THE FOURTH INDUSTRIAL REVOLUTION AND ITS DISCONTENTS:
GOVERNANCE, BIG TECH, AND THE DIGITIZATION OF GEOPOLITICS

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Introduction

In 2016, World Economic Forum founder and Executive Chairman Klaus Schwab published a book, *The Fourth Industrial Revolution*,[1] a concept that has since held currency as the umbrella term to frame and examine the impact of emerging technologies on all aspects of society in the early 21st century. Artificial intelligence (AI), fifth generation mobile networks (5G), three-dimensional (3D) printing, cloud computing, robotics, drones, virtual reality (VR) and augmented reality (AR), the Internet of Things (IoT), genomics, biometrics, and blockchain are commonly included in the list of present-day emerging technologies anticipated to provide human societies with the means to overcome global challenges like disease, poverty, and ignorance.

The Fourth Industrial Revolution (4IR) is distinct from prior revolutions in at least three ways. First, building upon the legacy of digital networks from the Third Industrial Revolution, the speed, scope, and scale of technological advance and diffusion in 4IR is quite unlike the world has ever seen before. It is evolving at an exponential rate and transforming virtually every industry in every country and all aspects of societal life. Second, it is about the dynamic fusion of digital, physical, and biological technologies. This merging is producing innovations that are issuing paradigm-shifting norms and upending existing ones. And third, many of the emerging technologies are personalized in nature that, while facilitating rapid societal integration, also create new normative challenges that

require major changes in the foundations of existing technology governance institutions.

All told, these features of 4IR animate disruptions in all aspects of society. The disruptions go beyond connecting smart, advanced machines and systems and the growing harmonization and integration of multiple disciplines and inventions: these developments are spurring conceptual breakaways and breakthroughs, forcing functions that are altering our ways of being, doing, perceiving, and thinking. Three factors will figure significantly in this revolution: technology governance, the role of Big Tech and platform companies, and the digitization of geopolitics.

Emerging Technologies, New Governance

Although still in its nascent period, 4IR is already marked by an inundation of innovations that are generating benefits and opportunities for people all over the world. However, not unlike all technological advancements, societal gains accruing from 4IR inventions are matched by negative disruptions and challenges. Laying the foundations for a different future virtually unchecked and in rapid fashion, the potential harm and risks associated with 4IR technologies are—at least in the West—causing great concern among various stakeholders, including governments, members of the science and technology (S&T) community, the private sector, nongovernmental organizations, ethicists, and a whole array of citizens' groups.

At the core of this concern are two interrelated issues—the ethical and legal dimensions of the innovations, and oversight over the direction and future development of emerging technologies to ensure that benefits are maximized while costs and risks are minimized. As a World Economic Forum White Paper on technology governance puts it:

> The speed with which new technologies converge, resulting in new applications and new technological combinations, increases the rate of obstacles and dilemmas for institutions and societies. At all levels—global, national, municipal, organizational and even familial—we are struggling to develop and enforce new sets of rules and behaviors at an equivalent speed in order to get the most out of emerging technologies while managing their risks . . . At this stage of the Fourth Industrial Revolution . . . there is no central point of reference for technology governance, and relatively few "leading practices."[2]

How can we ensure that innovations in AI, robotics, and gene-splicing do not violate human dignity and the core values of being human? What principles and rules should govern the conduct of cyberwar and drone use? What might an ethics of surveillance look like? Who should assess the risks and benefits of innovation? How do we guarantee responsible and ethical innovation in an unequal world? What are the universal design principles and values that should guide our thinking, design, and development of technology?[3]

These questions illustrate the kinds of dilemmas and conditions that must inform multi-stakeholder technology governance discussions. They point to two overarching imperatives. First, the need to know and understand the values of the inventors. Technological innovations do not happen in a vacuum: the disruptive nature of emerging technologies stems from the offer of new normative, organic (i.e., "still-in-the-making") criteria derived from the intent of the creators and users. And second, the need to create the world's future in a principled manner.[4] Moving the global governance discourse forward requires a "whole-of-world," multi-stakeholder effort that treats technology-making and technology futures as dynamic, governable spaces that humankind can shape.

Current efforts to improve global technology governance face serious gaps and challenges. First, governance approaches around the world are diverse in terms of institutions, processes, and priorities depending on the countries' levels of technological and economic development. Second, countries have different national interests, and national governance strategies reflect to protect these differences. Third, there is a dearth of governance bodies that function in the fashion of 4IR and emerging technology dynamics, ie., multi-stakeholder, multi- and cross-disciplinary, multi-domain, multilevel (domestic-regional-global), innovative, and adaptable.[5] Fourth, governance initiatives that do exist have a short shelf life, quickly becoming ineffective when pitted against the normative requirements of new and rapidly evolving innovations. And fifth, stakeholders may prefer the absence of technology governance mechanisms in order to have a wider range of strategic options insofar as the use of particular emerging technologies is concerned to protect national interests.[6]

There is great opportunity to define the as yet sparsely populated space of emerging technology governance to parallel the development of the cyber domain as human territory. The gaps and challenges mentioned in brief here are lessons from past revolutions, submitting that if the gov-

ernance of emerging technologies is to work, its tenets should be as disruptive as the intent and consequences of the technologies themselves.

BIG TECH: BIGGER THAN EVER

In 1995, 25 years ago, the Internet started with 16 million users, or 0.04% of the world's population of around 5.7 billion. Today the number of users is at 4.7 billion (58.7% of the world population), just one billion over the 1995 population.[7] Whether information is like oil or "sunlight,"[8] it is becoming, in this nascent period of the Fourth Industrial Revolution, the most valuable, strategic, and contested resource in the world.[9] One of the most dominant themes of the discourse on the Information Revolution is the growing importance of data in all aspects of human society: as centerpiece of the 21st century economy, driver of socio-ethical change, and lynchpin of geopolitical and security dynamics.

Controlled by the very few in Silicon Valley at the outset, the emergence of information as a new resource created a technology oligarchy of immense wealth, power, and influence. The economic weight of Big Tech[10]—as they are known today—dominates global trade and investment. Four of America's top five tech firms (Alphabet, Amazon, Apple, and Microsoft) are each worth over $1 trillion each. The combined value of the five—including Facebook (#7 in revenue)—is around $2 trillion, roughly equivalent to Germany's entire stock market,[11] the ninth largest in the world. Alibaba, Baidu, Huawei, JD.com, and Tencent hold similar rankings in China's tech industry, and together with America's five, round out the list of the world's top 10 tech revenue earners. Seven of these firms (America's five plus Alibaba and Tencent) are among the world's top 10 most valuable companies.[12] Combined, the firms' value, earnings, resources, scope, and reach of investments and influence put them in the leading position to continue informing the techno-economic agenda of 4IR.

Attendant to its tremendous economic value is Big Tech's role in framing the socio-ethical debates pertaining to privacy and emerging technologies such as AI. While the Third Industrial Revolution paved the way for universal access to information and individual empowerment through the Internet, it also gave the tech oligarchs a new kind of unregulated power to control virtual information and to manipulate and shape human behavior with the help of AI-based innovations. The construct of this discourse, however, is quite different between America's Big Tech and

China's tech titans owing to the profound differences between the two countries' political systems.

In the United States up until recently, the tech giants were on the receiving end of a "techlash"—public criticism, among other issues, for their alleged disregard of individual rights to privacy in the digital domain[13] and for failing to incorporate environmental, social, and governance (ESG) criteria into their business strategy and decisions.[14] Of late however, the idea that firms "with a sense of purpose" could address issues like social injustice, climate change, and inequality is sweeping across sectors of the business community.[15] This proposition proceeds from the notion that the firms' increased power imposes new demands on them. Per Microsoft CEO Satya Nadella, the combination of having a sense of purpose with a mission that is "aligned with what the world needs" is a powerful way to win public trust. And because trust matters, the core of Microsoft's business model is purpose. He goes on to say that:

> As technology becomes so pervasive in our lives and society, we as platform companies have more responsibility, whether it's ethics around artificial intelligence, cyber-security or privacy . . . There is *moral obligation*.[16] [emphasis added]

Today, this vision recalibration finds a more visible presence of American Big Tech and other Western firms in multilateral deliberations that address the impact of emerging technologies on societies. International fora such as the World Economic Forum have become important venues for them to articulate their techno-social responsibility policies and plans on issues like privacy, ethics, and AI. This normative space will likely continue to expand for the private sector not only because they have extensive resources, but also because state capacity to wrestle with technology-based legal/ethical dilemmas is simply outmatched by the speed of technological invention and diffusion. Making themselves a part of the discussion will further enhance the private sector's influence in the broader process of "norm-shaping" moving forward.

On the other side of the world in China, the world's other five Big Tech firms inform the digital information discourse in a significantly different way. Unlike their Western counterparts, China's Big Tech is under the authoritarian state's tacit control, and the power and authority that undergirds the ownership and use of citizens' personal data is exclusively

exercised by the state—i.e., the Chinese Communist Party. Domestically, Big Tech's development of 4IR technologies including AI-powered surveillance devices and systems have become a critical feature of the state's strategy to further enhance and assert its power and repressive capacity. The government's relentless and systematic use of advanced and invasive surveillance in its crackdown on the minority Uyghur population in Xinjiang and the million or so in detention camps is cited as the prime example of how technology can be used to establish complete population control.

This Chinese model of digital authoritarianism has caught the attention of other autocracies.[17] Its tech giants and data platform companies have been instrumental not only in selling digital technologies to these countries, but in the process of doing so, also exporting the Chinese model of "cyberspace management." Studies show that the transfer of China's authoritarian DNA to existing repressive regimes have transformed the latter into "durable digital autocracies,"[18] with the imported technology platforms providing the wherewithal to support repressive cultures. Arguably, this group of "early adaptor" countries could serve as important allies to China in its global drive to promote an alternate vision of international order.

Seen in this light, Big Tech serves at the forefront as "vectors"[19] of China's geopolitical agenda, supporting the strategic objectives of the state in the domestic and international fronts. While their counterparts in the West are wrestling with trying to strike a balance between their techno-economic interests and their social and ethical responsibilities, China's tech giants are inventing, using, and diffusing new technologies that promote and support the values of state authoritarianism.

Competition among the world's top 10 tech firms (five each from the United States and China) for technological leadership in the virtual domain is thus platformed on two fundamentally different propositions of the digital future and cyberspace reality—one grounded on the principles of liberal democracy, and the other on the tenets of authoritarianism. Working through the governance of the digital world as it is will be a daunting task but will be even more so if the power players proceed by defaulting to their respective normative corners. There are indications that cyberspace currents are already headed that way (see next section). In concert with a central geopolitical motif, technology rivalry and normative power have the United States, China, and their respective tech and data platform companies as the most prominent players.

GEOPOLITICS IN THE STATE OF THE CLOUD

The digitization of geopolitics is the process--currently in its early phases—that transfers the scope of political reality into the virtual domain. However, digital geopolitics should not only be seen as "a layer superimposed on conventional geopolitics, but as a major geopolitical force itself that will create its own new alignments among new actors, and not only states."[20] The process of migration itself generates new sources of geopolitical currents. The previous section examined the pivotal role of the tech giants in shaping the cyber domain discourse. The choice of platform company matters because it is linked to regime type. Under the rubric of U.S.-China strategic competition, the ongoing debates about the risks and benefits of using Huawei's 5G to upgrade national telecommunications infrastructures are no longer just matters of economic or technology policy, but one of national security and the future of the international order. As a British study of Huawei and 5G puts it:

> . . . we should remind ourselves that China's military strategists perceive a world in which the military and the civilian will be fused into a single plane of conflict. The ability to control communications and the data that flows through its channels will be the route to exercise power over societies and other nations.[21]

From this vantage point, the decision of traditional American allies, Thailand and the Philippines, to opt for Huawei 5G and/or other Chinese data platform companies is unsettling one of the cornerstones of post-World War II international security architecture. These deviations suggest that variations exist among allies' views on the global role of China, and that the strategic value of the ally's relations with China has risen to rival the alliance agenda, alongside changes in its bilateral relations with the United States.

Absent emerging technology governance on the global level, the expectation is the emergence of a wider spread of new regulatory or governance regimes as countries and/or regions attempt to manage the impact of technological advancements. For instance, the digital overlay on the "conventional" geopolitical map suggests an emerging "new technological global divide" between the United States and Europe based on differing

views of technology as a strategic instrument.[22] Consequently, whereas the European Union (EU) has established an "extensive regime around data, data privacy and human rights," the United States has been focused on technology-building complemented by "light-touch regulations" that put the onus of managing the consequences of technology use to companies and societal groups.[23]

The EU's preoccupation with data and data privacy is not excessive. The strategic, economic, and monetary value of digital information has given rise to cybercrime. Cyber criminals are taking advantage of weak, diverse, or absent, cyber governance laws to operate globally, anonymously, and with impunity. Their activities can be politically consequential: they can be hired to undermine political rivals or enemies, destabilize a country by damaging critical infrastructure, paralyze business operations that can cause societal panic, steal state secrets for ransom, and so forth. They present serious political, diplomatic, legal and security challenges to all states, and for as long as cybersecurity is not collectively addressed, cyber criminals will continue to occupy dangerous and unregulated territory in the cyber domain.

The Planet and the Cloud

The coexistence of the virtual and the real has spurred the introduction of new concepts, connotations, and constructs in the language of geopolitics. The digitization of war—cyberwar—not only extends warfighting into the virtual; writing on the state of military art today, professor of war studies Lawrence Freedman finds that the common theme

> . . . was of the blurring of boundaries—between peace and war, the military and the civilian, the conventional and unconventional, the regular and the irregular, the domestic and the international, and the state and the non-state, the legitimate and the criminal.[24]

He also examines "gray zone" conflicts, located "somewhere between peace and war, where the action chosen was deliberately kept below the threshold that would spark major war."[25]

These states of "blur and between-ness" essay the role of advanced digital and emerging technologies in a complex geopolitical landscape of

two spaces (virtual and real). They expose the inadequacy of traditional concepts and tools of statecraft to explain and address the changes attendant to the process of digitization.

Both Russia and China are proving to be highly successful operators in this dual environment. The seminal work on "sharp power" specifically refers to Russia and China as authoritarian states who use "aggressive and subversive" policies to project state power in democratic countries with the intention to "manipulate their targeted audience by distorting the information that reaches them."[26] Indeed, Russia's preferred gray zone tactic is using disinformation campaigns (such as in the U.S. 2016 presidential elections) to undermine political institutions, while China uses a more "materially threatening form" in its conduct of gray zone operations.[27]

Operating along blurred conceptual lines and in gray zones are pivotal venues in the contest of global narratives and power projection. Thus far, the United States and its allies have yet to come up with a strategy to address rapidly emerging gray zone challenges in a timely, responsive manner.[28] In order for the United States to enhance its strategic advantage over Russia and China, it needs to be present in these new areas of contested spaces. Whoever assumes control over the levers of power in the real and digital arenas will be in a position of global leadership.

In the virtual world thus, we see a distinct architecture of interconnectivity that features a more prominent role for Big Tech and platform companies and other non-state actors (to include terrorists, underworld criminal organizations, individuals, and citizens' groups). We also detect the emergence of new divides among states, the resurgence of Russia as a potential cyber power, weakening and/or shifting alliances, and potential nation-based coalitions organized along techno-authoritarian lines. The digitization of geopolitics is reshaping the strategic layout of international relations, accompanied by new concepts and constructs that capture the dynamics of change from the real to the virtual domain.

CONCLUSION

This chapter explores three issues that figure importantly in understanding the dynamics of the Fourth Industrial Revolution. Technology governance, the role of Big Tech, and the digitization of geopolitics inform the disruptions in the revolution. The persistence of technology governance ideas that affirm the supremacy of the Westphalian order is a negative disruption that inhibits the construction of a governance regime that

function in the fashion of 4IR and emerging technology dynamics: multi-stakeholder, multi- and cross-disciplinary, multi-domain and multilevel (domestic-regional-global), innovative and adaptable.

The rise of Big Tech is in and of itself a disruptive force. Together with data platform companies, they have had the primary charter of transfer to digitize geopolitics. As principal players in cyberspace, they are the gatekeepers to the universal adoption of "everything and anything digital" that is now materializing into a new strategic space for the conduct of societal affairs—cyber domain—"a technology-enabled domain for humans and machines to live and interact, a hypostatic abstraction, a political reality."[29]

The political theorist Langdon Winner famously proposed that "artifacts have politics."[30] The digitization of geopolitics is not a mechanical process. The migration of "conventional" geopolitics to the virtual domain is a disruptive process that is rife with social, ethical, and legal conversations. The proliferation of conceptual and contested blurred lines and the inherent ambiguity of gray zones indicate that we are still in the early phases of transfer, and that the normative structure that will define the beginnings of the Fifth Industrial Revolution is still far off on the distant horizon.

Notes

1 Klaus Schwab, *The Fourth Industrial Revolution* (New York: Currency Books, 2016).

2 "Global Technology Governance: A Multistakeholder Approach," World Economic Forum, October 2019, 5, http://www3.weforum.org/docs/WEF_Global_Technology_Governance.pdf.

3 This last question from: Satya Nadella, "The Partnership of the Future," Slate, June 28, 2016, https://slate.com/technology/2016/06/microsoft-ceo-satya-nadella-humans-and-a-i-can-work-together-to-solve-societys-challenges.html.

4 Ibid. Nadella citing computer pioneer Alan Kay, who was quoted as saying, "The best way to predict the future is to invent it." Also see: Tony Prophet, "Ethics and Technology in the Fourth Industrial Revolution," World Economic Forum, January 21, 2019, https://www.weforum.org/agenda/2019/01/ethics-and-technology-in-the-fourth-industrial-revolution/.

5 "Global Technology Governance," World Economic Forum, 4.

6 Virginia B. Watson, "Offsetting the Impacts of Emerging Critical Technologies," in *Emerging Critical Technologies and Security in the Asia-Pacific*, ed. Richard Bitzinger (London: Palgrave Macmillan, 2016), 70-71.

7 "Internet Growth Statistics," Internet World Stats, https://www.internetworld-stats.com/emarketing.htm; "Population Pyramids of the World," https://www.populationpyramid.net/world/1995/.

8 "Digital Plurality," *Economist* 434, no. 9182 (February 20, 2020): 4.

9 "The World's Most Valuable Resource is No Longer Oil, But Data," *Economist* 423, no. 9039 (May 6, 2017), https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data.

10 "Big Tech" became part of mainstream language in 2013, but the turning point for using it as a label ascribed to the largest U.S. Internet companies occurred in 2017. The list includes U.S. companies like Alphabet, Amazon (also the world's largest retailer), Apple, Facebook, Microsoft (aka 'Big Five'). From Asia, the list would include Alibaba (PRC), Baidu (PRC), Fuji (Japan), Huawei (PRC), JD.com (PRC), Samsung (ROK), Tata (India), Tencent (PRC). It was during this period when President Trump accused Amazon of being a monopoly, making it a target for antitrust action. There were questions on the extent of Big Tech's role in spreading misinformation and facilitating foreign interference in the 2016 U.S. elections. And it was also during this time when Congress summoned some of these companies to take part in hearings that sought to clarify their role in Russia's U.S. election meddling. Will Oremus, "Big Tobacco. Big Pharma. Big Tech?" Slate, November 17, 2017, https://slate.com/technology/2017/11/how-silicon-valley-became-big-tech.html.

11 "Big Tech's $2Trn Bull Run," *Economist 434,* no. 9182, February 22, 2020: 9.

12 "Most Valuable Companies in the World: 2020," FXSSI, May 23, 2020, https://fxssi.com/top-10-most-valuable-companies-in-the-world.

13 Another major reason for the 'techlash' was public concern over the tech companies' lackluster efforts to stop ISIS and other terrorist groups from working their messages online. See Google/Facebook response in Joseph Menn and Dustin Volz, "Exclusive: Google, Facebook Quietly Move toward Automatic Blocking of Extremist Video," Reuters, June 24, 2016, https://www.reuters.com/article/us-internet-extremism-video-exclusive-idUSKCN0ZB00M.

14 "I'm from a Company, and I'm Here to Help," *Economist* 432, no. 9157, August 24, 2019: 14.

15 Ibid.

16 Ibid., 15.

17 Huawei, for example, is reported to have deployed its digital surveillance technology to at least a dozen authoritarian regimes. Andrea Kendall-Taylor, Erica Frantz, and Joseph Wright, "The Digital Dictators: How Technology Strengthens Autocracy," Foreign Affairs 99, no. 2 (March/April 2020): 103-115; Steven Feldstein, "The Road to Digital Unfreedom: How Artificial Intelligence Is Changing Repression," Journal of Democracy 30, no. 1 (January 2019): 40-52.

18 Kendall-Taylor et al., "Digital Dictators," 112.

19 Paul Triolo, of Eurasia Group, quoted in "The Challenger," Economist 426, no. 9083 (March 17, 2018): 19-22.

20 Steven Weber and Gabriel Nicholas, "Data, Rivalry, and Government Power: Machine Learning Is Changing Everything," *Global Asia* 14, no. 1 (March 2019): 22-29.

21 Bob Seely, Peter Varnish, and John Hemmings, "Defending Our Data: Huawei, 5G, and the Five Eyes," Henry Jackson Society, May 16, 2019, 3, https://henryjacksonsociety.org/wp-content/uploads/2019/05/HJS-Huawei-Report-A1.pdf.

22 Ibid. Also, Lesley Seebeck, "The New Global Technology Divide," Australian Strategic Policy Institute, July 11, 2019, https://www.aspistrategist.org.au/the-new-global-technological-divide/.

23 Ibid.

24 Lawrence Freedman, *The Future of War: A History* (New York: Public Affairs, 2017), 284-285.

25 Ibid., 285.

26 Juan Pablo Cardenal et al., "Sharp Power: Rising Authoritarian Influence," National Endowment for Democracy, December 5, 2017, https://www.ned.org/wp-content/uploads/2017/12/Sharp-Power-Rising-Authoritarian-Influence-Full-Report.pdf.

27 Lyle J. Morris et al., Gaining Competitive Advantage in the Gray Zone (California: RAND Corporation, 2019), xi, https://www.rand.org/content/dam/rand/pubs/research_reports/RR2900/RR2942/RAND_RR2942.pdf.

28 Ibid., xiii.

29 William Gibson, "A consensual hallucination experienced daily by billions of legitimate operators," Neuromancer (1984), cited in Fabio Rugge, "Emerging Disruptive Technologies and International Stability," *The Global Race for Technological Superiority*, ed. Fabio Rugge (Italy: Italian Institute for International Political Studies, 2019), 20, https://www.ispionline.it/sites/default/files/pubblicazioni/ispi_cybsec_2019_web2.pdf.

30 Langdon Winner, "Do Artifacts Have Politics?" *Daedalus* 109, no. 1 (Winter 1980): 121-136, https://www.jstor.org/stable/20024652.