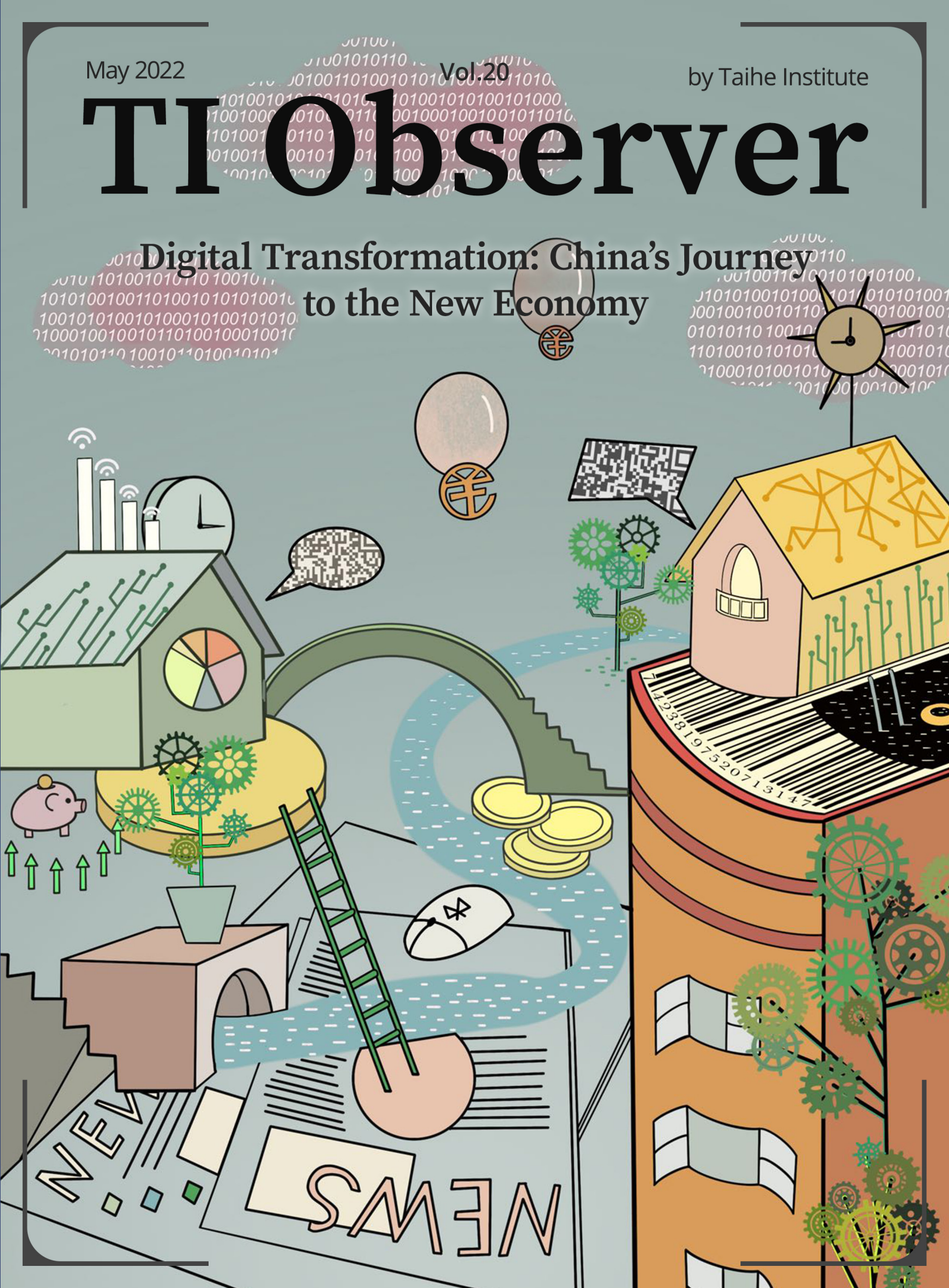
May 2022 Vol.20 by Taihe Institute

TI Observer

Digital Transformation: China's Journey to the New Economy



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How China Breaks Through the Western Hegemony in Telecommunications

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Learning from the history of telecommunications

The telecommunications industry has become one of the primary targets of the heightened demand for digital sovereignty, epitomizing the fierce competition over technology leadership as well as the crisis in global governance. The problem is not one of sovereignty or the right to make independent policy choices, but the fine line separating sovereignty from nationalism and protectionism. Once relegated in the West as a commodity and low-profit-margin industry, mobile communications networks are now regarded as key enabler for the digital transformation, as critical infrastructure, and thus a matter of economic and national security.

Since the Trump administration and continuing under the Biden administration, the United States has started banning 5G network equipment from Chinese suppliers and kept pushing the European Union, its members, and other leading economies to exclude and remove Huawei and ZTE equipment from their mobile network infrastructure. This ban is complemented by the US government's unilateral trade restrictions on China's semiconductor makers and importers to sabotage and contain China's development in this and other key technology areas that are deemed a security risk. Those measures are aligned under the Biden administration's whole-of-government approach, which seeks both to strengthen US competitiveness and to restrict and contain the development of China.

For now, the European Union has resisted an outright ban of Chinese technology

companies. However, the European Commission has introduced a series of cybersecurity regulations that also target Chinese technology companies. While cybersecurity is essential for mitigating the rapidly changing and intensifying landscape of cybersecurity threats and for building trust and confidence in the digital economy, the EU aims at minimizing its exposure to "high-risk suppliers" and "avoiding dependency" on these suppliers at national and EU levels. Although no evidence has been provided about intentional security breaches linked to Chinese network equipment, and bans based on the nationality of the equipment provider offers little assurance for cybersecurity, several European countries have effectively sanctioned Chinese telecommunications equipment.

After a few decades of open trade and global innovation in telecommunications, during which Western mobile operators enjoyed buying China's lower priced and increasingly high-quality mobile communications equipment, the rise of protectionism and technology nationalism in the West reminds of the technological silos that determined most of the 20th century, especially in the telecommunications sector.

During the previous century, a few Western states – including the United States, France, Germany, the United Kingdom, as well as Japan – could sustain their own "natural monopolies" as well as their domination of the international telecommunications industry. This system of regulated telecommunications monopolies lasted in the U.S. from 1913 to the 1980s and in Europe until the 1990s. It was sustained through rent-seeking, cartelistic arrangements, and government favoritism on a national level and reinforced through the technology hegemony of the West and its domination and control at the international level. While less developed countries could set up their own state monopolies and benefit from Western technologies, the West gained most from its monopoly, as it kept its international advantage through domination and coercion, as well as control over technology standards, adoption, spillovers, and its multinational corporations governing global supply chains.

Such asymmetrical distribution of power and technology was also sustained on a multilateral level, mainly through the Western-dominated International Telecommunication Union (ITU), which effectively suppressed the less developed world in the acquisition of knowledge for developing their own native technology industry. Controlling the international policy discourse, the West did not set up ITU for bargaining or the redistribution of technological capabilities, and an asymmetrical settlement for joined services for the benefit of less-developed countries remained a voluntary matter for rich world operators. Overall, the West

was not interested in the non-West to become technologically self-sufficient.

Amongst the late emerging economies, however, China has been the only exception who successfully managed to break through the Western hegemony and become a global leader in mobile communications. Harvard Professor Dani Rodrik has shown that market mechanisms alone are not sufficient to transform a poor country into a rich one, which has always been the laudable purpose of Western development aid. However, this transition from poor to rich requires state intervention, including the development of human capital, robust institutions, and modern industries. China's development approach confirms Dani Rodrik's observations. However, as the West has lost its relative competitiveness in telecommunications, it no longer tolerates what it had practiced itself during most of the 20th century, that is state interventionism.

China's rise

Similar to other less developed or late emerging economies, China's telecommunications network was lagging behind those of Western nations. In 1978, China operated merely 1.93 million telephones. Thus, as part of the reform and opening-up agenda in 1978, the Chinese government started viewing telecommunications as a critical infrastructure for economic development and competitiveness.

To catch up with the West and narrow the technology gap between China and the West, the government pursued three development paths. First, in the early 1980s, the government initiated a national initiative to boost domestic R&D. The purpose of the government-led program was to track global trends and carry out research in areas useful for China; to train China's new generation of students, scientists, and engineers and generate up-to-date industry and scientific knowledge; and to offer R&D funds for the state-owned and growing private enterprise sector. These R&D objectives were part of a larger plan, which was in support of the development of China's national defense system. China's national R&D program resembled the Strategic Defense Initiative (SDI) in the United States, Eureka in Western Europe, or the Human Frontier program in Japan.

Second, China started importing Western technologies using loans from the World Bank or the Asian Development Bank. The import of the latest Western technologies gained momentum in 1986, when the State Council approved lower

import tariffs. Importing Western technology was a clear break with the previous socialist doctrine of self-reliance. However, to prevent foreign-dependency and build local capacity, China followed the "policy of import, digestion, absorption and creation." The Western companies selling their products to China were required to transfer their technologies to state-owned enterprises (SOEs). Western companies were required to form joint ventures (JVs) with local firms, as practiced in other industries, and to set up their production and assembly lines in China. The JV approach was necessary to upgrade China's outdated production facilities.

The potentially huge telecommunications market provided bargaining power for the Chinese government, so Western companies mostly complied. While Siemens and its rival Alcatel were the first transnational corporations (TNCs) in China, companies like Cisco, NEC, Lucent, Nortel, or Ericsson soon followed suit as they feared losing this market entry opportunity. As a result of the JV-driven foreign direct investment approach, imports decreased, local manufacturing outputs increased, and Western companies retained their high market share for some time.

The third critical path of China's catching-up was the government's gradual introduction of a market for local equipment manufacturers. The challenge was the recurring technology gap that emerged with each generational advancement. Domestic competition between equipment manufacturers intended to accelerate the catch-up process and narrow the gap with each technology upgrade.

The government actively encouraged the establishment of local companies, supported independent innovation, and eventually fostered their internationalization. A group of three enterprises emerged in the mid-end 1980s, including ZTE (1985), Julong (1989), and Huawei (1987). Datang was another company that was established in 1998. While the former two and Datang were SOEs, Huawei was the only private company. Those four local companies fiercely competed against each other and against foreign companies. While the SOEs could strongly rely on government support and state loans, Huawei faced a continuous uphill battle as it largely lacked government support.

The introduction of competition paid off. The Chinese manufacturers built cheaper yet reliable alternatives and shortened the catch-up cycles between each new generation of communications technology. Consequently, foreign companies were increasingly pushed out of the market and towards the end of the 1990s, many JVs often ended in divorce.

In 1996, the import policy from 1986 had ended. While core network components were no longer imported, unavailable technology continued to be licensed from Western companies like Qualcomm's CDMA (Code Division Multiple Access) technology or Cisco's data switches and routers. With technology adoption and spillovers predominantly under the control of the Western multinationals, Chinese equipment manufacturers were accused of imitating or reverse engineering Western production and assembly lines or even intellectual property (IP) theft. In any case, the success of catching up is attributed to the combination of three development approaches – national R&D program, import and joint ventures, domestic competition – all of which led to the technology capacity and capability necessary to ensure the establishment of a fast-growing domestic telecommunications and ICT (Information and Communications Technology) industry.

The introduction of market competition proved to be a determinant of China's success. Unlike the other two SOEs, ZTE was state-owned but privately managed and, therefore, did not have to be accountable under different ministries. Among other factors, ZTE's success could be largely attributed to this aspect of enhanced self-management and thus the ability to respond more quickly to market demands. This explains why Huawei, which is the only privately-owned company amongst the four domestic competitors, came out as the winner of the local competition.

Around 2005, Julong was driven out of the market and Datang remained a local player. Despite its domestic and international success, ZTE increasingly lagged behind Huawei during the 2000s. Over the next generations of mobile communications technology, including 3G (2000), 4G (2010), and 5G (since 2020), Huawei subsequently became the global industry leader in terms of global market share, technology standards-setting, as well as declared 5G and ICT patent families. Huawei is ahead of its main competitors, including Samsung (Korea), ZTE (China), LG (Korea), Nokia (Finland), Ericsson (Sweden), or Qualcomm (the United States), and owned 40 percent of all 6G patents worldwide as of September 2021.

Overall, the rise of China's telecommunications industry was extremely successful. In 1978, only 0.38 percent of China's households had a telephone, which meant that China lagged behind the United States by 75 years. In 2004, China started ranking first globally in the total number of both mobile phone (270 million) and fixed line (260 million) users, and, in 2008, in total Internet users (253 million). In October 2021, about 1.64 billion mobile phone subscriptions were registered

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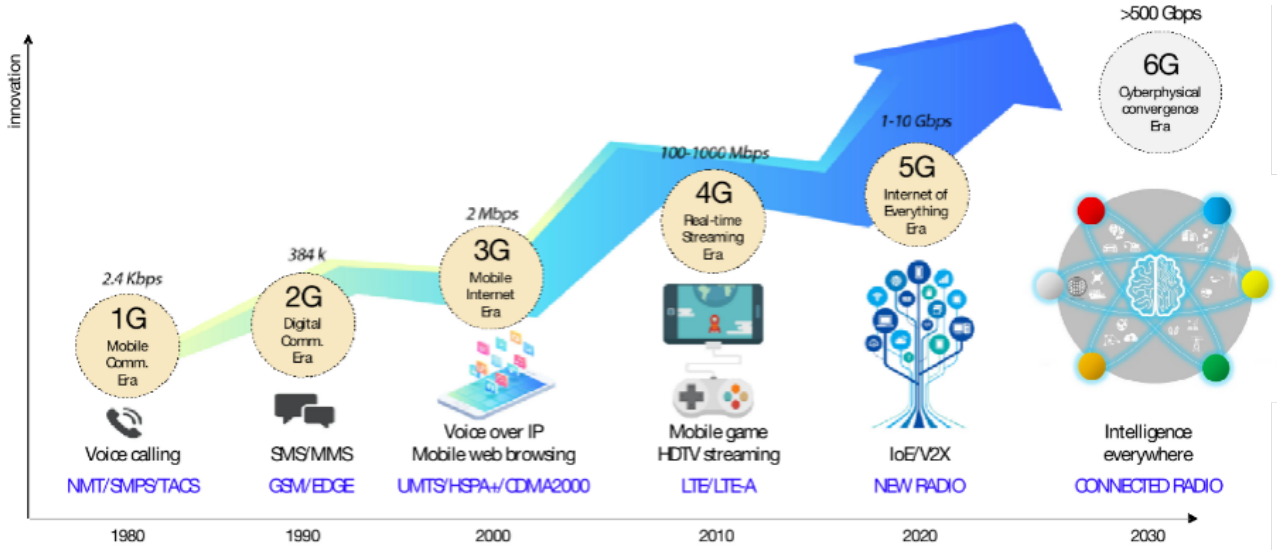

Figure 1: Evolution of mobile communications systems from 1G to 6G
Note: Evolution of mobile communications systems. Modified from *5G and beyond: fundamentals and standards* (p. 3), by X. Lin and N. Lin (eds.), 2021, Springer Nature.

in China, and the number of Internet users had surpassed one billion as of June 2021, thereby further reducing its digital divide.

China's successful development approach has confirmed Rodrik's observation that market forces alone are insufficient to achieve structural change. The government played an important role in setting up the domestic playing field, formed the industry actors and defined the rules of the game. In 2019, however, Huawei and other Chinese high-technology companies got severely hit by unilateral sanctions imposed by the United States, which had the effect of damaging not just Huawei's but China's development. The Western world is suppressing China's international rollout of 5G networks, and there is a complete decoupling of R&D work leading to the sixth generation (6G).

Conclusion

Ubiquitous digitalization and connectivity will increase the threat surface for cyberattacks, which poses a national security issue. However, the history of telecommunications suggests that today's tension between the West and China is less an issue of security, but more one of competition and domination. While China's state interventionism will continue for China to reach its development goals and further transition towards a prosperous economy and society, the West

experiences its own renaissance of state intervention to tackle climate change and manage its own transition towards a fully digitalized future. This could be good news, as the negotiation of new competition rules is less difficult than negotiating national security concerns.

The history of telecommunications also confirms that telecommunications is an infrastructure that is primarily critical for development and growth rather than for sustaining national security. As no other technology, mobile communications has been the most successful one, and the most successful mobile network generations were those defined by standards that became globally implemented. Decoupling is justified on the basis of national security risks while undoing the previous success and regressing to old technological and ideological silos of the West.

Global Challenges and Opportunities of a National Digital Strategy

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Over the past decades, as with many other countries, China has evolved from an agricultural economy to an industrial economy to a digital economy. This has been driven by numerous forces: the exponential improvements in the price-performance of digital technologies; the value that enterprises, governments, and individuals can appreciate through these technologies; a variety of digital business strategies; tech firms' global competition and innovation; and deliberate planning by central, provincial, and local governments to pursue global leadership in specific technologies such as mobile communications, robotics, artificial intelligence, and big data.

Price-performance improvements. Digital technologies continue to exponentially improve thanks to new technologies, new manufacturing processes, new algorithms, and the cross-fertilization of ideas. Disruptive new technologies offer promise for continuing improvements: for example, quantum computing may be able to solve certain classes of problems formerly considered too computationally complex to be solved in meaningful timeframes; quantum communications may be able to provide "unbreakable" communications channels; 5G and 6G offer previously unimaginable bandwidth for mobile communications at improved latency, density, energy usage, and other performance characteristics; and neuromorphic chips offer the promise of faster learning and computation for certain tasks by mirroring human thought processes.

Distributed computing architectures are combining the best of centralized "cloud" facilities with distributed; tying these together with highly interconnected networks with previously unimaginable bandwidth; running complex technologies

such as artificial intelligence, machine learning, speech recognition and synthesis, and natural language understanding; and fostering platforms and applications including social media, gaming, messaging and communications, e-commerce, e-books, streaming media including video and music, collaboration tools, payments, virtual/digital currencies, e-government, telehealth, connected autonomous vehicles, drones, robots, sensors, actuators, 3D printers, and more.

Business value. Meanwhile, stakeholders from different segments are realizing the value that these technologies bring. For example, consumers appreciate the convenience and functionality that mobile phones offer and the ability to shop, learn, or focus on health and wellness from home; enterprises can use digital technologies to reduce cost, grow revenues, build more durable customer relationships, enhance sustainability, e.g., by optimizing processes and resource utilization to reduce carbon emissions from operations, and more.

Digital business strategies. The trends driving digitalization are the same the world over, however individual responses to those trends vary. Digital technologies can create value in many ways. For example, they can improve processes and resource utilization, by substituting virtual resources for physical ones, or by optimizing and reimagining processes, or by reducing resource requirements. They can improve products and services by making them smart, digital, and connected. These products and services can become platforms for additional functionality, as when a smart phone or smart speaker has additional apps downloaded into it; they also can become parts of extended ecosystems of similar products, other products in the portfolio, partner products, or even competitor products. Value can also be created through the use of recommendation engines that customize and tailor products and services to the exact needs of the customer at that time and in that context of use.

Global innovation. Technology firms continue to innovate, exploiting exponential technology improvements to create value for stakeholders. They introduce and trial new features and functions at a dizzying pace, aiming for competitive advantage and increased market share—or at least the preservation of existing market share. The nature of digital services and information goods makes experimentation and evolution of services faster by orders of magnitude. A digital company can introduce, trial, and discontinue a new feature in an hour or two. Compare that to the years required for, say, an auto manufacturer to bring a new model to market and evaluate whether sales figures met targets.

Deliberate planning and execution. What makes China unique in this global

maelstrom of innovation, competition, and technology evolution is the degree of planning, collaboration, support, funding, and sometimes control, between its governments at all levels and technology enterprises. For example, the 13th Five-Year Plan called for "innovation in next generation information technology industries," including "integrated circuit industrial systems…artificial intelligence, intelligent hardware, new display technologies, smart mobile terminals, 5G mobile communications, advanced sensors, and wearable devices," as well as biotech, spatial navigation systems, energy, materials, and new-energy vehicles.

The recently released 14th Five-Year Plan has the acceleration of "digitalization-based development" and the construction of a "digital China" as major elements. This includes the creation of a "cyber powerhouse," a digital economy, society, and government, and digital transformation in all facets of society. In China, such plans are not mere documents, but then drive projects, mega-scale initiatives, funding, and metrics across the country and beyond its borders. For example, an objective of gaining leadership in 5G mobile technologies manifested itself in China being widely viewed as the global leader in 5G, whether measured in terms of patents issued, global standards influence, or the number and coverage of 5G base stations and wireless devices deployed and operational. This was achieved through a variety of successful efforts ranging across government entities, funding programs, private enterprises, standards bodies, educational institutions, etc.

Enabling these successes are innumerable components. For example, a fund of funds directs government capital through venture capitalists with insights into market trends and eventually into entrepreneurial firms creating emerging capabilities. Thus, may the best mix of deep capital reserves, market and technology insights, and entrepreneurial agility be achieved. In short, the Chinese model of today provides a centrally driven alignment for major initiatives of national importance while also supporting serendipitous entrepreneurship of smaller firms that are largely free to pursue new technologies, business models, and marketable ideas.

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This type of approach is different than in other regions. For example, in the United States, direct government funding exists, and programs such as the Defense Advanced Research Projects Agency, which created the Internet, or major government programs such as the Space Program and the recently passed

Infrastructure Investment and Jobs Act, have transferred national government money to a variety of initiatives including academia and public-private partnerships. However, the prototypical funding for entrepreneurial activity in the U.S. over the years has come from angel investors, venture capitalists, and private equity in centers such as Silicon Valley. Such centers are communities with strong cultures that attract, foster, and are centered around research universities and young talent with skills in leading-edge technologies. In Europe, major funding has come from programs focused on innovation such as Horizon 2020, which distributed almost €80 billion, and its successor, Horizon Europe, which promises €100 billion.

In any country, governments may have objectives that are each individually rational and well-intended but can come into conflict with each other. For example, governments typically are desirous of strong national defense, economic growth and prosperity, protecting citizens from criminal activity or other dangers, and the like. However, is taming inflation but causing a recession or stagflation worth it? What about the impact on jobs and unemployment? Is serving targeted ads on social media a contributor to economic growth, by linking potential purchasers with solutions that can create value? Or is it an intrusive invasion of privacy? Economic growth typically benefits from free trade, but can such free trade open up potentially fatal gaps in national defense? Resolving these dilemmas requires a balance of top-down direction, bottom-up creativity, and continuous agility and flexibility as conditions change and new information becomes available.

These dilemmas sometimes materialize as disagreements between the public and private sectors; between governments, representing national interests or protecting the individual citizen, and companies, eager to grow profits and market share. Perhaps one defining characteristic of truly disruptive technologies is that technological progress typically outstrips regulatory capabilities because technology can be advanced by a single company or individual, whereas regulation often requires consensus. Moreover, regulatory issues often don’t arise until after a technology has emerged and scaled.

For example, creating a ridesharing firm takes a handful of software developers and a few drivers and riders. However, untangling the web of issues that then arise as the new technology impacts the status quo can take time. Should ridesharing companies have the same regulation as taxis? Do drivers need to be certified and undergo background checks? How should the services be taxed? Are drivers employees or contractors? Issues such as these are not restricted to China

or the U.S. or Europe or anywhere else. They represent the complex interactions between new technologies, their embodiments in products and services, how they are used by customers, and how they relate to competitive products, complements, and substitutes, local customs and culture, and governmental and societal objectives. These issues may not have perfect answers nor stable ones. An imperfect solution—the best available at the time under the circumstances—may be destabilized by world events, emerging technologies, or a single local issue that becomes a viral call for change.

Cryptocurrency is another example of the dance between technology and regulation. Although digital cash had been invented, the first meaningful cryptocurrency, Bitcoin, began as a conceptual white paper, a URL, and some open-source software in 2008. A decade and a half later, El Salvador has made it legal tender; the United States has issued an executive order to study and define regulations for cryptocurrency, while clearly stating that crypto transactions can be taxable events; and other countries' central banks have begun to issue digital equivalents of their currency: in China, the People's Bank of China has created a digital yuan which is being integrated into WeChat Pay and Alipay, while the nation has also banned crypto transactions, crypto mining, and cryptocurrencies. Ultimately, a mix of consumers, businesses, regulators, technologies, cultures, and events—such as thefts from exchanges—will determine which mechanisms gain traction in which countries.

Countries and blocs today recognize the importance of development and growth to maintaining and improving their economies and standards of living. A cornerstone of that development and growth is the interplay between technology, economics, and regulation. New technologies can benefit domestic consumption and the standard of living and create value for international consumers and businesses while driving up export income. The percentage of the global economy that is directly or indirectly digital has continued to grow—by some analyses it grows by 0.5% per year. Some estimates suggest that over 50% of the global economy is now digital.

Regardless of the exact percentage or exact rate of growth, it is clear that for nations to successfully compete on the world stage, they must embrace emerging technologies and must master the complex constellation of critical success factors: digital skills, education and training; academia, research, development, entrepreneurship, investment and innovation; national, provincial, and local policies and regulations; technology architectures, standards, and models; and structured programs that focus resources while also fostering creativity,

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allowing for serendipity, and accentuating agility to respond to challenges and opportunities.

Moreover, digital infrastructure and platforms—whether they be cloud computing, digital currencies, mobile handsets, and networks, or software stacks—have a multiplier effect on the economy, the same way that good highways, ports, and airports do. One dollar or RMB spent on asphalt can enable hundreds or thousands of dollars or RMB worth of products to get to its destination; similarly, a dollar spent on a data network can enable hundreds or thousands of dollars or RMB worth of financial transactions to flow, or of intellectual property to be created, or of collaborative brainstorming to occur. Studies have shown that these create a virtuous cycle: data networks enable collaboration and flows of ideas, so more bandwidth in more places with greater interconnections drives greater digital and virtual, or "knowledge-intensive" flows. These flows have been growing faster than other flows such as commodities trading or labor, e.g., offshore manufacturing or offshore outsourcing, in turn driving continued investment in network infrastructure.

Therefore, in a world of global trade and competition, which may already be a majority digital, there is arguably nothing more important for nations to pursue than digital capabilities, digital infrastructure, and digital advantage. Thus, there is nothing more important for nations than to find the right balance of top-down and bottom-up; of planned direction and serendipity; of technology and regulation; of scale and innovation. The future depends on it.

Macro-Historical Perspective on Digital Transformation

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Digital transformation: a massive social restructuring

Human history is a process of migration.

In the beginning, humans migrated from sea to land and evolved into hunter-gatherers. Later on, as agriculture began, migration was limited to fertile land and agrarian labor. With the advent of the industrial age, labor migrated from farms to factories. This is known as “majestic urbanization,” and lasted for nearly 200 years.

Humans are now migrating again, this time moving from the physical world into a cyber realm, or a new domain where both physical and digital spaces co-exist. This new migration is referred to as “digital transformation.”

Digitalization transforms us in the following ways. “Digital governance” is a new way of administration by governments; social networks have become new platforms where people interact and communicate with each other; online education has become a new way of imparting knowledge; digital finance has become a new approach for allocating resources and facilitating cash-flows; e-commerce is a new basis for conducting business and shopping; digital marketing is a new method for spreading business awareness; online-dating has provided a new place for people to look for potential partners.

The transition from a traditional society to a digital one may take hundreds of years to complete. Many are not aware that society is already in the midst of this

transformation. Often, people who work in financial and retail industries do not understand the changes to the prevailing business environment and may struggle with the challenges posed by the introduction of disruptive technologies such as the Internet.

The key element driving the transition from the physical world to cyberspace is not simply the rise of the Internet but also the transformation it has on society at large.

Changes to the social environment inevitably lead to a change of the social rubric. The rules that govern traditional human society may not work for a digital one. Thus, it is necessary to reconsider or rebuild traditional approaches to perceptions of the world in a digital age.

In the near future, to enhance one's competitiveness and gain a favorable position, it is crucial to familiarize with the new social context and the rules that govern digital society.

Some observers believe that mastering social media applications such as WeChat, Douyin (TikTok), Taobao, and Weibo equates to mastering digital governance. However, this is an illusion.

The following analogy illuminates the contradiction between technical mastery and societal context. A young man, who lives on a prairie, is trained to be a skilled horse rider. Then one day, he is relocated to an island. In this "new world," he must change his views and acquire the ability to row a boat and catch fish to survive. For humanity, inhabiting the new digital "island" requires adaptation to and assimilation of this new environment.

While both technology and the real world are ever-changing, humanity changes little. People do everything for a specific purpose, be it in a physical or a cyber world. For example, car lovers tune their engines to make their presence heard. Likewise, many social influencers use beauty filters to enhance their appearances while livestreaming. Another example is found in the maintenance of interpersonal relationships. In the physical world, people often treat guests to dinner or drinks. On social media platforms, people may feel obliged to "like" or comment on stories or posts shared by their friends to maintain social networks. Failure to maintain these physical or virtual social networks reduces our social standing. The same analogy applies for retail promotional activities. In the digital age, live streaming and or short video marketing replaces traditional methods

of increasing customer traffic with physically distributed leaflets and handbills. No matter which method is selected, attracting more customers remains the objective.

The social and commercial advantages of understanding the rules governing digital society allow practitioners to accrue benefits and reap richer rewards.

Start the digital transformation journey on the right track

The transformation of labor markets is another key area of the digital future. Suppose your child recently graduated from a university and received job offers from the following organizations: (a) a branch of a major bank, (b) a local TV station, (c) a middle school, or (d) a branch of a large energy supplier. Which one would you recommend? What are you basing your recommendation on? Salary and perks? Growth opportunities? To make a wise recommendation, candidates will need a clear understanding about the social division of labor in the digital age.

By putting aside ethical and political considerations, it becomes apparent that the four organizations offering employment to a recent graduate essentially fill the same social role of intermediary agent or channel.

Both commercial and social systems begin with producers whose products include physical goods and any form of services, such as education. At the other end is consumers who receive their products through an intermediary channel, such being traditionally performed by account managers, teachers, salespeople, etc.

It can also be an organization, such as a department store, a bank (branch or sub-branch), or an energy distributor. These intermediary roles came into being amid the time and space limitations of the agricultural and industrial ages.

With the advent of the digital age, such limitations begin to fall apart due to several game-changers, including the Metaverse, artificial intelligence, and the Internet of Things. With the technology galloping ahead, these limitations are likely to vanish soon. The great waves of technology will eventually sweep away many organizations and jobs that are created due to time and space limitations.

A television station is a channel for delivering programming to audiences. Thus, viewers do not congregate at local broadcasters to watch television. If a television station in a prefecture-level city provides programming with little purpose, it will soon lose audiences and advertisers and eventually fail.

Teachers are hailed as the engineers of the human soul, but they too are intermediary agents for dissemination of knowledge. In the agricultural age, teachers supplied knowledge, as an intermediary agent, to the population in much the same way that a marketing cooperative distributed groceries to local residents. Back then, the demand for teachers was high due to limits on time and space, and therefore, information.

In the digital age, such limitations are no longer a concern, especially now that the virtual reality (VR) and augmented reality (AV) technologies are becoming widespread. A few well-trained teachers are capable of disseminating knowledge to children who can access information about any discipline by simply connecting to the Internet and wearing a set of metaverse communication equipment. Against this backdrop, teachers in remote areas, and with less resources, must also improve their teaching ability and change their teaching approaches to adapt to the digital trend.

Teachers constantly need to update and improve their core competencies. For example, if a teacher cannot master online teaching through livestreaming or online videos, their teaching quality and efficiency will be greatly reduced. According to a previous report, over the past years, students from 248 high schools in poverty-stricken areas have attended livestreaming classes simultaneously with the prestigious Chengdu No. 7 High School. If Confucius were living in the digital age, he too may have been happy to livestream his teaching.

Society must think outside the box and take a fresh look at employment in the new era from a digital perspective. A failure to understand how the digital world works is certain to disrupt individual and group planning, as well as to one's social life and career prospects.

Digital society is the key to the prosperity of businesses and nations for the coming centuries. Therefore, the rules of the digital world are worth investigating.

From my experience in overseas lecturing and international exchanges, it has become apparent that the two major digital economies, China and the U.S., are performing far better than others. European countries and regions

have encountered difficulties in developing an advanced digital society due to demographic and geographical factors amongst others. In recent years, China has succeeded in fast tracking digital transformation due to three major contributions: the spirit of innovation and practice in the Internet industry, national policy guidance, and leading-edge communication and digital infrastructure.

As such, China's digital transformation has begun to influence global trends. After years of practice, China is now exporting its digital experience and talent to Southeast Asian countries, such as Singapore, Indonesia, and Thailand. By integrating artificial intelligence, software analytics, machine learning, etc., China's digital twin technology, which can create digital simulations to predict how an industrial product or process performs, has sharpened the competitive edge of China's manufacturing sector, allowing the country to easily acquire the knowledge and industrial manufacturing processes that Western factories have accumulated over the past century.

One of my foreign colleagues commented that the Sino-US trade war might not be necessary but that the digital technology struggle between the two countries must be contested fearlessly. I agree with this assessment. The competition in container-based international trade in the industrial age has fallen by the wayside. The new competition fought by Chinese companies, such as Huawei, are framing the future. If a country wins the competition in the container technology category but fails in digital transformation, its win still amounts to a net loss.

Agrarian society focused on land and labor, industrial society was centered on steel and petroleum, but the digital society prioritizes data and knowledge. The core logic of digital transformation is to utilize the data resources in and outside an organization or a country to solve real problems and create value for society. This is how the future is to be won.

TIO Spotlight Talk

China and the UAE: Together for a Shared Digital Future

An Interview with H.E. Dr. Ali Obaid Al Dhaheri

H.E. Dr. Ali Obaid Al Dhaheri

Ambassador of the United Arab of Emirates to China

The United Arab Emirates (UAE) is one of China's most important economic partners in the region. It is a gateway for Chinese exports and China's major partner country in the Belt and Road Initiative. The UAE is also an important destination for diversified investment and construction and home to thousands of Chinese businesses. As developing economies, China and the UAE share considerable economic complementarity, cooperation, and potential in areas including technological innovation and logistics and infrastructure. Against all prevailing challenges, China is entering a digital era. How is this relevant to the UAE and the rest of the world? How is the international community understanding all the changes that have taken place in the past few years?

TIO What is the current state of play in China's digital economy, its components, and the major forces that have brought us to where we are today?

Amb. China is among the most advanced countries in the world in the development of the digital economy, and I think that China has already made great headway in digitalizing its economy to drive dynamic growth. In 2012, China made its digital economy a national strategy and digital economic activities have grown rapidly in past years.

We note that China has the objective of expanding its digital information infrastructure, developing an integrated national system of

big data centers step by step, and applying 5G technology on a larger scale as charted in its 14th Five-Year Plan.

The UAE has also launched a Digital Economy Strategy. Detailed roadmaps and incentives to promote the sector have been released, with the goal to increase the contribution of this sector to the GDP from 9.7 percent to 20 percent over the next 10 years.

Like China, the UAE also believes innovation and technology are at the core of social development. Already, the UAE is among the top 25 percent of countries according to the most important global digital indicators. While the contribution of the digital economy to the overall GDP is 9.7 percent, for the "non-oil GDP," it is running at 11.7 percent.[1]

The UAE has also established a Council for Digital Economy in order to chart future directions and support, and to ensure the implementation of the Digital Economy Strategy initiatives proliferates across all economic and business sectors.

TIO What do you think are the key trends driving digitalization in China? Do they differ from what is driving the U.S. and the world? Why is this important?

Amb. Recently, I saw an article by President Xi Jinping urging continuous efforts to build a stronger digital economy for China, stressing that developing digital economy is becoming a key force in reorganizing global factor resources, reshaping global economic structures, and changing global competitive landscapes.

The UAE shares this view. We are ambitious to become a leader with the adoption of digitalization across our region, in driving transformation of both government and the private sectors.

Our Digital Economy Strategy is the vehicle for enhancing this position as a hub for digital transformation in the region and globally. In recent years, the UAE's banking and financial services sectors have undergone rapid change, encompassing digitalization of existing services and the launch of a number of digital only services.

China's rapid digital development was due to robust construction of

1 "Chaired by Mohammed Bin Rashid, UAE Cabinet Meeting Approves Establishment of UAE Council for Digital Economy," WAM, https://wam.ae/en/details/1395303038462.

infrastructure and large-scale deployment of 5G, much faster than most other countries. In 2019, the UAE became the first Arab country to deploy 5G networks. This came about due to a very successful partnership with pioneering company Huawei. Our target is to reach 100 percent 5G coverage by 2025.

TIO China is ramping up efforts to roll out the digital yuan to the broader population. What do you see are the challenges ahead? Why now, and how will this impact the Chinese and other economies?

Amb. It is my view that the challenges for the digital yuan can be categorized as technical issues and regulatory issues, such as data abuse, excessive data mining, and disorderly data processing. China has already promulgated laws to deal with data security and protection of personal information last year.

With regard to data management, the UAE approved a federal decree law regarding the protection of personal information and data last November.[2] Our Personal Data Protection Law constitutes an integrated framework seeking to ensure the confidentiality of information and protect the privacy of individuals in the UAE. It provides a proper governance for data management and protection and defines the rights and duties of all parties concerned.

The UAE and China are already cooperating in promoting digital payments and currency. Last November, the Central Bank of the UAE issued a communique on a joint project, "mBridge,"[3] which brings together the Chinese mainland with the Hong Kong Special Administrative Region, Thailand and the UAE to jointly build a platform for international payments. The project aims to create more efficient and innovative digital currency infrastructure to reduce obstacles to cross-border payments and to lower costs. The advantages are to increase transparency, to be more efficient, and to lessen operational complexities.

Lastly, I believe digital payments bring environmental benefits and promote sustainability. Digital currencies will save the costs of coinage and notes and reduce the risk of virus transmissions happening in currency transaction amid the outbreak of pandemic.

2 "Data Protection Laws," Data Protection Laws - The Official Portal of the UAE Government, https://u.ae/en/about-the-uae/digital-uae/data/data-protection-laws.

3 "CBUAE Issues Communiqué on Joint 'MBridge' Project with Partners from BIS," WAM, February 14, 2022, http://www.wam.ae/en/details/1395302990631.

TIO Recent moves by the central government to regulate the activities of some of the largest Internet players in China have cast a cloud of uncertainty over the digital ecosystem. In your opinion, what's the logic behind this and where is China's digital ecosystem heading towards? Is the situation roughly the same for other countries? If so, is this about governments or technology?

Amb. China has over one billion mobile Internet users, the largest online shopper population, and the highest use of mobile payments in the world. According to China Statistical Yearbook (CSY) 2020, 25% of overall national retail took place online in 2019, amounting to $1.8 trillion, over 90% of which was via mobile payments.[4] Therefore, China is a global leader in e-commerce. Also, these trends have given rise to Internet giants and created a digital ecosystem in China. However, such a large number of users poses new challenges, such as cyber violence, misinformation, and personal data disclosure.

Cyberspace should not be a place for illegal and irrational behaviors though cybersecurity has already become a global issue that requires countries across the world to work together to safeguard security and online order. For creating a safe and strong cyber infrastructure in the UAE that enables citizens to fulfill their aspirations and empowers businesses to thrive, the UAE launched National Cybersecurity Strategy in 2019. This March, Dubai hosted G-I-S-E-C Global 2022, the region's largest and most influential cybersecurity event, gathering government leaders, the world's top cybersecurity companies and international experts to increase international collaboration and information-sharing to strengthen the region's cybersecurity posture.

TIO How is digitalization in China relevant to the rest of the world and vice versa?

Amb. The digitalization in China will empower China's manufacturing industries, and the fusion between the flourishing e-commerce and the robust manufacturing powerhouse has created fertile soil for the rapid growth of the digital economy in China. Now, China is not only one of the largest global digital economies, but also the world's manufacturing powerhouse.

As Comprehensive Strategic Partners, the UAE and China have a high

4 "一图看懂 2019 年全国网络零售市场发展报告," 电子商务公共服务网, https://dzswgf.mofcom.gov.cn/news/5/2020/4/1586913870177.html.

degree of innovation complementarity, especially in the energy, finance, health and life sciences, retail, logistics, transport and other high-tech sectors. The UAE was among the first countries to join the Belt and Road Initiative and now it serves as a key logistic hub for China in the Middle East region, leveraging this platform as a means of increasing bilateral trade and investment, and as a means of promoting regional prosperity. The Port of Jebel Ali, Khalifa Port Container Terminal Phase II, and the China-UAE Industrial Capacity Cooperation Demonstration Zone are major projects whereby China and the UAE are achieving unprecedented connectivity.

I believe the scope of this partnership will continue to expand and diversify, with new areas of cooperation such as digital economy. The UAE's Digital Economy Strategy defines e-commerce as a key area for the UAE's digital economy. Last August, Dubai CommerCity, the first dedicated e-commerce free zone in the Middle East, Africa and South Asia (MEASA) region began commercial operations.

The UAE seeks to transform our country with ambitions to become the innovation powerhouse for the Middle East and North Africa. As businesses across the world are preparing for Metaverse, the next generation of Internet that combines virtual reality, virtual money and virtual transactions, the UAE, with a clear digital economy strategy, is set to emerging as a leader in Metaverse finance (MetaFi), a combination of decentralized finance (DeFi), centralized finance (CeFi), and traditional finance (TradFi), with new products specifically designed to meet the unique needs of the new economic ecosystem.[5]

This interview was conducted by Kang Yingyue, International Communications Officer of Taihe Institute.

5 "Local Press: UAE Strategy Will Make It a Digital Economy Hub," WAM, April 14, 2022, http://www.wam.ae/en/details/1395303039215.

Chinese Digitalization Ecosystem and Its Relevance to the World

An Interview with Rui Ma

Rui Ma

China Tech Analyst
Founder, Tech Buzz China
Executive Chairman, Rookie Fund
Venture Partner, Synaptic Ventures

Over the past decade or so, people's lives have been revolutionized with the rise of the "digital economy" alongside mass online media. There is no other country in the world where this change has happened at such a scale, speed, and scope than China, where several e-commerce giants contributed to making the country the largest market for Internet services on Earth. How did this change happen? What are the consequences? Where is this phenomenon going?

TIO What are the key forces driving digitalization in China? Do they differ from what is driving the U.S. and the rest of the world? Why is this important?

Ma Digitalization in China is driven by both market opportunity and government mandate.

On the market opportunity front, China had a vast but underdeveloped economy with an extremely low level of digitalization as recently as a decade ago. The birth of the mobile Internet, ushered in by ubiquitous broadband connectivity, buoyed by a fast-growing domestic economy, and unhindered by legacy information systems, are some of the main catalysts that explain why the Chinese market was able to leapfrog some of the world's most developed markets in a relatively short period of time.

In addition, lax regulatory standards and supportive government policies were also helpful accelerants. If we look at the rest of the world, often one or two of these key ingredients are missing.

> **"The majority of the restrictive regulations issued in the last two years have been along the lines of what I would describe as 'rectification.'"**

For example, the U.S. has many legacy systems that must be supplanted, which makes disruption a more expensive and laborious endeavor. On the other hand, developing countries may not have the infrastructure or fast economic growth to sustain the level of digitalization that China has been able to. This is important to understand because even in China, not all of these factors will be present going forward, or at least not to the same degree, and this will affect how fast digitalization continues to make progress there, especially now that a large swath of the opportunities facing consumers have already been claimed and exploited.

TIO China is ramping up efforts to roll out the digital yuan to the broader population. What are the challenges ahead? Why now and how will this impact the Chinese and other economies?

Ma Central bank-backed digital currencies such as the digital yuan will be some of the most interesting technological and economic experiments in the world in the next few decades.

In China, the very fact that citizens are so used to a cashless society could actually turn out to be an obstacle to the digital yuan, since the existing digital alternative is already so ubiquitous, convenient, and powerful.

However, the digital yuan does provide several other advantages, offline access, cross-platform transactions, and different levels of privacy, for example, and is of course sovereign legal tender just like cash. By having a digital currency, the Chinese central bank will ultimately have greater capability to control and monitor financial flows. While intended for domestic use in the near term, there is little doubt that the digital yuan will eventually be used for cross-border transactions as well, and to facilitate global trade. Some folks have been alarmed that it may help in dislodging the US dollar as the reserve currency, but most experts I've spoken to believe this risk is negligible at the moment and we are many steps removed from that happening just yet.

TIO Recent moves by the government to regulate the activities of some of the largest Internet

players in China have cast a cloud of uncertainty over the digital ecosystem. What's the logic behind this and where is China's digital ecosystem heading?

Ma The majority of the restrictive regulations issued in the last two years have been along the lines of what I would describe as "rectification." This means that many of the policies are meant to correct the overly lax regulatory environment in the past so that standards look more like those that have been adopted by the developed world. Most of these are in the area of antitrust/anti-competition, privacy, cybersecurity, financial risk, etc., and many had been in preparation for years.

Assuming that the government is able to continue to adopt a reasonable level of oversight and not step into over-regulation territory, this could be healthier for the ecosystem in the long run.

The government has recently signaled that this "special rectification period" is nearing completion, and I think it bodes well for the companies that have solid business fundamentals and superior strategies. They will continue to thrive in spite of, and possibly thanks to, this more regulated business environment.

Of course, it is also important to acknowledge that there were some regulations that do not have Western analogue, such as the initiative to eliminate the for-profit after-school tutoring sector, and harsh restrictions on video gaming hours for minors. Those are the result of the government solving for issues idiosyncratic to China and resulted in extremely unfavorable outcomes to investors and entrepreneurs in the space. While these seem to be largely one-off in nature, the impact they've had on investor confidence may be long-lasting and can be a problem for the entire digital ecosystem going forward.

TIO Given the scale of the Chinese marketplace and the pace of transformation into a digital economy, what do you think are the best business practices for companies? In other words, how can companies be better positioned to succeed? Is the situation roughly the same for other countries? If so, is this about governments or technology?

Ma Most people who have worked in both China and the U.S. agree that the competition in China is much more intense.

An innovative breakout feature or product in the U.S., for example, may not see competition for months, and tech giants can take years before adopting new technologies, such as what we saw with the short video format.

In China, expect other companies to begin copying your innovations the same day they're

launched. Therefore, a core competitive advantage is speed. Foreign digital economy companies who wish to operate in China either independently or through a partner will have to adapt to "China speed" as best as they can to have a chance at success. That being said, it is clear from the last two years of increased regulation that both foreign and domestic technology companies operating in China will have to pay more attention to government policy. There will be some risks that cannot be mitigated and only avoided entirely. The company's core IP and technological know-how will always matter, of course, but have to be considered in conjunction with current market conditions.

TIO In what way is China's digitalization relevant to the rest of the world and vice versa?

Ma There are many companies, whether just starting out, or very established, who are looking to China as a reference point. I think there are three main reasons for this.

One is simply that China has made a lot of progress in digitalization in a very short period of time and has become a global innovation leader in digital entertainment and e-commerce especially, which are two very large sectors with broad applicability everywhere.

The second is that China has two somewhat distinct populations - coastal urban residents and inland rural ones - who exhibit sufficiently different behaviors so as to make good examples for entrepreneurs in developed and developing nations both.

Finally, China is so large that even its smaller market segments represent hundreds of millions of users. This means that many companies, whether they are servicing the general population or a smaller niche, often become the largest global company of their type, at least by usage and sometimes by revenue as well, therefore warranting serious study.

As for vice versa, Chinese entrepreneurs, while no longer relegated to always chasing after Silicon Valley, have global ambitions and are therefore as curious about the rest of the world as ever. With locally birthed champions like ByteDance (TikTok) and Shein taking the top spot in their respective categories worldwide, I am only seeing the drive to globalize and the eagerness to understand and learn from international markets intensify.

TIO In your opinion, what are some of the digital innovation megatrends to watch?

Ma China leads the world in mobile digital entertainment and e-commerce, and that's where I think there is still a lot of room for trends from China to be popularized in the rest of the world.

The intersection of digital content and commerce, such as gamification of e-commerce,

or live streaming e-commerce, for example, is especially interesting. Livestreaming e-commerce is quickly remaking the online retail sector in China and is expected to account for 20% of total GMV (Gross Merchandise Value) this year. But it has yet to establish itself as a significant distribution channel in other countries, and so I am watching the space carefully for investment opportunities.

In general, China still has one of the highest e-commerce penetration rates in the world, and I'd expect many successful business models to take root in other parts of the globe.

Finally, there is also just the general upgrading of the entire enterprise sector, especially in manufacturing, which I'm watching closely. While this trend may be more difficult to globalize in developed countries, given the relative uniqueness of China's manufacturing-heavy economy, it represents an incredible opportunity in China and has been one of the most popular investment theses of the last five years, one that I don't foresee going away any time soon.

This interview was conducted by Kang Yingyue, International Communications Officer of Taihe Institute.

Youth Voices

Metaverse Applications in China

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The world is rapidly evolving thanks to technological advancements that continue to characterize the 21st century and are revolutionizing every aspect of human life. One notable innovation embraced in the developed nations, and now sweeping across the globe, is the Metaverse.

Metaverse has been identified as both a digital world and a virtual universe where technology presents avatars of human beings. In the digital world, individuals can partake in many of the things with which they engage in the real world, including shopping, attending school, and moving from one place to another. Individuals also experience a greater overlap of their physical and digital lives through advanced technologies such as virtual and augmented realities (VR and AR). According to a comparative study on the way the Metaverse connects with China laws, the Metaverse is bound to replicate the real world in the not-too-distant future, including how individuals meet, engage, and socialize.[1]

China is one of the countries that are progressively buying into the idea of the Metaverse and its applications in the hope of reaping massive profits when it finally expands throughout the entire globe. To this end, the Chinese government has received more than 16,000 Metaverse-related trademark applications.[2] With the Asian region's fast increasing population, the Metaverse also provides Chinese organizations and

1 Yujun Huang, "Comparative Study: How Metaverse Connect with China Laws," *SSRN Electronic Journal*, October 20, 2021, pp. 1-17, https://doi.org/10.2139/ssrn.3955900.

2 Giulia Interesse, "Metaverse in China: Key Players, Government Regulations, and Trends," China Briefing News, April 21, 2022, https://www.china-briefing.com/news/metaverse-in-china-trends.

entities with the opportunity of expanding their operations.

To contribute positively to Metaverse's growth, Chinese investors are increasingly fusing and transforming the business models and commodities they offer with VR and AR capabilities. It is worth mentioning that VR and AR technologies represent the platform upon which China is cementing and strengthening its Metaverse version, regardless of whether it is creating a computerized version of reality or intensifying sensorial perceptions of human experience.[3]

According to a report published by Kharpal, the Metaverse has proved intriguing for many Chinese netizens. As such, tech firms in the region are increasingly investing in the new market that they predict will surpass US$8 trillion in the next few years.[4] In 2021, Baidu became one of the first entities to signal its entry into an emerging global Metaverse arena when it established the Metaverse application, "Land of Hope."

The "Land of Hope" application introduced an avatar that allowed individuals to engage and interact in different virtual scenarios of Chinese history combined with futuristic designs. For example, users on the app can view the sci-fi version of the Shaolin Temple.

Tencent, the creator of WeChat and the region's leading Internet and tech company, has employed measures that focus on virtualizing its social offerings. It recently launched the *Super QQ Show* feature on the QQ Platform and created a 3D interactive space where individuals can interact and play games together.

In 2022, Yidian Entertainment Technology Company developed an application named *Jelly* that allows users to create personalized avatars and interact with a maximum of 50 people.[5] *Jelly* has taken the Chinese market by storm and has since surpassed WeChat to be identified as the most downloaded application in the region's Apple app store.[6] Additionally, ByteDance, which is renowned for the development of TikTok, has created two Metaverse applications - Party Island and *Pixsoul* - which respectively cater to the Chinese and Southeast Asian markets. Both applications allow individuals to create avatars and converse with friends.[7] The *Soul* is another popular Metaverse application that employs an algorithm to connect individuals who share common passions and hobbies.[8] It succeeds in balancing the

3 Staff Writer, "China's Frenzied Metaverse Poised to Balloon into $50bn Business," Nikkei Asia (Nikkei Asia, March 15, 2022), https://asia.nikkei.com/Business/China-tech/China-s-frenzied-metaverse-poised-to-balloon-into-50bn-business.

4 Arjun Kharpal, "China's Tech Giants Push toward an $8 Trillion Metaverse Opportunity - One That Will Be Highly Regulated," CNBC (CNBC, February 14, 2022), https://www.cnbc.com/2022/02/14/china-metaverse-tech-giants-latest-moves-regulatory-action.html.

5 Interesse, "Metaverse in China," China Briefing News, April 21, 2022, https://www.china-briefing.com/news/metaverse-in-china-trends.

6 Chang Che, "The Top 10 Metaverse Companies in China," SupChina, February 21, 2022, https://supchina.com/2022/02/15/the-top-10-metaverse-companies-in-china.

7 Giulia, "Metaverse in China," China Briefing News, April 21, 2022, https://www.china-briefing.com/news/metaverse-in-china-trends.

8 Yi Jing Fly and Laura Grünberg, "What Will China's Metaverse Look like?," The Diplomat (for The Diplomat, March 30, 2022), https://thediplomat.com/2022/03/what-will-chinas-metaverse-look-like.

excitement of real connections with the freedom of virtual identity by using features such as voice call matching functionality.[9] *Soul* appeals to and endears itself to the open and curious young users in China.

Chinese consumer behavior has proven to be intrigued immensely by the Metaverse. This is supported by the long history of Chinese Internet users appreciating new technology and embracing advancements that make their work and life easier. A study revealed that 78% of Chinese consumers are keen on interacting within gaming worlds, which is in sharp contrast to the 57% of US and 47% of UK consumers seeking interaction within virtual gaming environments.[10]

Luo Tianyi, a Chinese Vocaloid developed by Bplats, Inc. under the YAMAHA Corporation. Source: https://vocaloid.fandom.com/wiki/Luo_Tianyi

The study also identified that 82% of Chinese consumers are entirely optimistic about the Metaverse's benefits. Thus, the markets for both VR and virtual idols in China are booming and are estimated to be respectively worth US$8 billion and US$548 million. The success witnessed in these markets is attributable to the fact that virtual intermediaries are more relatable to Gen-Z consumers. Moreover, they guarantee safer alternatives for conventional influencers due to ease of use and elimination of human error.[11] A good example in this regard was the 2021 launch of the region's first meta-human, Ayayi, which has recently functioned as a digital manager at Alibaba. Another pertinent example is the virtual performer Luo Tianyi, who has attracted over five million followers on her Weibo account. Both Alibaba's Ayayi and Luo Tianyi are evidence that content-sharing platforms are turning to the Metaverse to attract younger users.

The Chinese Metaverse has several significant differences from those of other countries. The first is increased supervision from political groups and government control. This is one of the main reasons for the caution witnessed in Chinese companies and constraints on unfettered investment in the new market. Regulatory constraints have also been applied to various commercial sectors including cryptocurrencies.

9 Ibid.
10 Ibid.
11 Ann Cao, "China's Hottest Metaverse App Suspends Downloads," South China Morning Post, February 14, 2022, https://www.scmp.com/tech/tech-trends/article/3167032/chinas-top-metaverse-app-removes-itself-app-stores-citing-online.

Secondly, unlike in other regions where the Metaverse is more visually focused, socializing is often the main motivation in China. As such, Chinese apps seek to establish a human connection by giving human voices to avatars and screens.[12]

Despite the many benefits of Metaverse applications, some of China's provincial governments, such as Shanghai and Hefei, have begun to regulate and control the new market. Their actions followed the 2021 publication of a report authored by The China Institutes of Contemporary International Relations, which is affiliated with China's Ministry of State Security, which required lawmakers to establish regulations, laws, and policies that would address virtual crimes and ensure greater protection of user privacy. Accordingly, Metaverse applications, produced by Chinese companies like Baidu and Tencent, must use strict security measures to prevent online fraud in the digital world. There is fear that unscrupulous individuals, including hackers, will infiltrate user platforms to steal valuable data.

Nevertheless, some local authorities such as the Guangzhou Huangpu District have shared several measures to help promote Metaverse innovation. One example is a proposal to develop a Metaverse Industrial Fund to assist in attracting social capital. Other local governments have adopted similar initiatives to showcase the importance and benefits of Metaverse innovation and its revenue potential.

The potential innovation and revenue benefits of Metaverse applications offer vast opportunities for brands. However, the current limitations on monetization opportunities have made some luxury brands defer venturing into the new market. Luxury brands don't view the Metaverse as a direct source for increasing their returns and profit. The lack of a resale market for digital collectibles in the Metaverse effectively restricts luxury brand engagement, which typically uses the digital world to market products and services. Nevertheless, as the Metaverse adapts and adopts commercialization, luxury and fashion brands will certainly begin realizing benefits from the platform. The Metaverse's potential to transform online shopping experiences into physical outlets is one such possibility.

Young consumers in China play a crucial role in the growth of the Metaverse and digital world. It accords them with new freedom and

12 Fly and Grünberg, "What Will China's Metaverse Look like?," The Diplomat (for The Diplomat, March 30, 2022), https://thediplomat.com/2022/03/what-will-chinas-metaverse-look-like.

different ways of self-expression by creating close social connections. The Metaverse also accords brands and organizations with limitless commercial opportunities. To exploit the vast commercial and social potential of the Metaverse, brands will need to adapt to local regulations, consumer preferences, and the stringent regulations being established to deter online fraud and protect user privacy.

Cryptocurrency and Its Prospects in China

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2021 and early 2022 marked the high point in excitement for cryptocurrency, NFTs (Non-Fungible Tokens), and blockchain technology worldwide. China has been ahead of the curve with such advances. However, while the first few entrepreneurs made their fortunes, many in China are quickly becoming skeptical about the unregulated new coinage. It wasn't long before the Internet, traditional media, and word of mouth began associating Bitcoin and cryptocurrency in general with pyramid schemes, still-born projects and lost money.

China was not unique in this criticism of cryptocurrency. China's economy was not set up to accommodate such assets. In September 2021, the Chinese government, not for the first time, rolled out a blanket ban on Bitcoin as it had been banned in some way, shape, or form as many as 19 times since 2009.[1] Why is this the case though? Although many use this story as a negative in the Bitcoin circle, it can be easily argued that the Chinese government has been forward-thinking in this move to secure its own resources, protect its people from financial fraud, and restore control of the future of finance back into the government's hand.

Currently, in the West, there is a boom in advertising for crypto exchanges. London Underground has been criticized, for example, for aggressive advertising in its stations and carriages,[2] selling a financial technology that was only recently developed and even more recently its dangers understood.

1 Turner Wright, "Crypto Has Recovered from China's Fud over a Dozen Times in the Last 12 Years," Cointelegraph (Cointelegraph, September 24, 2021), https://cointelegraph.com/news/crypto-has-recovered-from-china-s-fud-nearly-two-dozen-times-in-the-last-12-years.

2 "Cryptocurrency Ads Reach Record Levels on London Transport," The Guardian (Guardian News and Media, January 14, 2022), https://www.theguardian.com/technology/2022/jan/14/cryptocurrency-ads-london-transport-tfl.

Coinfloor advertisement, Kings Cross, London
Source: https://www.coindesk.com/business/2020/12/14/bitcoin-exchanges-flood-londons-metro-with-adverts/

Crypto exchanges are also beginning to generate huge amounts of bad press in relation to MLM (Multi-Level Marketing) schemes and pyramid selling, which are both highly illegal activities in China. Due to its large population, China can be quite susceptible to MLMs and other related frauds known as *chuanxiao* (传销), as it is often the poor and the less educated who would easily fall prey to such activities.[3]

MLM selling became popular in the 1990s as a fad introduced from Taiwan via Japan and the United States. During its first run in a less digitally connected world, it ran up against the state for similar ideological reasons to Bitcoin. MLM sold "being your own boss" rather than the collectivism traditionally embraced by the Chinese society.[4]

Regardless of the form, MLM and the later transactions of cryptocurrencies are anti-government control in nature, making them fundamentally opposed to the Chinese state's basic ideals. The ruling party's motto, "Serve the People," can be applied here, where the state acts to protect the population against abasing predatory practices that may scam the people. For example, the People's Bank of China explains in an online article published in 2021 that the trading of virtual currency has contributed to the rise of gambling, fraud, money laundering, and other illegal activities, and therefore it seriously endangers the safety of people's assets.[5]

That being said, it is doubtful that China will abandon the idea of digital

3 Nancy N. Chen et al., *China Urban: Ethnographies of Contemporary Culture* (Durham N.C.: Duke Univ. Press, 2001), 27.
4 Nancy N. Chen et al., *China Urban: Ethnographies of Contemporary Culture*, 31.
5 " 关于进一步防范和处置虚拟货币交易炒作风险的通知 ," The People's Bank of China, September 24, 2021, http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4348521/index.html?mc_cid=b0a97b47fa&mc_eid=f1124a997c.

currency or blockchain technology once and for all. Digital payments were fast becoming the only way to pay before the pandemic hit in 2019. Furthermore, due to the "dynamic zero-Covid" policy, online shopping has assumed a central place in people's lives as Chinese people in cities like Shanghai and Beijing are using their phones more than ever to buy food, supplies, and other goods and services during the current lockdown period. In addition, the launch of the digital yuan shows that China is not shying away from promoting digital payments.[6] So far, the new digital yuan app is now available to users in 23 cities across China. Tencent-owned WeChat also announced that it would begin rolling out the e-CNY as a payment option on its platform, introducing the digital currency to over 1.2 billion users.

Yet, the digital yuan does not operate on the blockchain and thus differs from cryptocurrencies in important ways. China is not taking any risks. It will not be the crypto paradise that many libertarians in China envisioned prior to 2019, as the state will make sure that each transaction is appropriately handled and regulated so that latent problems that threaten social stability and security can be successfully warded off.

6 Coco Feng, "Alipay, WeChat Pay Deliver New Features to Support Expanded E-Cny Roll-Out," South China Morning Post, May 6, 2022, https://www.scmp.com/tech/big-tech/article/3176812/china-digital-currency-leading-mobile-payment-apps-alipay-wechat-pay.

When China Meets the Metaverse: Opportunities and Risks

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The Metaverse is best conceptualized as "an expansive network of persistent, real-time rendered 3D worlds and simulations," according to venture capitalist Matthew Ball.[1] The Metaverse serves both as augmentation and amplification of existing Internet and communicative platform technology, delivered through a multi-dimensional simulated environment in which individuals can interact in *real-time*, across an *expansive setting* of non-exhaustive stimuli and data points. In short, it is a parallel, yet attached, universe constructed through cutting-edge technology.

The operative question is what are we to make of the implications of the Metaverse for China? What are the upsides and downsides to China's drawing upon this nascent technology? And what are the downsides of the Metaverse objects of regulatory concern that China ought to take seriously? This article submits that the Metaverse offers the Chinese economy and people vast opportunities and that the possible risks, which are certainly extant and pose valid concerns, are largely mitigable through targeted prudential measures by both government and social actors.

The Metaverse provides a lucrative source of economic growth and financial empowerment. As of March 2022, over 16,000 Metaverse-related trademark applications had been filed, with substantial

1 Matthew Ball, "Framework for the Metaverse," MatthewBall.vc (MatthewBall.vc, March 9, 2022), https://www.matthewball.vc/all/forwardtothemetaverseprimer.

investment made by leading tech firms into key infrastructure and platforms required for a stable and cogent Chinese Metaverse (or a multitude of them) to exist. Estimates suggest that the net size of China's Metaverse-centric and adjacent industries is due to exceed US$50 billion by mid-2020s,[2] with much for firms to offer high-end and middle-class consumers alike, seeking both an alternative mode of consumption and platform for social interaction.

Joint ventures with overseas technology conglomerates, such as the Tencent-Roblox (LuoBuLesi – currently being revamped)[3] and BV-Supermedia Holdings (Yuanbang Technology),[4] have driven parts of Metaverse growth - specifically, Metaverse streams that seek to leverage extant innovation and patented technologies from overseas. Homegrown talents and infra-country research and development are the primary engine of growth propelling the expansion and deepening of information and digital technologies within China. As such, and independent of structural concerns over semiconductor/chip technology, China remains largely a self-sufficient powerhouse capable of taking on more radical and substantive developments in the Metaverse.

A further Metaverse opportunity, uniquely afforded to the Chinese populace, is its ability to augment and enhance experiences of "reality." The Metaverse does not displace the real world. At least, existing trends in communicative-technological developments do not point, in any meaningful sense or form, towards that kind of substitutive relationship. Instead, the vibrant and fledgling space serves to supplement "physical reality" through providing a parallel and alternate source of entertainment.

Through vivid simulations of experiences and transmission of sensory stimuli at a level that the Internet alone most certainly cannot accomplish, the Metaverse could serve as a vital repository of leisure, entertainment, and sports. Users, who may lack the real-life opportunities to access such goods, would benefit from the hybridized and highly diversified range of experiences afforded by technology that can accurately store, transmit, and mimic real-life experiences.

The Metaverse could well be the perfect antidote to the "lying flat culture" – a systemic push towards inertia induced by hyper-pressurized

2 Takashi Kawakami, "China's Frenzied Metaverse Poised to Balloon into $50bn Business," Nikkei Asia (Nikkei Asia, March 15, 2022), https://asia.nikkei.com/Business/China-tech/China-s-frenzied-metaverse-poised-to-balloon-into-50bn-business#:~:text=More%20than%201%2C500%20companies%20are,(%2453%20billion)%20by%202025.

3 " 开启罗布乐思之旅 ," 罗布乐思官方网站 - 腾讯游戏 , accessed May 12, 2022, https://roblox.qq.com/.

4 CoinYuppie, "Supermedia Holdings and BV Baidu Ventures Jointly Initiated the Establishment of Yuanbang Technology to Accelerate the Development of Metaverse," CoinYuppie, April 28, 2022, https://coinyuppie.com/supermedia-holdings-and-bv-baidu-ventures-jointly-initiated-the-establishment-of-yuanbang-technology-to-accelerate-the-development-of-metaverse/.

and intensive working environments. Through the eclectic and action-oriented nature of the entertainment and physical training routines on offer through the Metaverse platform, citizens could be activated to become more athletically involved, thereby improving net public health. One may find this suggestion far-fetched, but the introduction of gadgets such as Wii (in the late 2000s) and Virtual Reality Fitness Experiences (in the early 2020s, in response to the lockdowns and drastic changes induced by the pandemic[5]) have proven to be instrumental in promoting a more proactive and exercise-oriented lifestyle amongst millennials and Gen-Z individuals.

Above all, the vast communicative and broadcast potential of the Metaverse cannot be underestimated. Whether it be through highly accurate and compact simulation of communities and physical spaces through entities such as the crypto-undergirded Sandbox Game[6] and/or Digital Villages,[7] or the shortcutting of communications through effective transmogrification of mailing lists into "contact databases" of Metaverse avatars, one fact is certain: the nascent combination of optical, stimulatory, and messaging technologies folded into the constructed "universe," is likely to expedite and improve accuracy in communications.

In the context of China, this could be highly significant, as the government seeks to enhance the efficiency and targetedness of public-oriented messaging in a way that could allow for effective education and more proximate and grounded state-citizen interactions. Through sensitive and pragmatic regulation, these communicative platforms could in turn supersede both conventional social media and traditional media, in offering core stakeholders in China a better and more flexible platform for formal and informal communication.

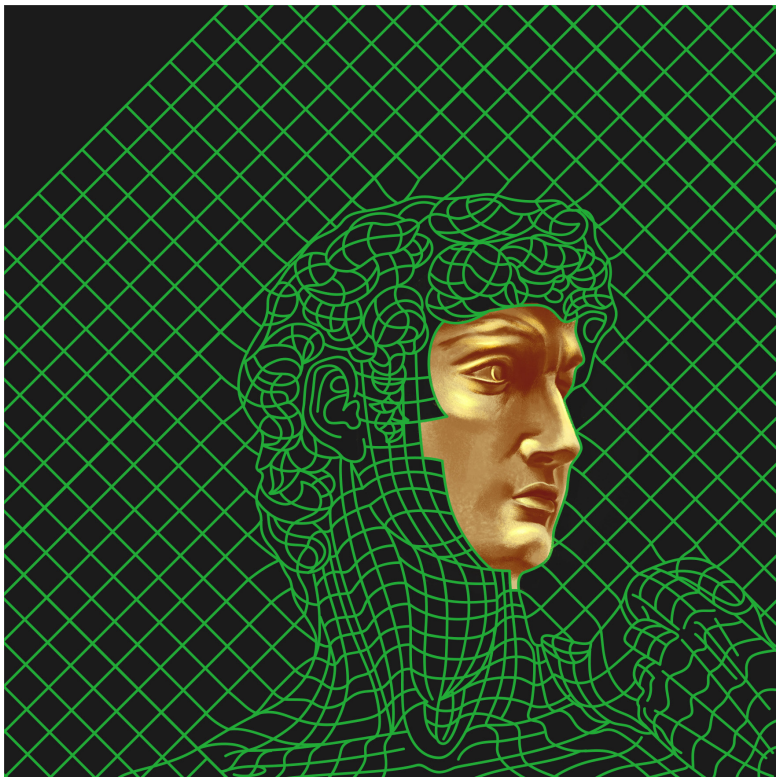
The Metaverse does not come without its fair share of challenges. At the recently concluded Two Sessions, several National People's Congress (NPC) deputies noted the need for caution and prudence when it comes to the pursuit of Metaverse technologies by firms and innovators.[8] NPC Deputy Gao Yu from Guizhou province called for the strengthening of regulations over economic and commercial activities on the Metaverse to ensure that risks arising from speculative activities could be internalized and tracked through inter-departmental coordination. Pony Ma (Tencent) noted that digitalization and carbon

5 Megan Wollerton, "Best Smart Home Gym Workouts of 2022: Peloton, Mirror, Tempo and More," CNET (CNET, April 27, 2022), https://www.cnet.com/health/fitness/best-smart-home-gym-workouts/.

6 "The Sandbox Game — User-Generated Crypto & Blockchain Games," accessed May 12, 2022, https://www.sandbox.game/en/.

7 "About Digital Village," About Digital Village, accessed May 12, 2022, https://info.digitalvillage.io/.

8 赵融 , " 政策密集发布 多地争抢元宇宙发展先机 ," 中国财经网 , April 8, 2022, http://finance.china.com.cn/qy/qyjj/20220408/5781334.shtml.



Digitalized artwork illustrated by Xie Xuru

neutralization ought to go hand-in-hand and that further research is very much needed with respect to the modus operandi of Internet governance in the "new era" of the Metaverse. As such, what are the real and possible risks brought about by the Metaverse?

The first pitfall concerns the regulatory lacunae of the Metaverse. In a recent analysis concerning the legal implications of the Metaverse, Clifford Chance, an international law firm headquartered in the UK noted that, as the world comes to grapple with the fullest implications of the Metaverse, concerns over data security and protection, intellectual property, and the distribution and development of financial-technological products in the space are likely to take center stage over the next decade.[9] How should the state regulate the Metaverse? Should the arbitration responsibilities be assigned to district and municipal courts, or should there be a separate legal institution empowered by the National People's Congress with the specifically designated functions of monitoring and governing the "Chinese Metaverse"? What are we to make of instances where the jurisdiction of the agents involved remains less-than-clear – e.g., it is ambiguous as to whether agents involved in potentially illicit activities fall into the legal jurisdiction of China or other countries? How should effective and direct enforcement be carried out, while retaining the virtues of quasi-anonymity and confidentiality associated with the Metaverse? These are challenges that security experts in China must address.

The second pitfall concerns the possible emergence of oligopolies that act to stifle or restrict competition in the domain. Unbridled Big Tech is a conspicuous and pressing problem in the West, with leading tech firms regularly clashing with governmental regulatory authorities

9 "The Metaverse: What Are the Legal Implications?," Clifford Chance, February 13, 2022, https://www.cliffordchance.com/insights/resources/hubs-and-toolkits/talking-tech/en/articles/2022/02/the-metaverse--what-are-the-legal-implications-.html.

over the limits and scope of their powers. This issue is rendered less salient by the more rigorous and preemptive regulation active in China. Yet, going forward, how are we to ensure that the Metaverse will not become merely a "pay-to-play," exclusive space that crowds out small and medium enterprises, as well as individual innovators?

Given the vast barriers to entry in relation to technological and infrastructural developments in the Metaverse, the commitment to equal access and opportunities, which is noble in principle, is difficult to implement fully in practice. A healthy and organic combination of anti-trust laws and positive incentives, which prompt technology firms to move in more socially productive directions and subsidies for up-and-coming Meta-startups, would be necessary to preserve competitiveness and openness in the market at large.

Finally, and on a more conceptual level – how should we approach the Metaverse's relationship with the "universe" that we currently inhabit? Notwithstanding the discussion above, which suggests the possibility to retain both our commitments and pursuits within lived reality and a turn to the Metaverse for additional opportunities and experiences – much is easier said than done. Where do we draw the line, and how can we ascertain that the Metaverse does not fundamentally disrupt and denature the relationships that bind humanity together? How can we leverage the Metaverse for good, as opposed to self-justifying lethargy and resignation from reality?

With the multitude of problems that remain unresolved in our world – ranging from climate change to the ongoing COVID-19 pandemic and socioeconomic inequality to rampant inflation, it is vital to not view the Metaverse as a defeatist escape from reality. Such a mindset is neither conducive to global prosperity nor our continued and collective survival as a species.

Along with its inherent abundance of opportunities, there is much good that the Chinese state and civil society could produce through the Metaverse. This includes more accurate and responsive public policymaking, an expansion in the range and quality of economic outcomes and pathways, and the empowerment of critical stakeholders in the start-up and innovative industries. Yet concurrently, we must also beware of the perils that such technology could bring. The

English adage, “the same knife cuts bread and fingers” is confirmed in the Chinese maxim, “the water that bears the boat is the same that swallows it up.”

Understanding China's Tech Regulatory Control in the Context of the U.S.-China Trade War

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A big part of China's rise as an economic juggernaut is the amazing degree to which technology has now become a major part of its economy. Home to Alibaba, Tencent, and Huawei, China is clearly competing on the global market for its technological supremacy. With much attention being paid to the technology-enabled digital sector's innovation and dynamism, the Chinese government's tightened regulatory control over the sector has caught many off-guard and has invited speculations both at home and abroad.

The specific reasons behind remain unclear. However, situating the policy direction in the broader context of U.S.-China competition, where core technologies are at the center of bilateral relations, it may be argued that the spate of regulations is not a policy innovation of Beijing last year, but the product of the trade war launched by Donald Trump in 2018.

China's political and economic-technological strategy going forward is well encapsulated in the so-called Dual-Circulation strategy. The term has frequently appeared on high-profile occasions such as the Sixth Plenary Session and the recently closed Two Sessions signaling China's economic direction to the world.

The objective of the strategy is two-fold. First, to make the Chinese economy more resilient and more self-sufficient domestically and less dependent

on the rest of the world. Second, to try to promote economic and trade exchanges between China and other countries in favor of globalization in whatever areas complementary to one another such as renewable technologies.

For a lot of China watchers or tech analysts, the pronounced regulatory tightening imposed on the tech sector that occurred during the summer of 2021 was the watershed moment marking the major shift towards self-sufficiency. Over the past 12 months, Ant Group's IPO has been suspended, several home-grown big techs have been cut down to size, and new private for-profit tutoring services have been banned from registering. The costs of these policy actions have been huge. Businesses suffered under the new initiatives, which have fanned unemployment worries amid economic headwinds. They have also created an atmosphere of uncertainty for foreign investors, especially against the backdrop of tightening US rules against investment in Chinese firms.

Indeed, China's self-sufficiency efforts have ramped up by an order of magnitude in the last five years as registered in the Made in China 2025 and the New Generation AI Development Plan for 2030.

However, it is important to note that the major driver of China's self-sufficiency efforts has not so much to do with government policies being dictated by Beijing, which has oriented itself towards the same goal of self-sufficiency and technological greatness arguably since the promotion of the First Five-Year Plan in 1953. Rather, the key differentiator was the trade war that designated Chinese tech companies such as ZTE, ByteDance, Tencent, and Huawei to various blacklists maintained by the US Department of Commerce and other government agencies over the last few years.

The reason behind this argument is fairly self-evident. Weeks after ZTE, one of China's most internationally successful technology suppliers that had about $17 billion in annual revenue, was banned from using components made in the U.S. in 2018, the company was reported by New York Times to be "facing a death sentence."[1]

When the U.S. accelerated its efforts to limit Huawei's business through a ban that kept it from getting key components like semiconductors and chips from US companies during the Trump administration, the company's market share in cell phones collapsed and its global share plunged from a peak of

1 Raymond Zhong, "Chinese Tech Giant on Brink of Collapse in New U.S. Cold War," The New York Times (The New York Times, May 9, 2018), https://www.nytimes.com/2018/05/09/technology/zte-china-us-trade-war.html.

17% in March 2020 to just 2% in September 2021.[2]

In an interview in December 2021, Vice President of Huawei Glenn Schloss acknowledged that the company's business has been "significantly disrupted" by US sanctions.[3]

These are perfect examples to illustrate how companies could bleed out due to a shortage of supply of what the U.S. controls and China does not. As the Biden administration continues to uphold his predecessor's position on China's tech companies, and as more Chinese leading tech firms are targeted by the United States as well as its allies, there is now a drive by the Chinese entrepreneurial firms to build up technological capabilities to strengthen their competitiveness.

In other words, what Washington has done is essentially to help align the interests of Beijing with those of the companies: to advance self-sufficiency as well as technological greatness. Both are very intent on building up technology capabilities in items including semiconductors, aviation, and biotech, which are proving to be unreliable in terms of supply.

For instance, to sustain its business in the aftermath of the trade war, Huawei was pushed to cultivate the domestic ecosystem, going after Chinese firms for collaboration. Furthermore, prior to the trade war, Chinese semiconductor companies had little business incentive to devote their research budgets because they could always buy from the West. Now, with the U.S.-imposed prohibition, companies such as SMIC (Semiconductor Manufacturing International Corporation) will strive to develop better chips for a domestic market that is suddenly vibrant. Quliang Electronics, a chip packaging and testing supplier based in Fujian Province, is reported to be rapidly expanding its production capacity in Quanzhou to help Huawei to shore up its defense in the face of ongoing US restrictions.[4]

Within this context, what has been happening in the Chinese tech sector can be approached as a side story relative to the major goal that China now has towards self-sufficiency, which has always been there but lacked momentum and was greatly motivated by the trade war in 2018. From here, the regulatory control over businesses like Tencent and Alibaba can be roughly interpreted in the following ways. On the one hand, as China hopes to enhance its economy's resilience, tech giants and their commercial behaviors have to be properly regulated as they are hurting small and

2 Ibid.
3 Ina Fried, "Huawei Sanctions Snarled Chip Supply Chains," Axios, December 3, 2021, https://www.axios.com/2021/12/03/huawei-sanctions-chips-supply-chains.
4 Anne Morris, "Huawei Shores up Chip Expertise to Counter US Curbs," Mobile World Live, January 12, 2022, https://www.mobileworldlive.com/featured-content/top-three/huawei-shores-up-chip-expertise-to-counter-us-curbs.

medium-sized enterprises as well as the ranks of the talents of the startups. On the other hand, Beijing has reoriented its priorities toward science-based technologies such as semiconductors, aviation, and biotech, and has stepped up efforts of promoting science and technology curricula in universities to cultivate technical labor force. Consumer Internet is not necessarily the most critical element for the country to win the trade war with the U.S., although consumers very much enjoy the services offered by entertainment or food delivery platforms.

In short, China and the U.S. are in a major time of discontinuity. Understanding the context and recognizing the trend will be of vital significance for companies to succeed in China in the upcoming years.

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Please note: The above contents only represent the views of the authors, and do not necessarily represent the views or positions of Taihe Institute.

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