, *supra* note 260.

341. *Id.*; see also *Brief History of GSM & the GSMA*, GSMA, <https://www.gsma.com/aboutus/history> [<https://perma.cc/8JKP-9BUR>]. The CDMA (Code Division Multiple Access) mobile standard developed by Qualcomm was adopted by Verizon and Sprint while the GSM standard was chosen by AT&T and T-Mobile and TDMA (Time Division Multiple Access) and AMPS (Advanced Mobile Phone Systems) by others still. Soo, *supra* note 260; see generally Arun A. Bhatjl, TDMA and CDMA in Mobile Communications (Apr. 13, 2004) (unpublished M.S. thesis, Florida State University), <https://fsu.digital.flvc.org/islandora/object/fsu:175931/datastream/PDF/view> [<https://perma.cc/VUY7-4NLA>] (describing CDMA and TDMA mobile technologies). CDMA is one type of radio technology used in the United States and GSM (Global Systems for Mobiles) is the radio technology adopted through Europe and much of the rest of the world. Sascha Segan, *CDMA vs. GSM*:

a device configured on one system would not work on another.³⁴² Lucent, for example, a former U.S. telecom communication equipment provider, chose CDMA and UMTS radio technology on which to build its equipment, neither of which were used in Europe.³⁴³ Additionally, the United States has wagered on mmWaves for its 5G spectrum allocation as opposed to China and the EU, who have opted to focus on mid-range bands further reducing the opportunity for interchangeability of components and access to the market abroad.³⁴⁴ Although higher frequencies result in faster speed and lower latency, they also are limited to much shorter distances and cannot pass through solid objects requiring a much denser base station installation than those that use lower frequencies.³⁴⁵ As a result, countries and municipalities around the world looking to save costs on infrastructure would choose Chinese equipment designed for these midrange frequencies, which most likely can be built on or adjacent to existing towers.³⁴⁶ The United States will be forced to build an entirely new, highly dense infrastructure for 5G costing billions for which it has no plans to fund again relying on private industry.³⁴⁷

Another important area that is being advanced without input from the United States is in cybersecurity. Huawei has already launched a Cyber Security Center in Brussels that seeks to create cybersecurity standards for telecommunications equipment.³⁴⁸ Huawei's Deputy Chair, Ken Hu, indicated that standards need to be adopted and agreed upon because global supply chains consist of components from all over the world with different

What's the Difference?, PC MAG. (Apr. 7, 2020), <https://www.pcmag.com/news/cdma-vs-gsm-whats-the-difference> [<https://perma.cc/BTA5-3EW3>].

342. See Soo, *supra* note 260.

343. *Id.* UMTS (Universal Mobile Telephone System) is a type of CDMA radio technology. See Segan, *supra* note 341.

344. See Kimberly A. Houser & Anjanette Raymond, *It Is Time to Move Beyond the 'AI Race' Narrative: Why Investment and International Cooperation Must Win the Day*, 18 NW. J. TECH. & INTELL. PROP. (forthcoming 2021) (manuscript at 33 n.191, 40, 58), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3582641 [<https://perma.cc/EXB2-UU3F>].

345. See Hongtao Zhan, *5G Will Hit a Wall, Literally, in 2019*, NETWORK COMPUTING (Jan. 15, 2019), <https://www.networkcomputing.com/networking/5g-will-hit-wall-literally-2019> [<https://perma.cc/YS8P-N8ET>].

346. See ERNST & YOUNG, *supra* note 117, at 28–29; Hsu, *supra* note 251; see also Jeremy Horwitz, *The Definitive Guide to 5G Low, Mid, and High Band Speeds*, VENTURE BEAT (Dec. 10, 2019, 1:29 PM), <https://venturebeat.com/2019/12/10/the-definitive-guide-to-5g-low-mid-and-high-band-speeds/> [<https://perma.cc/4KHR-E2MW>].

347. See Hillol Roy, *Tackling the Cost of a 5G Build*, ACCENTURE (Aug. 3, 2018), <https://www.accenture.com/us-en/insights/strategy/5g-network-build> [<https://perma.cc/8Z7S-5PM6>]. Accenture puts the potential cost at \$275 billion. *Id.*

348. Rob O'Neill, *Huawei: EU GDPR Regulations Provide a Model for Cyber Security*, RESELLER NEWS (Mar. 6, 2019, 9:30 AM), <https://www.reseller.co.nz/article/658493/huawei-eu-gdpr-regulations-provide-model-cyber-security/> [<https://perma.cc/S49Q-287M>].

or no standards.³⁴⁹ Locating the center in Brussels indicates a willingness to work with EU authorities who are already considered to have an advanced understanding of the issues based on their creation of the General Data Protection Regulation.³⁵⁰ Rather than pursuing collaboration with the United States, Huawei has announced a strategic alliance with the Moscow Institute of Physics and Technology (MIPT) in Russia.³⁵¹ This newly formed coalition will share strategy and work together to form AI technologies.³⁵² What is especially concerning is the United States' lack of cybersecurity innovations.³⁵³ According to two dozen national security experts, "America's computers are almost completely defenseless."³⁵⁴ Consequently, this failure puts the United States at great risk in a cyber war.³⁵⁵

349. *Id.*

New developments in All Cloud, intelligence, and software-defined everything are posing unprecedented challenges to the cyber security of ICT infrastructure. The lack of consensus on cyber security, technical standards, verification systems, and legislative support further exacerbates these challenges. Safeguarding cyber security is considered to be a responsibility held by all industry players and society as a whole. Growing security risks are significant threats to future digital society.

Huawei Cyber Security Transparency Centre Opens in Brussels, HUAWEI (Mar. 5, 2019), <https://www.huawei.com/us/press-events/news/2019/3/huawei-cyber-security-transparency-centre-brussels> [<https://perma.cc/C89D-G2H9>].

350. *Id.*

351. Varvara Bogomolova, *MIPT and HUAWEI Started Cooperation in the Field of Artificial Intelligence*, SCIENMAG (Aug. 19, 2019), <https://scienmag.com/mipt-and-huawei-started-cooperation-in-the-field-of-artificial-intelligence/> [<https://perma.cc/WXE9-T726>].

352. *Id.* This should be an enormous concern to the United States. By trying to isolate China, the United States has instead created an incentive for China to partner with others leaving the United States completely out. *See id.*

353. *See* KELLEY M. SAYLOR, CONG. RESEARCH SERV., R45178. ARTIFICIAL INTELLIGENCE AND NATIONAL SECURITY 15 (2019), <https://fas.org/sgp/crs/natsec/R45178.pdf> [<https://perma.cc/33LU-LEGG>]; *see also* Amy Zegart & Michael Morell, *Spies, Lies and Algorithms: Why U.S. Intelligence Agencies Must Adapt or Fail*, FOREIGN AFF. (May/June 2019), <https://www.foreignaffairs.com/articles/2019-04-16/spies-lies-and-algorithms> [<https://perma.cc/KF6S-UXYB>] (explaining how U.S. intelligence agencies are not keeping up with new technology, including AI). AI has enormous potential nonlethal uses for military purposes such as surveillance, reconnaissance, and logistics, for example. *See* SAYLOR, *supra*, at 9–11.

354. John M. Donnelly & Gopal Ratnam, *America Is Woefully Unprepared for Cyber-Warfare*, ROLL CALL (July 11, 2019, 6:30 AM), <https://www.rollcall.com/news/u-s-is-woefully-unprepared-for-cyber-warfare> [<https://perma.cc/33N2-AZKU>].

355. *See* Anthony Capaccio, *The Pentagon's Cybersecurity Is Falling Behind*, BLOOMBERG (Jan. 28, 2019, 1:00 AM), <https://www.bloomberg.com/news/articles/2019-01-28/pentagon-s-cybersecurity-found-unable-to-stay-ahead-of-attackers> [<https://perma.cc/U82U-8XBA>]. Although beyond the scope of this paper to discuss how advancements in

The movement towards protectionism is effectively preventing the United States from being able to influence the development and standards for AI as well. The EU has already drafted a plan for the ethical development of AI.³⁵⁶ China's prominence in 5G hardware, and its current installation in China and much of the EU, is permitting it to influence standards in this area for those who continue to adopt their technology.³⁵⁷ China has already begun working on an international set of global standards on ethical norms, which if adopted globally, will likely reflect Chinese culture and ideology rather than the West's.³⁵⁸ By withdrawing from international organizations and attempting to thwart rather than guide the responsible development of AI, we risk AI being created without appropriate safeguards for humanity.³⁵⁹ Without cooperation, tech companies in the United States and China will be competing with one another making it unlikely that they will devote time and resources to the coordinated development of AI for social good.³⁶⁰ The U.S. withdrawal from the WTO and its multilateral

AI relate to cybersecurity, it should be noted that even the Pentagon acknowledges that they are ill prepared to detect and prevent against cyberattacks by adversaries. *Id.*

356. See generally Tambiana Madiega, European Parliamentary Research Serv., *EU Guidelines on Ethics in Artificial Intelligence: Context and Implementation*, PE 640.163 (Sept. 2019), [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/ EPRS_BRI\(2019\)640163_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/ EPRS_BRI(2019)640163_EN.pdf) [<https://perma.cc/LH7A-FPFS>]. The Chinese have a different culture and different expectations of privacy than the United States. While China looks at facial recognition deployment as a helpful technology that can identify criminals as well as lost children, they are also engaged in the development of ethical standards for AI, which will reflect their cultural norms. Jane Zhang, *Privacy Vs Social Good: AI Must Balance Responsibilities, China Governance Expert Says*, SOUTH CHINA MORNING POST (Aug. 20, 2019, 6:30 AM), <https://www.scmp.com/tech/policy/article/3023407/old-problem-balancing-individual-rights-social-good-just-important-ai> [<https://perma.cc/B5RY-MYCZ>]. The United States has lost its ability to influence this ethical discussion for a variety of reasons, not the least of which is the trade war. See, e.g., *id.*

357. For a list of countries who have banned or adopted Huawei as the supplier of their 5G network, see Joe Panettieri, *Huawei: Banned and Permitted in Which Countries? List and FAQ*, CHANNELE2E (Jan. 14, 2020), <https://www.channel2e.com/business/enterprise/huawei-banned-in-which-countries/> [<https://perma.cc/HP76-JQZL>].

358. See Waddell, *supra* note 329. One of the concerns is that Chinese AI developed in the area of surveillance will be sold to authoritarian countries. Chris C. Demchak, *China: Determined to Dominate Cyberspace and AI*, 75 BULL. ATOMIC SCIENTISTS 99, 102 (2019).

359. See Amy Webb, *How Can We Design AI for the Best Long-Term Interests of Humanity?*, FAST COMPANY (Mar. 4, 2019), <https://www.fastcompany.com/90312306/how-can-we-design-ai-for-the-best-long-term-interests-of-humanity> [<https://perma.cc/HK5X-SSQJ>] ("The Big Nine [Google, Microsoft, Amazon, Facebook, IBM, Apple, Baidu, Alibaba and Tencent] should develop a process to evaluate the ethical implications of research, workflows, projects, partnerships, and products, and that process should be woven in to most of the job functions within the companies.").

360. Khari Johnson, *Amy Webb's 'The Big Nine' Predicts the Impact of AI and Tech Giants over the Next 50 Years*, VENTURE BEAT (Mar. 5, 2019, 2:25 PM), <https://venturebeat.com/2019/03/05/amy-webbs-the-big-nine-predicts-the-impact-of-ai-and-tech-giants-over-the-next-50-years/> [<https://perma.cc/ZQF3-85NS>].

agreements, along with its institution of a trade war with China, will reduce its influence in the world leaving a large gap, which China will be only too happy to fill. China's model of a government-controlled internet is already taking root in Vietnam and Thailand.³⁶¹ It is already apparent that there is no global consensus on what ethical AI looks like. Labeled AI for good, trustworthy AI, responsible AI, or AI governance, all acknowledge the transformative value of AI, but differ in how to address the risks involved. Developing standards in isolation will not work because of the global nature of technology today. While a global consensus may be difficult to come by, it will be devastating for the United States to have no role in this discussion.

VI. CONCLUSION

In recognition of their differing cultures and ideologies, one of the most important recommendations that came out of the 2013 Sunnyland Summit between President Obama and President Xi was the admonition "Do not allow bilateral differences and suspicions [between the United States and China] to derail cooperation."³⁶²

The Joint Working Group is concerned, however, that developments in bilateral relations could impede the ability of the two countries to work together to meet common global challenges, thus imperiling each country's long-run prosperity and security. Consequently, it is the responsibility of the leaderships of the two countries to step back from the current dynamic of US-China relations and begin an earnest search for a balance of interests that could underpin a long-term relationship that is largely cooperative.³⁶³

This prophetic statement acknowledges the need for international cooperation. The report goes on to warn of the danger of becoming "strategic . . . enemies" resulting in "devot[ing] increasing resources to unnecessary and counter-productive geopolitical and military competition."³⁶⁴ The report seems to predict that the failure of these two powers to work together will result in what we are seeing today: the trade war, currency destabilization, market uncertainty, and the potential for a cyber war, if

361. Lulu Yilun Chen & Yoolim Lee, *The U.S. Is Losing a Major Front to China in the New Cold War*, BLOOMBERG (Apr. 14, 2019, 2:00 PM), <https://www.bloomberg.com/news/articles/2019-04-14/china-wins-allies-for-web-vision-in-ideological-battle-with-u-s> [<https://perma.cc/BPB9-4BPP>].

362. FINGAR & GARETT, *supra* note 232, at 16.

363. *Id.*

364. *Id.*

not an actual war.³⁶⁵ The United States is wholly unprepared to deal with war in cyberspace due to the lack of appropriate cybersecurity protections and investment in technology. No border wall will be a defense against a cyber war.³⁶⁶ The United States is playing a game of catch-up, but rather than supporting its own tech industry it is seeking to slow down China's progress. The United States cannot afford to miss out on AI's potential to deliver \$13 trillion to the global economy.³⁶⁷ The U.S.-instigated trade war not only threatens the global economy and endangers democracy, it will likely cause an innovation winter—hindering future developments in AI. There is a very real danger that should the United States and China continue with this decoupling, the result could be a bifurcated internet, the development of technology on two divergent tracks, and a 5G infrastructure with non-interchangeable components requiring the rest of the world to choose a side. Although the damage from the trade war is likely to be long-term, if the United States does not learn how to exist in a world with a new balance of power, it will suffer the most from the coming Innovation Winter.

365. See Erik Gartzke & Yonatan Lupu, *Trading on Preconceptions: Why World War I Was Not a Failure of Economic Interdependence*, INT'L SECURITY, Spring 2012, at 115, 117–18, <https://www.jstor.org/stable/41428122> [<https://perma.cc/27NS-35D2>] (“The notion that international trade is associated with a decreased likelihood of conflict has found significant empirical support.”)

366. The Pentagon is diverting \$3.6 billion to fund the border wall desired by President Trump. Zachary Cohen & Ryan Browne, *Lawmakers Furious After Learning How Military Will Pay for Trump's Wall*, CNN POLITICS (Sept. 4, 2019, 7:29 PM), <https://www.cnn.com/2019/09/04/politics/lawmakers-pentagon-border-wall/index.html> [<https://perma.cc/D87X-6L5L>].

367. See Bughin et al., *supra* note 29.