Digital Transformation Facilitating Balanced Development in Asia

Report on Technology for Sustainable Development in Asia (2022-2023)

2022

[About the Tech4SDG]

The Technology for Sustainable Development Goals Alliance for Asia (Tech4SDG for short) is committed to many aspects such as increasing engagement in society, facilitating industry-university-research (IUR) interaction, conducting exchanges and communications in science and technology and studying its ethics. It also deeply involves in the development of standards, the compilation of industrial case studies, and the publication of the subsequent results to promote sustainable development in Asia. The alliance is composed primarily of technology enterprises, research institutions, think tanks, universities, experts, and scholars in Asia.

For more information about the alliance or to obtain the electronic version of this report, please visit the website:

www.tech4sdgaa.org

Contact Information: secretariat@tech4sdgaa.org

Digital technology promotes economical and societal progress to create a better future for humanity

Contents

About the Technology for Sustainable Development Goals Alliance for Asia

Chapter III Practices of Technology for Sustainable Development in Asia 18

Initiatives 36

Foreword

We are resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet. We are determined to take the bold and transformative steps which are urgently needed to shift the world on to a sustainable and resilient path.

As we embark on this collective journey, we pledge that no one will be left behind.

Preamble of *Transforming our World: The 2030 Agenda for Sustainable Development*

Seven years have passed since the United Nations officially adopted the *2030 Agenda for Sustainable Development*. In other words, half of the time allotted to make good on the 17 Sustainable Development Goals (SDGs) has passed.

Have we made strategic progress? The answer is yes. In the past seven years, despite fluctuations in global development, the *Paris Agreement* has been adopted and implemented, and large-scale poverty alleviation has been achieved in China. The global life expectancy has increased from 66.8 years in 2000 to 73.3 years in 2019, and global electricity supply levels have risen from 83% in 2010 to 90% in 2019. Meanwhile, the green energy transformation has achieved widespread acceptance...

Does that mean we have reason to be optimistic about achieving the 17 SDGs by 2030? The answer is that we are under a great deal of pressure and must do more if we are to succeed. The COVID-19 pandemic has dragged an already sluggish economy into the worst recession since World War II, and global food security, poverty alleviation, universal access to education, and the fight against climate change have all been severely impacted. Now, the COVID-19 pandemic, natural disasters, economic weakness, and regional conflicts, have led to change and turmoil that the world has not experienced in a century. The Human Development Index (HDI) has dropped for the first time in 30 years, and the implementation of the 2030 Agenda for Sustainable Development is being hampered.

Development is the eternal theme of human society, and sustainable development is the world's foremost goal at present. In the face of global change and upheaval, we must seize opportunities in the next eight years and redouble our efforts to achieve the SDGs by 2030.

Asia is playing an increasingly important role globally and is key to achieving the SDGs. It accounts for 29.4% of the world's total land area and approximately 60% of the world's population. It has unleashed its innovative energy, with a GDP measured by purchasing power parity almost half of the entire world's total and an economic growth rate significantly faster than the global average. Asia, especially in recent years, has shown strong momentum in digital economy, and become the center of global digital technology innovation. The "digital economic divide" between different economies and groups, however, must not be neglected. At the same time, Asia has been one of those hardest hit by COVID-19, natural disasters, local political instability, poverty, and problems related to resources and the environment.

A better Asia makes a better world. If Asia achieves sound development, demonstrates its resilience, wisdom, and strength, and is able to serve as an anchor of peace and stability, a driving force for growth and a new hub for cooperation, it will be more likely to achieve the SDGs.

Technology, especially digital technology, must play a greater role in promoting sustainable development. Technological innovation acts as the primary impetus for the progress of human productivity. To achieve sustainable development, three core elements must be coordinated: economic growth, social inclusion, and environmental protection. Technology can play a greater role in promoting economic growth, social inclusion, and environmental protection, and it can serve to provide greater impetus in achieving the 17 SDGs.

It is in view of the above-mentioned considerations that the Technology for Sustainable Development Goals Alliance for Asia (Tech4SDG) was established, through the joint efforts of universities, think tanks, enterprises, experts, and scholars in Asia and is committed to promoting sustainable development in Asia through technology.

Despite the innumerable challenges facing the future of global sustainable development, we shall remain unswerving in our efforts. We will continue to carry out research with regard to sustainable development in Asia, and this report is the first of Tech4SDG's findings. We will encourage exchanges and discussions among think tanks, universities, enterprises, governments, and international organizations and appeal to more organizations and individuals for the great

cause of promoting sustainable development. We will attempt to find, explore, and promote excellent models of sustainable development.

Despite the constraints of time, we are full of confidence and hope in the ability of humanity (especially in Asia) to create an inclusive, sustainable, and resilient future!

Chapter I Challenges to Sustainable Development in Asia

We are at an inflection point in history.

In our biggest shared test since the Second World War, humanity faces a stark and urgent choice: a breakdown or a breakthrough.

Summary of *Our Common Agenda·Report of the Secretary-General (Guterres)*

Asia is the key to achieving global SDGs, and its sustainable development achievements have attracted worldwide attention. However, Asia is also one of the regions facing the most serious challenges on sustainability. In the planet's largest land, global and regional problems, traditional difficulties and new challenges are intertwined, making it more difficult for the region to achieve the 17 SDGs in the next eight years.

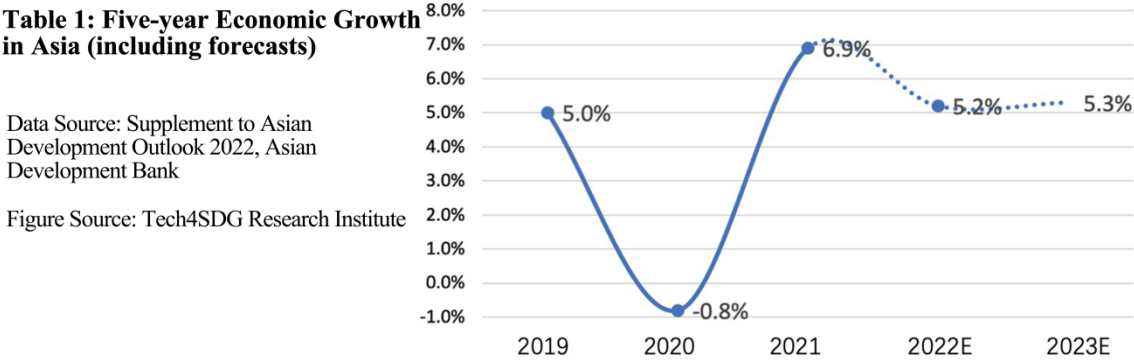## I. Traditional sustainable development challenges

The size of the population indicates a larger consumption of resources. Although population growth in East Asia has been slow on the whole, it has continued at high rates in South, West, and Southeast Asia. This places even more pressure on the already strained supply of local resources. For one thing, local self-sufficiency in food and energy is facing severe challenges. For another, the huge, fast-growing and young population exacerbates the imbalance between man and land and increases the risk of environmental damage. According to the UN Food and Agriculture Organization (FAO), the proportion of global forest to total land area fell to 31.2% in 2020 from 31.9% in 2000. In Southeast Asia, forest coverage decreased from 49% in 2015 to 47.8% in 2020.

It must be noted that Asia has undergone rapid industrialization in recent years, which has led to continued expansion of resource consumption as well as increase of income resulting in the continuous increase of personal resource consumption. Overall, the sustainable development challenges that have historically troubled Asia, such as population, resources, and environment, remain, and the situation has not been fundamentally improved.

II. COVID-19 challenges

Since the outbreak of the COVID-19 pandemic, approximately 600 million people have been diagnosed worldwide, and 6.5 million people have died. Asia has been hardest hit by the virus, with more than 160 million confirmed cases, second only to Europe in total. Four of the world's top 10 countries for cumulative confirmed cases are in Asia.

The COVID-19 pandemic has seriously retarded economic development in Asia. The economic growth rate in Asia for 2020 was -0.8%, the first negative rate in 60 years. Although the Asian economy has shown greater resilience than other regions during the pandemic, the chain reaction remains serious. The pandemic has worsened employment and gender inequality. In 2020, there were 81 million unemployed workers in the Asia-Pacific region. Statistics from a variety of institutions attest to a significantly higher unemployment rate for women than that of men in the pandemic

Table 1: Five-year Economic Growth in Asia (including forecasts)

Data Source: Supplement to Asian Development Outlook 2022, Asian Development Bank

Figure Source: Tech4SDG Research Institute

What's more, the pandemic has driven a large portion of the population in Asia back into poverty and caused living and education standards to decline. The COVID-19 pandemic has eroded the gains made in global poverty alleviation, resulting in the return to poverty of 140 million people and leaving approximately 800 million people hungry. The number of those stricken by poverty in Asia has increased by more than 80 million. The United Nations International Children's Emergency Fund (UNICEF) reports that the COVID-19 pandemic has

become "the greatest global crisis facing children" in its 75-year history. As the pandemic enters its third year, 23 countries have yet to completely reopen schools, leaving some 405 million schoolchildren in those countries at risk of not returning to class. Many of them are in Asian countries.
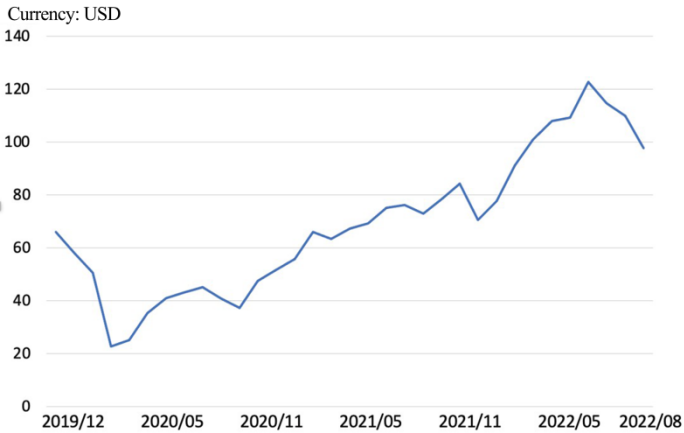
III. Regional turmoil challenges

Persistent economic weakness, unilateralism, and protectionism have caused serious damage to the international development and cooperation environment, highlighting the global governance deficit. The pandemic, combined with regional conflicts, has accelerated the profound restructuring of the Asian landscape and exacerbated the global governance deficit, which in turn has led to more persistent instability and difficulties in sustaining one's livelihood. The stricken world economic triangle, the impacted global manufacturing network, and the altered supply chain have led to more attention on "supply chain gap".

In Asia, Afghanistan, Sri Lanka, Iraq, Syria, Myanmar, and a number of other countries are facing serious humanitarian crises amid political turmoil. Since the beginning of this year, the Russia-Ukraine conflict has continued to escalate, hindering the process of global recovery and pushing up global inflation. In particular, the rise in commodity prices has posed a serious challenge to livelihoods. Low- and middle-income countries will be disproportionately affected. Some analysts believe that oil prices this year could climb 50% or more over 2021. If fuel prices rise by an average of 10% throughout the year, the real national income of commodity importers such as Cambodia and Thailand may decrease by 0.7 percentage points. Global food supplies are also affected by regional turmoil. As a result of the Russia-Ukraine conflict, global food prices have exceeded the levels seen during the 2007-2008 global food crisis. Asia, with its large population and high dependence on agricultural imports, has been severely affected by soaring food prices. According to statistics, if grain prices increase by 10% on average throughout the year, the proportion of those experiencing poverty in the Philippines may rise by 1 percentage point, or an increase of 1.1 million people.

Table 2: Changes in London Brent Crude Oil Futures Prices

Data source: Investing.com

Figure Source: Tech4SDG Research Institute

IV. Multiple security challenges

Security and stability are the prerequisite and foundation for development. However, the persistent regional turmoil in Asia has worsened local public security. Meanwhile, serious environmental pollution and climate change are complicating the security situation in Asia.

The proliferation of terrorism poses a challenge to regional security in Asia. In the past five years, terrorist attacks have expanded from West Asia to South, Central, and Southeast Asia, in witness of a trend towards international coordination among terrorist organizations. What's more, Asia faces severe environmental security challenges. Environmental pollution and destruction caused by industrial development and population growth in Asia still require much attention. According to an environmental risk assessment report released by risk consultancy Verisk Maplecroft, 99 of the world's 100 cities most vulnerable to environmental problems are

located in Asia. Asia is also one of the main regions affected by global warming.

Ongoing climate change has increased both the frequency of extreme weather and the security risks resulting therefrom for residents. In 2021 alone, the area stretching from Shizuoka to Kanagawa Prefecture in Japan was hit by the heaviest rainfall on record, and India's Maharashtra State suffered the heaviest rainfall in 40 years. Typhoon In-Fa has become the most severe typhoon to make landfall in Zhejiang Province since the founding of New China. From April 2020 to March 2021, there were 1.85 million lightning strikes in India, an increase of 34% over the same period last year. According to the Asian Development Bank, if climate change is not contained, Southeast Asia's economy may shrink by 11% by the end of the century.

Table 3: Number of People Affected and Killed by Natural Disasters

(per 100,000 people) in selected Asian countries (2010-2021)

(2010-2021)
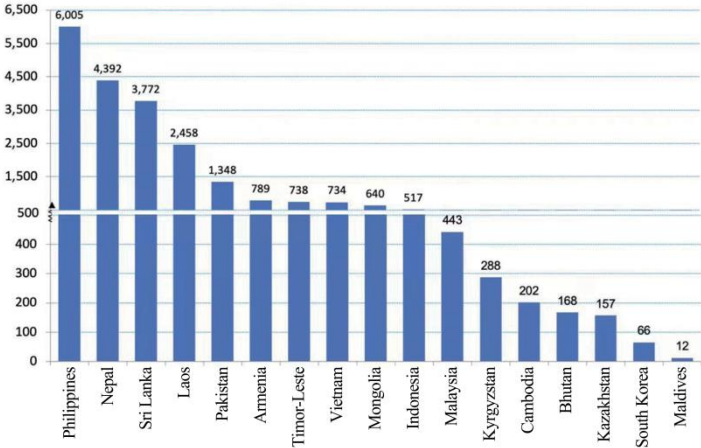
Data source: Asian Development Bank

Figure Source: Tech4SDG Research Institute

Country	Value
Philippines	6,005
Nepal	4,392
Sri Lanka	3,772
Laos	2,458
Pakistan	1,348
Armenia	789
Timor-Leste	738
Vietnam	734
Mongolia	640
Indonesia	517
Malaysia	443
Kyrgyzstan	288
Cambodia	202
Bhutan	168
Kazakhstan	157
South Korea	66
Maldives	12

V.   Challenges of development transformation

In the second half of the 20th century, many economies in Asia achieved rapid development by undertaking global industrial transfer. From Japan, to the Four Asian Tigers, to China... Asia's share of the global economy has risen from approximately 10% in the 1990s to more than 47% today. The number of people living in poverty fell from 1.52 billion in 1990 to 263 million in 2015.

However, in the early and middle stages of the rapid development of Asian economies, the economic growth model characterized by high investment, high energy consumption, and high emissions has led to serious problems with pollution. From Minamata disease in Japan, to the hazy weather in China and the severe air and water pollution in India today... According to the Asian Development Bank, 42% of the reduction in life expectancy in Asia is due to water pollution and poor sanitation. Water scarcity, air pollution, forest and land degradation, and climate change are among the most serious environmental problems facing Asia in the lead up to 2030, predicted by the Asian Development Bank. According to the Global Carbon Atlas, developing economies in the Asia-Pacific region accounted for 49% of global carbon dioxide emissions in 2020, higher than the value of 41% in 2010.

Today, green economic transformation and the pursuit of innovative development are a matter receiving global consensus. Coupled with serious environmental pollution and climate warming, the traditional economic development model can hardly go far. However, for a wide range of developing countries in Asia (especially large economies), there is still no mature model for switching to green development. There is currently no reasonable answer to the question of how to develop the economy, remain competitive, increase income, improve people's livelihoods, and protect the environment and people's health on a large scale. Asia needs a new and innovative development path.

Chapter II Ethical Consensus on Technology for Sustainable Development in Asia

The Asia-Pacific region is an engine of global growth, trade and investment and the creation of jobs all over the world… But profound transformation is underway, driven by technological innovation and the challenge is to ensure that this transformation is for the better and takes everyone in the Asia-Pacific region with it.

Guterres, UN Secretary-General at the 74th session of the Economic and Social Commission for Asia and the Pacific (ESCAP) (May 14 to 16, 2018), Bangkok, Thailand

Science and technology are key productive forces. In order to overcome the impact of the COVID-19 pandemic, transform the development mode and achieve a better life for people in Asia, we shall make full use of the positive role of technology in promoting sustainable development. In the face of the rise of the digital economy, major countries have successively launched their own digital economy (technology) development strategies. However, technology is a double-edged sword, which can either accelerate development or bring about a series of negative effects. Therefore, it is crucial that we develop the broadest possible consensus on the ethics of science and technology.

Ethical science and technology encompass the values and behavioral norms that must be followed in scientific research, technological development, and other related activities and also serve as an important guarantee to the healthy development of such undertakings. In a technology-driven era, human beings must regulate research activities and the mass application of technology through the ethics of science and technology.

We believe that to reach the broadest consensus on the ethics of science and technology, the scientific community, the government and the public should understand and recognize three principles (sustainability, human-centric and controllable technology), and implement them in the whole chain of technology development and application. Only in this way can technology better promote sustainable development and achieve prosperity and stability in Asia.
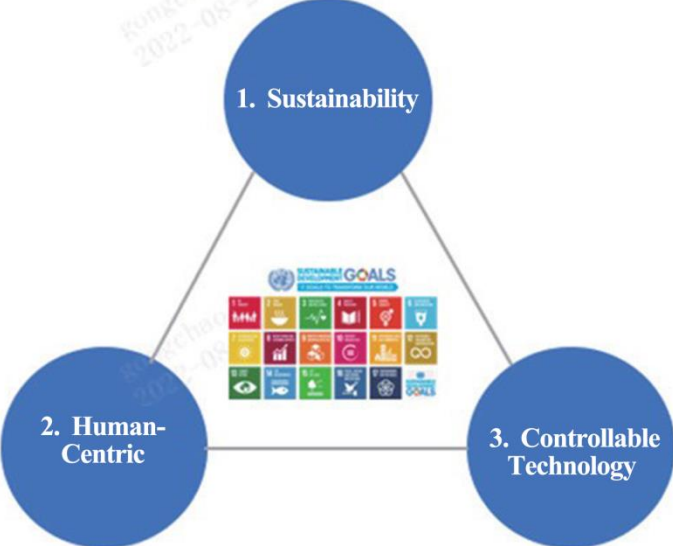
The three principles of ethical science and technology

I. The principle of sustainability

The principle of sustainability is to call on all countries, be they poor, rich, or middle-income to protect the planet while promoting economic prosperity. Furthermore, poverty elimination must keep pace with a series of strategies, including the promotion of economic growth, addressing the social needs of education, health, social protection and employment opportunities, limiting climate change, and protecting the environment. Based on the needs of economic, social, and individual sustainable development, we believe that the understanding and implementation of sustainable development from the perspective of ethical science and technology must focus on the following three points.

First, a concept of the "full life cycle" of the sustainable development on technology

High-quality sustainability should not be assessed in terms of whether something is sustainable in itself, but should strive to establish awareness of the full life cycle. The same can be said for technology. When talking about the principle of sustainability in relation to the ethics of science and technology, we should consider the full life cycle to be consistent with sustainable

development from the exploration of theories, experimentation, the engineering of achievements, the application of these achievements on a large scale, and the birth of technological products to their discontinuation. In fact, basic consensus and similar practices already exist in relation to this concept internationally. The 22nd APEC Economic Leaders' Meetings held in Beijing, China in 2014 came to an agreement on establishing the APEC Cooperation Network on Green Supply Chain. In the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)* issued by the World Business Council for Sustainable Development and the World Resources Institute, carbon emissions are tracked and defined with all three major ranges (direct greenhouse gas emissions, indirect greenhouse gas emissions, and other indirect greenhouse gas emissions) to provide a definition of supply-side emissions applicable to the whole industry chain and full life cycle. In fact, green supply chain and carbon emission range calculation are consistent with the concept of "full life cycle" sustainable technological development, and both emphasize the whole industry chain and full life cycle.

Second, science and technology based on local conditions.

The SDGs proposed by the United Nations consist of 17 components. Due to the limitations of economic and social development, available resources, and constraints of various kinds in different countries and regions, SDGs are more focused and localized. For example, the goal of zero hunger (SDG2) has basically been achieved for developed countries such as Japan and South Korea, while the issue continues to challenge countries such as Afghanistan. Humanity's largest ever operation to eradicate poverty has been completed in China, but there are still significant populations in South and Central Asia stricken by poverty. In general, to achieve more realistic, high-quality sustainable development in the face of the Environmental, Social and Governance (ESG) divide, technology must be focused on different priorities in different regions.

Third, priority on addressing climate change

Climate change is one of the largest, most widespread, and most serious challenges facing the world. Climate action is the 13th of the UN's 17 SDGs, but the UN website supports the integration of sustainable development and climate action into a single category. The United Nations has also made it clear that sustainable development and climate action are interconnected and critical to both current and future human well-being. The reason is the extreme, abnormal climate that has pervaded in recent years and created a serious challenge affecting individuals worldwide. In other words, if we do not respond well to climate change, the human race will be at risk of extinction. We must also realize that climate change is the result of unchecked human desire and the unsustainable development that has continued since the industrial revolution.

II. The Principle of human-centric

"Human-centric" advocates respecting, accommodating, and balancing differences in historical, cultural, social, and economic development among different countries and regions, and pursuing consensus among different cultures. Meanwhile, we shall also ensure the protection of human rights and privacy, and deploy technology without prejudice. In regards to technology, it is precisely by being human-centric that we will succeed in promoting economic development and social progress, improving livelihoods and environmental protection, continuously enhancing the sense of access, happiness, and security enjoyed by social groups and individuals, and promoting the peaceful and sustainable development of society. To this end, technological activities should avoid causing harm or potential threats to safety and physical or psychological well-being and should respect an individual's dignity and privacy and guarantee the right to information and choice of those participating therein. Technological activities should also respect differences in religious beliefs and cultural traditions, treat different social groups fairly, justly, and inclusively, and prevent discrimination and prejudice. In addition, the use of

experimental animals should meet the requirements of reduction, replacement, and optimization.

First, a full technological life cycle that will respect, protect, and improve humans

To be human-centric in regards to the ethics of science and technology, we should not only focus on the resulting products but also pay more attention to the "full life cycle" of technological activities. Specifically, the impact of technological activities on people should be considered and evaluated from the outset and taken into account in regards to subsequent research and products while we also consider the possible negative impact after the product has ceased to be of value and how to minimize it. At the same time, the ethics of science and technology based on the human-centric principle should give full consideration to the impact on the activities' main participants. For example, the special environment required for some activities could impact researchers physically or psychologically. In addition, it is important for researchers to establish the human-centric concept so that it can be achieved in the full life cycle of science and technology.

Second, a wider range and scale of public participation

Within the UN system, the main entities supporting action on sustainable development and climate change include 38 institutions such as the United Nations High-level Political Forum on Sustainable Development, the International Monetary Fund, the World Bank, the United Nations Development Programme, the United Nations International Children's Emergency Fund, the United Nations Educational, Scientific and Cultural Organization, Food and Agricultural Organization, Industrial Development Organization, and the Office for Disaster Risk Reduction among others. In addition, the United Nations has set monthly targets based on the SDGs, in the hope of encouraging more frequent and larger-scale participation. The technology required for sustainable development depends on public attitudes and requires the widest possible participation. Researchers should not be the only ones who concern about the ethics of science and technology. Only when the public has succeeded in forming a general consensus on the ethics can science and technology promote sustainable development and avoid the risk of misuse and abuse that would endanger sustainable development.

Third, the advocate for "inclusive technology"

Sustainable development is essential if we wish to ensure that people of all genders, ages, and races will enjoy equal access to development opportunities. Specifically, under the guidance of the human-centric principle, great importance shall be attached to whether marginalized and vulnerable groups enjoy full access to the benefits of technology. This requires the promotion of inclusive technology to prevent marginalized and vulnerable groups from being left behind or from seeing their living and working conditions harmed by technology. For example, some elderly people are unable to use smartphones well and are thus prevented from using many public or commercial services. The most telling example is that the rapid development of online car-hailing has made travel must easier for the majority of people while actually making it more difficult for the elderly, who can not use car-hailing applications.

Fourth, a focus on the development of frontier technology

The new generation of information technology represented by artificial intelligence, quantum communication, and so forth, is stepping up making breakthroughs in applications, and the field of life sciences represented by gene editing, brain science, and regenerative medicine among others continues to give rise to new changes. Technology is constantly expanding the boundaries of human existence and changing the way we live, thus inspiring new branches of research in human ethics. For example, human rights, obligations, offenses and crimes in the metaverse need to be defined and quickly studied. There have even been previous instances of female users being assaulted in a metaverse game. In these new technologies and new scenarios, especially in application scenarios that combine virtual reality with reality, how to deepen the understanding of what it means to be human-centric and how to better protect people, respect

them, and promote their development have taken on great importance.

III. The principle of controllable technology

"Controllable technology" advocates that technology is developed by and for humans, therefore, technology should be controlled by humans. Humans have full autonomy in decision-making over technology. Correspondingly, its controllers, that is humans, should be responsible for its actions. Therefore, while exploring technological innovation and promoting increased productivity, humans must objectively evaluate and carefully deal with uncertainties and risks related to technological applications and strive to avoid and prevent possible risks from technological activities so as to prevent the misuse and abuse of technological achievements and avoid endangering social, public, biological, and ecological security.

First, foundation of moral integrity of those working with technology

Those working with technology account for one of the most influential groups behind technological development. For technology to be controllable, it must first be controlled by those working with it, who must in turn be conscious of the importance of ensuring its controllability. In 1949, the *Charter of Scientists*, adopted by the International Council of Scientific Unions, clearly defined the obligations and responsibilities of the scientific community and called for "maximizing the influence of scientists, promoting technology in the most beneficial way to mankind, and preventing the misuse of technology." In fact, the core connotation of this requirement is to ensure that technology is controllable so as to pursue benefits and avoid possible harm. Technology workers without the concept of controllable technology in mind are not qualified.

Second, one of core propositions of public governance

Technology has spread to all aspects of society and its controllability has an impact on everything and everyone. Therefore, controllable technology is a social ethics and governance issue. In recent years, losing control over technology in the process of usage frequently has occurred. For example, the problem of gun proliferation in some areas is itself the result of arms technology not being subject to social control. In fact, the severe environmental pollution previously experienced by people also reflects that technologies were out of control. The green transformation actively advocated nowadays also hopes to see controllable technology on social and environmental levels. In general, as a key component of public governance, controllable technology must be emphasized both in research and application.

Third, principal direction to develop and make good use of technology

Controllable technology should become a necessary ethical boundary and core value for technological innovation, though we must also be careful to avoid its generalization. Controllable technology means the development of technology under controllable conditions, rather than merely emphasizing the control of technology. If we don't regard it from the perspective of development and blindly emphasize control, we actually deviate from the original intention of sustainable development. We should learn from negative cases in history. In 1865, the *British Motor Vehicle Act* stipulated that the driving speed in towns and cities should not exceed 3.2km/h, and there should be one person holding a red flag and walking 50 meters in front of the car to clear the way and warn pedestrians to ensure their safety. The result of the strict control over technology was a delay in the growth of the automotive industry in Britain, the birthplace of the industrial revolution.

The new round of scientific and technological revolution has given birth to a large number of new technological achievements, and the controllability of these technologies has become the focus of research in the field of the ethics of science and technology. Let us learn from the history by looking at new technologies from the point of view of development and controlling them with a view to better serving humanity.

Chapter III Practices of Technology for Sustainable Development in Asia

The 2030 Agenda for Sustainable Development is our blueprint for success, and the Asia-Pacific region can lead from the front.

Guterres, UN Secretary-General at the 74th session of the Economic and Social Commission for Asia and the Pacific (ESCAP) (May 14 to 16, 2018), Bangkok, Thailand

Faced with a series of challenges, we can see that many entities in Asia have integrated the principles of sustainability, human-centric, and controllable technology (three principles for chasing ethical science and technology) into the practices of technology for sustainable development. These practices, generally supported by technology, seek to overcome the challenges facing sustainable development in Asia and increase the likelihood of Asia's successfully achieving the SDGs. We also hope that these practices can bring experience, inspiration, and encouragement to Asia and the rest of the world.

I.   Technology for Good Health and Well-Being (SDG3) Practice Case

Amyotrophic Lateral Sclerosis (ALS) is listed by the World Health Organization as one of the five intractable diseases. It damages motor neurons, and as the disease progresses, patients gradually lose their ability to move, eat, speak, and even breathe in just a few years, with the disease eventually taking their lives. During this process, patients are awake and conscious, as if watching their bodies gradually freeze. According to statistics, half of the patients with ALS will die within 3 years, and 90% don't live past 5 years. How to prolong the lifespan and improve the quality of life of people with ALS is a global medical and social issue.

In February 2022, the SenseTime Intelligent Nursing System, developed by SenseTime and the Shanghai AI Laboratory, was officially delivered to its first patient. This set of products for ALS patients brings peace of mind and convenience to patients and their families.
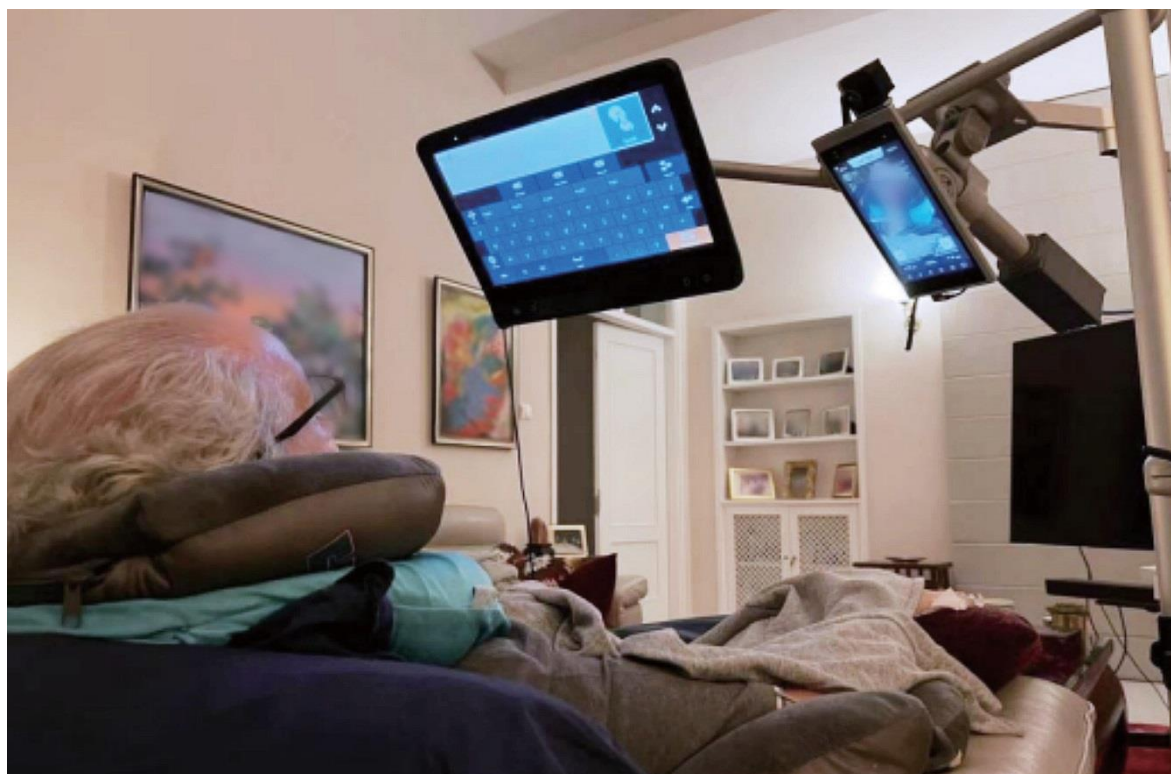
The Intelligent AI Nursing System

The SenseTime Intelligent Nursing System is a new technical solution for the care of ALS patients that can provide contactless care for patients with limited mobility and difficulty swallowing and breathing. The system employs multi-spectral imaging sensors unaffected by lighting conditions and can function for 24 hours without interruption. Moreover, it provides a non-invasive and non-contact way of monitoring physiological indicators for ALS patients. By collecting physiological information such as the radiation intensity of the patient's shell temperature and the degree of chest fluctuation, physiological indicators such as the patient's body temperature, respiratory rate, and heart rate can be quickly and accurately identified.

Compared with traditional medical equipment, which usually monitors physiological indicators

by attaching electrodes and through other invasive methods, this non-contact monitoring frees ALS patients from the need to wear other auxiliary tools, thus avoiding possible skin allergies and sores or low monitoring resistance and inaccurate signals that can result from long-term bed rest, malnutrition, and low skin moisture. SenseTime Intelligent Nursing System can also provide contactless active call function for critically ill patients who have lost the ability to speak and move. For example, through a series of predefined actions based on highly receptive AI technology, the care recipient can send out active call signals through their mouth, eye, or facial movements with no voice and a fixed posture.

In addition, the SenseTime Intelligent Nursing System is also more convenient for caregivers. The system employs computer vision analysis technology to continuously monitor the patient's physiological indicators, wake/sleep status, and count information such as sleep duration and wake-up times and generate a sleep quality analysis report for the caregiver to adjust the nursing plan in a timely manner. With the dedicated display terminal, the caregiver can also remotely view the status of the care recipient anytime, anywhere, and in real time. The system continuously records the physiological indicators of the care recipient and records anything abnormal.

In June 2022, SenseTime collaborated with the Shaanxi ALS Association to carry out "AI warm 'ASL' care" activities and provided the Intelligent Nursing System for public welfare to families in Xi'an, Xingping, Weinan, Yanchuan, and a number of other places in Shaanxi Province.

The incidence of ALS is relatively low, but there are many other diseases, such as stroke, cerebral palsy, and Alzheimer's disease, exhibiting similar symptoms, In addition, the overall health of the elderly in China is not ideal. More than 180 million elderly people suffer from chronic diseases, with the proportion of those suffering from one or more chronic diseases as high as 75%. Approximately 40 million elderly people are disabled or partially disabled, accounting for 18.3% of the elderly population. At the same time, there are only 300,000 elderly care workers, making for an absolutely unbreachable gap. These larger groups are equally eager to attain a greater quality of life and to be treated with more dignity. SenseTime is committed to enabling Intelligent Nursing System to provide nursing services for more patients suffering from other diseases who are incapacitated or bedridden for a long time, or for the elderly, so as to improve their quality of life. (This case has been recommended and provided by SenseTime)

II. Technology for Quality Education (SDG4) Practice Case

Practice Case 1: XR technology drives iterations and new explorations in human education

In recent years, the extended reality (XR) market has developed rapidly. A market research report by Technavio has shown that the global augmented reality (AR) market is expected to grow by USD 76.99 billion in 2020-2024. XR development in China enjoys the support of government policymaking. According to some statistics, 160 incentive policies were issued nationwide in the first half of 2021 alone. Of those, 39 involved the development of virtual reality (VR)/AR-related industries, 37 the promotion and display of VR/AR, 23 the development of VR/AR culture and tourism industry, and 17 the use of VR/AR in education and training.

Education is the foundation of a country, and reinvigorating the country through science and education has become a national strategy. Encouraged by national policies, some XR market entities are also attempting to use related technologies to promote the modernization of education and a fairer distribution of educational resources.

Rokid is an XR enterprise that has succeeded in producing and selling optical waveguide intelligent glasses on a large scale and has accumulated a full set of self-developed algorithms, operating systems, chips, optics, and structural designs and software.

Rokid has responded to current policy and development demands to apply XR technology to education. First, launching an integrated platform for educational product design and development. An integrated platform for creating and publishing Rokid educational products has been established on the basis of the Rokid developer platform in keeping with AR product design and development requirements for a simple environment, improved interface, and good functional compatibility. Second, introducing Rokid basic subject tools. Rokid designs and produces common tools for mathematics (mainly solid geometry), physics, chemistry, biology, and science among other subjects in primary and secondary schools (including vocational schools). The tools are scientifically-designed and highly usable and can boast seamless platform compatibility. Third, exploring characteristic educational scenarios. Rokid has built a series of characteristic scenario models to facilitate the application of specific educational knowledge without a need for code. For example, safety education scenarios such as electricity use, earthquake, drug prevention, and drowning prevention, and subject education scenarios such as biological growth process demonstrations. The fourth step looks to the design and release of standards based on Rokid educational products. Continuous design and production on the platform call for the creation and publication standards for media element formats, attributes and standard code interfaces. Finally, there is a need for designing and releasing tutorials for Rokid platform. For example, the release of design, development process and standard explanation through the platform on the web, the development document integration page of SDK and common codes, as well as comprehensive case presentation and solutions.
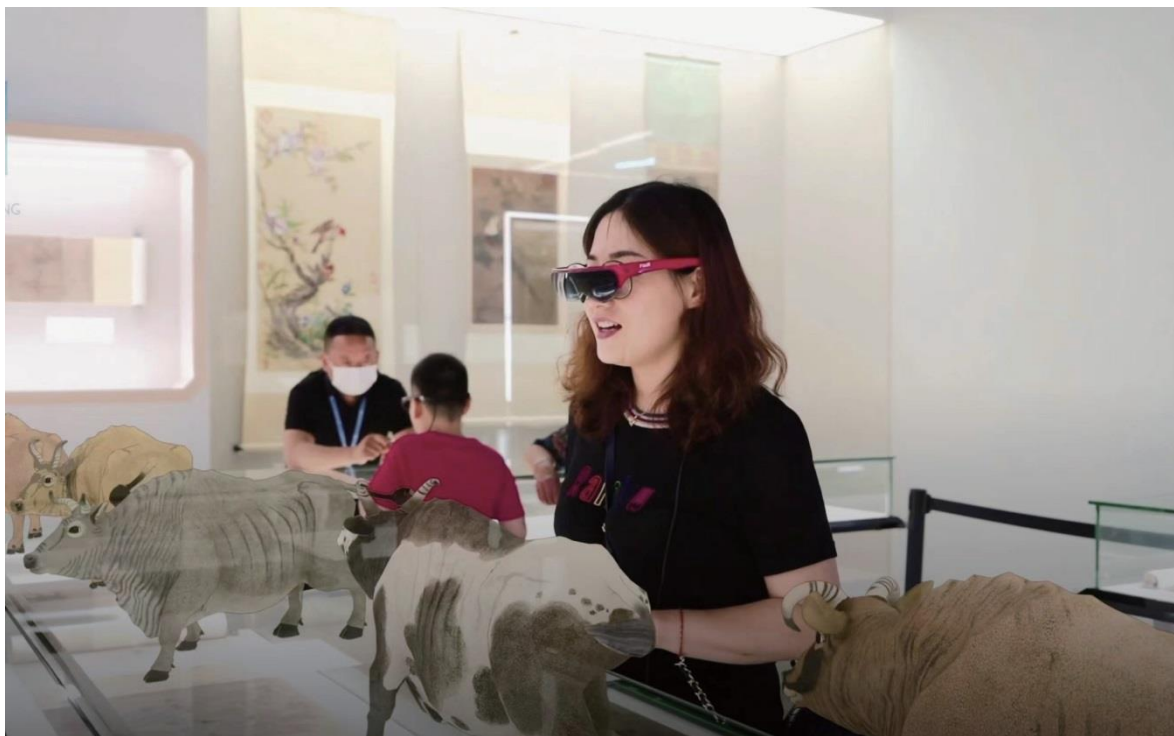
AR Glasses Developed by Rokid

In its exploration of educational XR, Rokid will attempt to highlight six aspects of AR technology in educational applications. First, three-dimensional and intuitive display. AR technology's ability to simulate and interact makes it possible to present abstract and obscure knowledge in a three-dimensional way, illuminating even the most incomprehensible cell structures and chemical reactions. Second, a combination of physical and virtual realities. AR can be used as an extension of textbooks. Scan a textbook and AR content appears, presenting information in a richer, more meaningful way and combining reality and imagination to make learning more effective. Third, high-level interactivity. With AR, students will no longer need to memorize complex knowledge by rote but will experience each knowledge point personally.

The multi-person AR function also allows students to participate in the learning process in a collaborative way, which makes learning fun. Fourth, discovery learning. AR in education adopts the discovery learning model to provide a rich and stereoscopic learning environment, so that students can explore knowledge by themselves and enhance their learning experience. Fifth, game-based learning. The visual capabilities and interactivity of AR are naturally conducive to attractive game-based teaching content, which greatly enhances the willingness of students to learn, stimulates interest in learning, and improves the overall effect by making education fun. Finally, there is the striving to be safe and open and encourage others to learn happily. AR is open, and students can see both virtual 3D content and the real physical environment around them, making for open interaction and ensuring that there are no safety concerns related to wearing VR equipment.

Rokid is committed to deepening educational XR in the future, creating a standardized AR education platform, and collecting various kinds of educational AR content for all ages and subjects. As a cutting-edge, high-quality teaching tool that is eminently reproducible, it aims for nationwide adoption for a more efficient, enjoyable, and safe teaching experience. (This case has been recommended and provided by Rokid.)

Practice Case 2: Qingdao Education e-Platform leads the digital transformation of education comprehensively

As education informatization enters the 2.0 era, the role of the Internet in education development is further highlighted. Internet-enabled education focuses on optimize resource allocation, improve education quality and efficiency, and promote personalized development, aiming to further amplify the functions of education in cultural transmission, choice, innovation and promotion of personal development, and to lay an important technical and humanistic foundation for reducing the education gap.

In this context, Qingdao Education Bureau, in accordance with the policy requirements of the Ministry of Education and the Department of Education of Shandong Province, and the deployment requirements of Qingdao Municipal Government, jointly with Inspur, seized the development opportunity to build a one-stop "Internet+Education" platform – Qingdao Education e Platform, which is the first in China.

The platform focuses on education's endogenous needs and social concerns, vertically connects various education departments at the ministry, provincial, municipal, district and school levels, and horizontally connects to the government service network, Qing e Office and other government platforms, comprehensively empowers the management, decision-making, teaching, evaluation, and other education work, and solves the "information island" and "chimneys stand" of the city's education system. It also carries out the application of big data in education, explores the application of big data in enrollment prediction and education resource bearing, education supervision, education evaluation, students' personalized development and teachers' professional growth, transforms the way of education development and realizes the modern governance of education.

Firstly, it helps stop schools while not stop classes. In 2020, Qingdao relied on the e-platform to ensure that 250,000 teachers and students in 100 high schools would be taught online at home during the school closure period, during which more than 30,000 lessons of various kinds were gathered. In the post-epidemic era, the city's Education Bureau actively responded to social concerns by opening the "Public Welfare Tutoring" to provide high-quality, free online teaching services for the city's primary and secondary school students, fully reducing the burden on parents.

Second, the data sharing application is normalized. In 2021, Qingdao e platform synchronizes school and teacher and student data with the provincial education department regularly every day and completes more than 10 times of external sharing for the Big Data Bureau, Sports

Bureau, Audit Office and education internal, and the cumulative amount of shared data reaches ten million, truly realizing data filling once and sharing by many parties.

Third, promoting balanced education based on education data. Relying on the e platform, 650,000 online learning spaces have been opened and nearly 10 million derived educational resources have been gathered, realizing more than 740 synchronous classroom accesses in the city's urban and rural schools, helping 265 urban high-quality schools pair up with 272 weak rural schools, and realizing synchronous classroom connections with schools in Tibet, Australia and other domestic and foreign schools.

Fourth, artificial intelligence helps classroom analysis. At present, classroom analysis has covered all classrooms in Qingdao, serving more than one million students from the beginning of the class, providing effective support for the objectivity and science of teaching management and evaluation.

Fifth, scientific management decision-making. Combined with the actual needs of business departments, 14 data overview screens and more than 50 sets of detailed data analysis reports have been developed to realize the sharing of basic data and one-stop access to services, which provides real-time data support for management decision-making.

The platform builder, Inspur, is a digital transformation service provider for the government and enterprise, providing overall solutions, software development and system integration services for digital government, tobacco, education, credit, traceability, market supervision, civil affairs and other industries. Inspur is the developer of "National Primary and Secondary School Registration Management Information System". At present, Inspur has implemented regional smart education cloud and smart campus construction for dozens of schools in 15 provinces, 14 cities and counties in China, based on the full series of solutions and product systems such as Inspur regional education cloud, smart campus, smart classroom, interactive classroom, and high-quality resource content, and comprehensively assisted the high-quality development of regional education new infrastructure.

The development of quality and balanced education is not a one-day effort, and the common goal of education is to the satisfaction of the people. We believe that with the boost of education information technology, the future teaching content, teaching methods and means will be new, so that students can "go to school" and "be educated well". (This case has been recommended and provided by Inspur.)

III. Technology for Quality Education and Gender Equality (SDG4+5) Practice Case

Education is directly linked to socioeconomic status and is the key to alleviating poverty. The past decade has seen a significant increase in access to education at all levels and marked increases in enrollment rates, especially for girls. Even so, some 260 million children, or nearly one-fifth of the world's school-age population, did not attend school in 2018. More than half of the world's youth still fail to meet minimum literacy and numeracy standards. The question of how to improve education levels (especially among females) is a critical issue around the world.

The Risk and Insurance Management Association of Singapore (RIMAS) is a non-profit organization established in 1988 to advance the discipline and practice of risk management. In recent years, RIMAS has promoted cooperative and self-study courses among its members through all possible channels. To date, RIMAS has engaged and registered no less than 20,000 partners and encouraged more than 10,000 women to study AI, empowering their participation in the field.

Examples include a free joint training camp organized by RIMAS with the Global AI Hub in Singapore and the launch of the "10 million.AI" Project. With a focus on SDG4 (Quality Education), the project looks to leverage technology to achieve sustainable development and gender equality in Asia. It aims to introduce an equal number of female and male AI professionals into the AI ecosystem to learn about the technology.

Specifically, it aims to provide free, first-class education in AI and digitalization globally, engaging 5 million men and 5 million women in the global AI ecosystem over the next 10 years. The project has attracted participation from more than 20 countries and regions worldwide and recruited more than 50 thought leaders with expertise to provide support, with more than 15,000 individuals joining the education platform and training camp. RIMAS is the project's main partner in Singapore and Asia.

According to the RIMAS Vision for the Future, project expansion will call for risk management in the use and deployment of AI to prevent the malicious use of AI and ensure that it is used in a responsible and ethical manner. (This case has been recommended and provided by the Risk and Insurance Management Association of Singapore.)

IV. Technology for Decent Work and Economic Growth (SDG8) Practice Case

The COVID-19 pandemic has brought about a historic economic downturn leading to record high levels of poverty and unemployment and an unprecedented humanitarian crisis. The International Monetary Fund expects the global recession to be as severe as that of 2009 and possibly even worse. The International Labor Organization estimates that as unemployment continues to rise, nearly half of the global workforce will be at risk of losing its livelihood. The question of how to create more employment opportunities and increase income has become a pressing issue of great concern to all.

Newborn Town is a Chinese social media company that has been deeply involved in the global market for 10 years, with business in more than 200 countries and regions. The company actively fulfills its corporate social responsibility both domestically and overseas. While developing its business, it focuses on employee development, cares for vulnerable groups, and adheres to the path of global sustainable development. Newborn Town has made many efforts to increase employment and income levels.

The company can boast more than 1.3 billion product users, with hundreds of thousands of full-

or part-time content creators around the world attracted to its social media products. While building up a presence on the social platform, users also earn income and improve their living standards in the midst of the global pandemic. Newborn Town also provides various types of support for content creators. In Japan, MICO's Star Project series has been held for a number of years, with the winning creators mentored by senior musicians such as YANAGIMAN, Yuki Kishida, and Akihito Tokunaga and given the opportunity to create custom singles and release albums. This has attracted many outstanding creators interested in pursuing a career in music to the platform, where they can showcase their talents through social platforms and embark on a career in music. In addition, Newborn Town has established multiple operation centers in different regions of the world to recruit local staff, thus creating additional employment along the way. In the process, it sees to long-term development by providing systematic training and improving the existing welfare system. (The case won the ESG Care Prize at InnoESG Prize 2021 jointly organized by the SocietyNext Foundation and the UNESCO Hong Kong Association Center for Peace, and has been provided and recommended by Newborn Town)

V. Technology for Industry, Innovation, and Infrastructure (SDG9) Practice Case

Humans have a tendency to urbanize, and they will continue to gather in cities. This does not, however, mean that rural areas no longer matter. As of 2018, the global urbanization rate was 55.3%, and that of Asia was 49.9%, according to UN data. This means that nearly half of Asia's population still lives in rural areas. With the rapid development of technology, the question of how to upgrade rural infrastructure so that those living in the countryside can reap the same technological benefits should be a common topic in Asian countries, enterprises, and universities. This is especially true for China, where rural revitalization has become a core task for the government as it seeks to build up rural areas following poverty alleviation.

As a provider of digital solutions, H3C employs more than 50% of its personnel in R&D and holds more than 13,000 patent applications. It can boast comprehensive digital infrastructure capabilities that include chips, computing, storage, network, 5G, and security and terminals and provides one-stop digital solutions in cloud computing, big data, artificial intelligence, industrial Internet, information security, intelligent connection, and edge computing among others alongside end-to-end technical services. Recent years have seen H3C exploring how to enable its technology to help build new rural infrastructure. One such case representative of H3C's search is that of the Yudong Village project.

Yudong Village is the famous hometown of Chinese peasant paintings. The question of how to improve agricultural informatization digitally, promote the development and growth of rural industries, further optimize their layout, capitalize on the beauty, wealth, and strength of rural areas, and achieve common prosperity presents a major opportunity and challenge at present. The local community has used H3C's digital solutions to build an integrated, intelligent big data "Future Rural Brain" platform tailored to Yudong and the diverse needs of the villagers.

The Yudong Village "Future Rural Brain" platform

Yu Dong's "Rural Brain" focuses on three main subjects, five aspects to modernization, and ten scenarios as it builds up a number of projects in rural governance, services, and industrial magic boxes.

In culture and tourism industry, "Rural Brain" collects and coordinates industrial information in Gouxi Township and integrates peasant painting transactions, farms, tourism, and other information into IoT devices to deepen the intelligent management of scenic spots. The QR code on the roadside of Yudong Village can provide tourists with 24-hour "Yudong Tour" services that include a Yudong map, tour guide map, and public mailbox among other functions for one-stop access to tourism information and services.

In the course of optimizing villagers' daily lives, "Rural Brain" can also use the QR codes to collect information about the needs of tourists and villagers to make precise connections and improve the effectiveness of services provided. "Rural Brain" has also launched a credit points program providing coupons, gift certificates, rice, flour, grain, and oil among other credit point rewards to villagers and tourists who actively report problems and participate in governance.

"Rural Brain" has now effectively opened up a channel for future community governance and public services and initiated intelligent sharing and co-governance. Since the start of "Rural Brain", more than 600 cases have been received, with nearly 550 being settled, for a settlement rate of over 90%.

The next step calls for Yudong Village to deepen the digital reform and promote the future development of the village by digital means. Yudong Village aims to improve the digital village 2.0 solution and the "cockpit" of the "rural brain". Important information on each module can be viewed on the cockpit page, making it convenient for administrators to grasp rural situations at once. The deployment of the "one village map, dual engines for points" program and vertical industry applications will help make Yudong Village better and more intelligent. (This case won the tourism industry "micro-transformation and fine promotion" best practice case in Zhejiang Province, China in 2021, and has been recommended and provided by H3C.)

VI. Technology for Sustainable Cities and Communities (SDG11) Practice Case

Practice Case 1: Solution of traffic problems caused by rapid urbanization in Nanshan District, Shenzhen

Although the urbanization rate in Asia is lower than the global average, it is increasing rapidly as a result of rapid economic development. This is especially true in China, where the urban

population has experienced explosive growth through industrialization and urbanization since the reform and opening up. By the end of 2021, China's urbanization rate had reached 64.7%. Meanwhile, urban road congestion, traffic safety, and a number of other issues have caused widespread concern in China. In order to speed up delivery times, it is not uncommon for take-out riders to violate traffic laws and regulations by driving on the wrong side, running red lights, speeding, cutting in on vehicles, and not wearing helmets. Riders have a large delivery area and are very mobile, while a limited traffic police force makes it difficult to obtain evidence about violations of regulations... In an effort to resolve the above-mentioned problems, local traffic control departments have carried out traffic safety education for riders, increased efforts at remediation, and increased the police presence at key road sections, which have led to an increase in the strain on manpower and material resources. Data from the Chinese Center for Disease Control and Prevention shows that in 2019, electric bicycles accounted for nearly 70% of non-motor vehicle injuries and fatalities in China. On average, one electric bicycle rider dies every hour in a road traffic accident.

As an AI enterprise, SenseTime's mission is to "be original and lead human progress with AI", and it is focused on developing an expansive and inclusive AI software platform to promote economic, social, and human development. Faced with the abundance of traffic problems caused by rapid urbanization, SenseTime is determined to provide solutions based on its own computer vision technology.

Nanshan District is a densely populated area with the highest GDP in Shenzhen, and its urban take-out and express delivery industry has grown rapidly. To alleviate the traffic pressure in Nanshan District, SenseTime has developed a set of intelligent vision platforms. By analyzing physical world data in real time with thousands of AI models and converting the data into insights, alarms, and actions, it has provided a multi-scenario, one-stop AI urban governance solution, which realizes the full closed-loop management of AI judgment and disposal and ensures road traffic order and law enforcement management in Nanshan District. As a result, the efficiency of urban traffic in Nanshan District has been significantly improved.

According to actual data, from January to February 2021, there were approximately 800 cases of illegal riders in Nanshan District, a decrease of 56% compared to the approximately 1,800 cases in December of the previous year, showing a clear downward trend. In December 2020, the rider violation record showed the helmet rate to be approximately 44%. From January to February 2021, the figure reached 94%, showing an obvious upward trend.

In December 2020, approximately 140 persons committed multiple consecutive violations, with approximately 40 from January to February 2020, also representing a great reduction in the number of instances. This shows that by meting out punishment, providing education, and promoting traffic safety, rider awareness regarding safe travel has been significantly improved, and the addition of technological means can effectively reduce rider negligence and prevent repeat violations.

As China's urban development enters a new stage of high-quality development, the model of urban development will undergo major changes, and significant problems such as traffic-related disturbances will become the focus of urban governance. An intelligent traffic governance model based on AI technology will do much to improve the quality of urban development and traffic safety. SenseTime hopes to help improve traffic in more cities. (This case has been recommended and provided by SenseTime)

Practice Case 2: AR navigation experience at Suvarnabhumi Airport, Thailand

For years, the Thai government has emphasized digital development. Since 2016, the Thai government's support for the digital economy has been guided by the "Thailand 4.0" plan, a 20-year roadmap for Thailand to move toward a "value-oriented and innovation-driven economy" focused on digital improvements to improve the quality of life, productivity and efficiency of

the Thai people.

As an important infrastructure for air transport and cities, airports will take on the responsibility of developing the country's digital economy and digital transformation under the "Thailand 4.0" plan. According to the Managing Director of Airports of Thailand (AOT), Nitinai said that AOT is accelerating the development of technology to improve services and make the airport more dynamic, and that digital disruption will happen eventually, "which is also a big challenge for the Ministry of Transport".

Suvarnabhumi Airport, one of the six airports under AOT, covers an area of 320,000 square kilometers and is one of the most important aviation hubs in Southeast Asia and even in the Asia-Pacific region, receiving the largest passenger throughput and aircraft movements in Thailand each year. In 2019, SenseTime cooperated with SKY ICT to carry out digital transformation for the 500000 square meters of large-scale physical space of Suvarnabhumi Airport in combination with AI and MR technologies to optimize the service experience of airport passengers.

AR Navigation. Based on large space digital reconstruction, visual positioning and MR technology, it can realize real-time positioning and AR real-world navigation for passengers in the airport. Combined with the AOT mobile app, passengers can open the AR navigation function in the app after arriving at the airport, scan the airport environment to locate and obtain convenient route guidance services. Following the AR arrows and virtual guides, passengers can easily reach their destinations to handle visa processing, currency exchange, cab rental, shopping and other airport services. At the same time, AR navigation is connected with the passenger flight system to navigate to the boarding gate with one click. AR navigation is more efficient than traditional information counters or 2D flat map guides, helping passengers to get to the airport accurately and directly, saving time for airport activities.
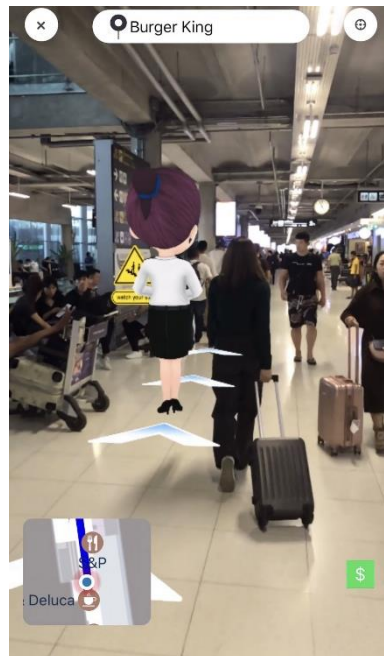
Airport AR navigation effect

AR marketing. In the AR navigation journey, the AR billboards of stores along the route are integrated, and passengers can learn the key information of stores such as special activities, product recommendation and per capita consumption in real time, which provides passengers with intuitive and quick information reference to enter the stores for purchase and brings convenient shopping experience, and also further promotes the marketing conversion of airport stores.

Airport AR advertising effect

Achieving high-precision navigation in large space scenes in airports through AI and MR technologies is a major innovation in the aviation industry. Traditional navigation in airport scenes is mostly based on GPS positioning or Bluetooth beacons, which cannot avoid the problems of large positioning error, high hardware cost and cumbersome maintenance. Based on the leading computer vision and MR capabilities of SenseTime's SenseMARS platform, it can quickly create comprehensive service tools that can adapt to a variety of indoor large space positioning, outdoor complex scene navigation, emergency situation positioning, cross floor positioning, underground parking lot positioning, functional service area positioning, etc, bringing fast, convenient and strong self-help airport navigation services to passengers and helping airport digital transformation and smart.

Practice Case 3: Middle East Riyadh Season AR Immersion Tour

As an important part of Vision 2030, Saudi Arabia has been promoting the development of the cultural and tourism industry in recent years by organizing thematic seasons in key tourism cities to showcase its natural and cultural attractions to tourists around the world. The Riyadh Season is the largest cultural and entertainment event in Saudi Arabia and the Middle East, and is an important part of Saudi Arabia's efforts to develop the digital tourism industry and achieve Vision 2030. With 900,000 square meters of event space divided into 14 themes and nearly 7,500 events, Riyadh Season is a feast of music, art, culture and dining. According to the General Entertainment Authority (GEA), the Riyadh Season has seen more than 11 million visitors, 1.6 million of whom are from overseas.

In order to continuously attract more visitors, create greater popularity and fervor globally, and promote the sustainable development of the cultural and tourism industry, SenseTime and Sela, a Saudi cultural and tourism event management company, have partnered to empower Riyadh Season events based on SenseMARS' AI and MR technologies to create a grand immersive cultural and entertainment experience for local residents and global visitors in five major event areas: Riyadh Boulevard, Combat Field, Winter Wonderland, Safari and Riyadh Front. The current main scenarios of the project landing include four functional modules of AR navigation, AR theme routes, AR attractions and AR marketing.

AR navigation. In view of the large scope of the scenic spot and the characteristics of scattered attractions, SenseTime uses AI and MR technology to build AR real-world navigation services in the park, covering various park services, including play attractions, prayer rooms, medical service points and public toilets. When opening the mobile app, visitors can get high-precision AR route guidance at any time, find the attractions and facilities quickly and easily, and easily

get the electronic guide introduction, making the tour more convenient and interesting. At the same time, the combination of visual perception technology for real-time analysis of the number of people in line at attractions and AR navigation makes it easy for visitors to check the queue situation at any time and better arrange their tour itinerary.
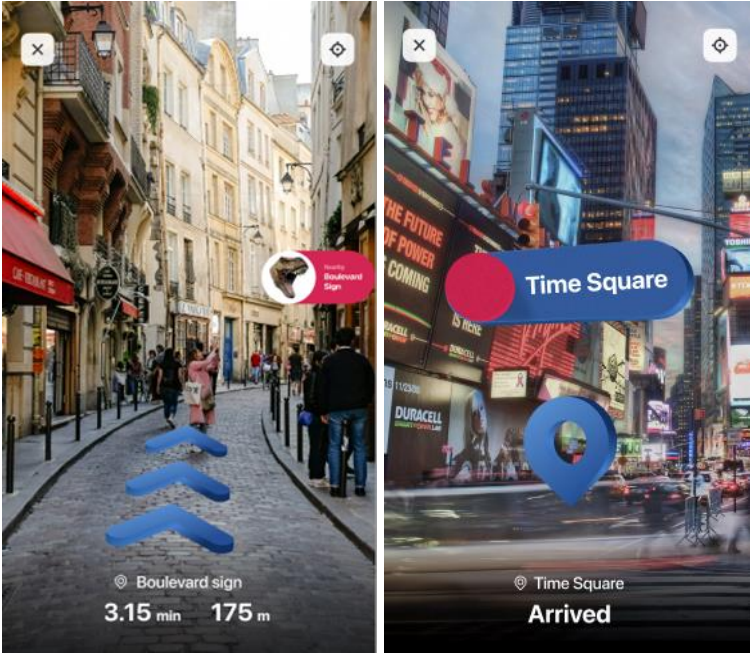
AR navigation in Time Square area

AR attractions. With the support of SenseTime MR technology, the park has set up AR attractions in the two major areas of Time Square, dinosaurs and fountains respectively. Visitors can see a virtual Tyrannosaurus Rex pacing back and forth in the square, looking and roaring through the mobile app; scanning the fountain will show the landscape of the sky ocean world, a "whale" leaping high from the fountain, splashing a wave, giving visitors a very realistic sense of visual impact. The AR attraction will show a view of the ocean world in the sky. Visitors can take photos with these AR attractions and share them on social media to attract more attention to the park.

AR dinosaur theme and AR Sea World theme

AR marketing. While providing AR navigation for tourists, the park will put AR advertising function along the navigation route, promote the stores around the attractions for tourists, show the preferential activities of stores and recommend discount goods on the AR billboard, so as

to channel the marketing of stores in the park, combine AR marketing with traditional marketing, and improve the conversion efficiency of tourists into stores.

AR advertising and marketing

AR theme route. In the Boulevard area, due to the complex terrain, the park provides AR theme route recommendation for visitors based on AR navigation function, which connects AR attractions and AR marketing points into a tour route, reduces users' action cost, guides users to visit related projects, and combines with AR punch card puzzle game to collect pictures for coupons, which also draws traffic to the park stores.

Based on SenseMARS of SenseTime, the park brings an efficient and convenient touring experience for global visitors through its technology-rich visual presentation and vivid and interesting immersive interactive design, giving visitors the opportunity to experience and embrace Saudi Arabia with a vivid and interesting perspective, adding popularity and topics to the cultural and tourism season activities.

VII.   Technology for Climate Action (SDG13) Practice Cases

Practice Case 1: A New Attempt at Intelligent Emission Reduction under the Digital Twin

With the further development of a scientific revolution and industrial transformation, the global economy is becoming increasingly digital. Climate change has also received widespread international attention, with the world's major economies promising to achieve carbon peaking and carbon neutrality goals. Emerging AI and 5G digital technologies are quickly being integrated into traditional industries, improving the efficiency of production and service all across the board and promoting green, energy-efficient, sustainable models of production and consumption in pursuit of carbon peaking and carbon neutrality goals.

Moviebook is an intelligent vision technology enterprise that relies on its computer vision, AI, and digital twin technologies among others to cover a range of scenarios that include intelligent media, intelligent science and education, and digital commerce to help introduce intelligent, digital, green upgrades to multiple industries. Through digital technology ADT, Moviebook promotes energy conservation and emissions reductions in a variety of ways.

ADT refers to the deep integration of AI+DT (digital twin), characterized by improved production and service efficiency, energy conservation, and emissions reductions. Business-wise, the digital manual business based on this technology leverages the power of digital technology for a greener society through "data, information, and image visualization" to reduce

user reliance on paper and promote reductions of carbon emissions. Industry-wise, Moviebook provides multiple digital technology services, such as AI digital application implementation and virtual reality scene execution among others to improve power system operating efficiency and reduce losses and waste. As for digital city construction, Moviebook's ADT engine amplifies the value of data and information, allowing the physical city and the digital city to "grow together" and the city to operate more intelligently while saving energy. As regards its own construction, Moviebook has established the first low-carbon demonstration project in the field of intelligent imaging, i.e., a visual production base and supercomputing center covering core domestic network nodes. Through self-developed technologies such as clean energy, technical architecture, product innovation, high-performance servers, liquid cooling and heat recovery technology, and AI temperature control, it reduces energy consumption and carbon emission throughout the entire life cycle.

Moviebook employs digital technology to make dual control of energy resource consumption possible while regulating carbon emissions. Through advanced system control methods, energy-saving algorithms, and energy storage devices, energy conservation permeates the production process, which ultimately achieves system-level carbon peaking and carbon neutrality in its own operation and supply chain. It is predicted that during the "14th Five-Year Plan" period, electricity consumption of the supercomputing center will be reduced by 38.7% and that of the visual digital base by 75.3％, with the corresponding carbon emissions to decrease by 43.2%. Moviebook promotes the reduction of carbon emissions in the upstream and downstream segments of the industry and covers a wide range of industries with more than a thousand low-carbon intelligent vision technologies. It is estimated that Moviebook's commercial and industrial chain green digital operation and management solution can increase production efficiency by over 1,000 times and reduce the production cost by 99.7%.

The Digital Production Line of Small Commodities in the Moviebook Visual Base

Moviebook is constantly seeking new paths for industrial integration. It employs AI and digital twin technologies among others to reshape the ecology of industrial production and consumption, bringing intelligent, low-carbon, green production, services, and living scenarios within reach. It will continue to strengthen the integration of ADT engines and traditional industries and promote the digital transformation of various industries to achieve energy conservation and meaningful reductions in emissions. (The project received the Wu Wenjun AI Science & Technology Award from the Chinese Association for Artificial Intelligence, the CAA Enterprise Innovation Award from the Chinese Association of Automation, and the

Golden Bridge Award from the China Technology Market Association, and has been recommended and provided by Moviebook.)

Practice Case 2: A New Fund for Air Pollution Prevention and Control in the Beijing-Tianjin-Hebei Region of China

Air pollution is a major challenge faced by many industrialized countries. The Beijing-Tianjin-Hebei region is one of the important comprehensive industrial bases in China. The process of industrialization and urbanization has led to persistent problems with air pollution, and the battle for blue skies is one of the most important environmental governance topics in the region.

The China Energy Conservation and Environmental Protection Group (or CECEP for short) is an enterprise focused on conserving energy, reducing emissions, and protecting the environment. CECEP Fund Management Co., Ltd. is a wholly-owned subsidiary of CECEP. In 2018, the Asian Development Bank, the Ministry of Finance of China, and CECEP formally signed the CECEP ADB Beijing-Tianjin-Hebei Air Pollution Prevention and Control Fund Project Agreement, which has made innovative use of the Asian Development Bank's sovereign loan of USD 500 million as a fund in the Beijing-Tianjin-Hebei region to promote the application of high technologies in the fields of energy conservation, emissions reduction, and climate change mitigation in manufacturing, energy, and transportation among other industries and to improve air quality in the region.

To implement CECEP ADB Fund Project, CECEP Fund Management Co., Ltd., as the fund manager, initiated the establishment of a parent fund (the CECEP ADB Industrial Investment Fund), a regional sub-fund (the CECEP ADB Blue Industry Investment Fund), and 2 industry sub-funds (the CECEP Jinxin Equity Investment Fund and the CECEP Bohua Equity Investment Fund). The company has invested RMB 2.2 billion in 14 projects and led the other funds to invest RMB 11.7 billion, actively promoting the application of advanced technologies. Some examples of these technologies include the use of industrial by-product hydrogen instead of natural gas, the efficient treatment of volatile organic compound VOC gas, the promotion of graphene heaters and sewage source heat pumps for heating, the recycling of waste resources such as sewage and garbage, the reduction of energy consumption of electrolyzers, the development and utilization of biomass energy, and the procurement of clean and low-emission vehicles among others. Likewise, efforts continue in regards to geothermal and rooftop solar energy, intelligent microgrids, super energy service companies, and intelligent industrial parks.

Overall, the CECEP ADB Beijing-Tianjin-Hebei Air Pollution Prevention and Control Fund Project implemented by CECEP Fund Management Co., Ltd. has led to active participation in energy conservation and a reduction to pollution, the development of renewable energy, and the prevention of pollution, all of which have improved regional air quality.

In terms of promotion, the CECEP ADB Fund Project was designed in concert with the government, business, and international financial institutions to leverage the industrial advantages and operating experience of the business community and put the funds in a position to effectively support major strategies with high application and promotional value. The funded sovereign loan model established by the project has been adopted by the World Bank-financed Green Low Carbon Investment Fund Project and the ADB-financed Shandong Green Development Fund Project. In terms of industry contribution, the CECEP ADB Fund Project is mindful of environmental and social impacts and adheres to the positive externalities of energy conservation and environmental protection. The establishment of a green performance evaluation system for funds facilitates cooperation between the green and fund industries. By guiding social capital to support the application and promotion of advanced technologies for energy conservation and emissions reduction and employing green finance to enable green business development, power, chemical, and transportation entities in the Beijing-Tianjin-Hebei region are aided in their green and low-carbon transformation. In terms of profitability, CECEP ADB Fund Project investment is planned on a rolling basis over a 15-year period, with

an initial target of a USD 500 million sovereign loan over USD 1.5 billion in social capital to carry out investment in energy conservation and environmental protection in a wide range of fields and regions, thus improving the efficiency of capital use and diversifying investment risks. In terms of public welfare, the CECEP ADB Fund Project has introduced an international green framework integrating ADB's environmental and social system requirements into each specific link and transmitting the advanced concepts of green, low-carbon, sustainable development to the enterprises receiving investment. The project will reduce air pollutant emissions in the Beijing-Tianjin-Hebei region and mitigate the negative impact of pollution on society and the economy. According to the EIA report and the results of regular monitoring of each project, those receiving investment can expect to save 1.0404 million tons of standard coal and realize 30.0262 million square meters of the clean heating area every year by adopting graphene composite materials, sewage source heat pumps, steam lithium bromide absorption heat pumps among other technologies to meet international advanced environmental protection standards. The resulting emissions reductions will equal 2.102 million tons of carbon dioxide, 18,100 tons of sulfur dioxide, 6,200 tons of nitrogen oxides, and 1.225 million tons of particulate matter. Future investment in new projects will further reduce energy consumption and pollutant emissions. In terms of innovation, the project's application of sovereign loans as a fund is conducive to the guiding role of a policy fund and improves the profitability of policy fund investment by being market-oriented and taking into account both policy and profitability. At the same time, it learns from the international evaluation system, actively incorporates environmental and social benefits into the investment decision-making process, builds a green investment mechanism, and transmits green concepts to relevant stakeholders.

CECEP Fund Management Co., Ltd. has used ADB's USD 500 million sovereign loans for the first time to establish funds with loans from international financial institutions innovatively, attract investors and technology suppliers for joint financing, continues to expand capital functions, power air pollution prevention and control in the Beijing-Tianjin-Hebei region, and accelerate the reduction of emissions. The project is long-term in nature and outstanding in profitability, paves the way for subsequent projects, and has obvious environmental benefits. (This case has been recommended and provided by the International Finance Forum)

VIII.   Technology for Life Below Water (SDG14) Practice Case

Biodiversity is the basis of life on earth and an important indicator of ecological civilization. However, global biodiversity must overcome serious challenges in the face of the expanding scope and intensity of human activity. The World Wide Fund For Nature (WWF) *Living Planet Report 2020* shows that between 1970 and 2016, monitored populations of mammals, birds, amphibians, reptiles and fish declined by an average of 68%. Asia, as the continent with the largest population and rapid industrial development, deserves special attention on biodiversity protection.

Founded in 1985, the China Biodiversity Conservation and Green Development Fund (CBCGDF) is a non-profit public welfare foundation, a national academic group, and an environmental protection organization approved by the State Council of China and supervised by the China Association for Science and Technology (CAST). CBCGDF is also a member of the International Union for Conservation of Nature (IUCN) and the United Nations (UN) Global Compact and a member or partner of institutions such as the Global Genome Biodiversity Network (GGBN). Since its establishment in December 2018, the Biological and Scientific Ethics Working Committee under CBCGDF has focused on animal ethics, decision-making consultation, standard setting, the promotion of legislation against animal cruelty, AI ethics, global environmental and digital governance, case studies on ethical science and technology, research in synthetic biology, and genetic resource sequence information among others. China's first application against electric fishing, Rivereye, focuses on protecting the biodiversity in waters.

In 2017, CBCGDF established the Anti-Electric Pulse Fishing Cooperation Center, which aims to protect native fish, aquatic organisms, and water resources by fighting illegal electric pulse fishing. Rivereye, developed by CBCGDF and a professional software development team, is a real-time anti-electric pulse fishing monitoring application. It is also the first application in China to integrate anti-electric pulse fishing and illegal fishing prevention functions.

As application software designed specifically to fight against electric fishing, Rivereye integrates functions aimed at preventing electric and illegal fishing, reporting and monitoring in real-time, providing a hotspot map, and promoting environmental science among other things, filling a gap in traditional reporting and evidence collection. An overall lack of manpower in the fishery supervision department, which makes it difficult to effectively supervise all rivers and lakes throughout the basin within the department's jurisdiction has thus been mitigated. Rivereye is equipped with a real-time public hotspot map, aquatic animal activity distribution, and the latest information and popular scientific data.

Rivereye is playing an increasingly important role in protecting aquatic biodiversity. The use of Rivereye has helped bring about the closure of a number of electric fishing equipment production and sales sites and essentially shut down the illegal "fishing - selling - catering consumption" chain in some areas where electric fishing activities have been out of control. The spread of electric pulse fishing has thus been contained, and a social atmosphere created against electric pulse fishing. According to the CBCGDF plan, more technologies will be introduced to promote the protection of aquatic biodiversity. CBCGDF also sends out widespread appeals for participation in biodiversity conservation in response to the IUCN declaration of the extinction of Psephurus Gladius, with a special appeal for a greater role to be played by technology. (The case has been recommended and provided by Biological and Scientific Ethics Working Committee of CBCGDF.)

Initiatives

Asia is one of the birthplaces of human civilization and has boasted a glorious history. It is also one of the most active regions in the world today and shows no signs of letting up. Despite the intertwining of old and new challenges in Asia, especially in the face of unexpected constraints caused by the COVID-19 pandemic, we are deeply inspired by the series of practical explorations and remarkable achievements made by Asian governments, enterprises, think tanks, universities, and individuals in sustainable development. By calling for action on the part of all countries (rich, poor, and middle-income countries alike) to promote prosperity while protecting the planet, the SDGs have already had a positive impact on human development.

As UN Secretary-General Guterres said, "While the problems before us are unprecedented, they are not insurmountable". For the next eight years, governments, enterprises, think tanks, universities and individuals will still have enough time to make up for the "debt" of sustainable development caused by the COVID-19 pandemic, and more action can be taken to further accelerate the process of sustainable development. There is still a chance that the world will meet the SDGs on time, and so will Asia.

As a non-profit organization based in Asia, Tech4SDG would like to bring together industry-university-research strength in Asia, focusing on the 17 SDGs with the goal of developing digital technology, promoting technology applications, and shaping a better future. We are committed to accelerating the process of sustainable development in Asia and discovering a sustainable development model that can be replicated and promoted.
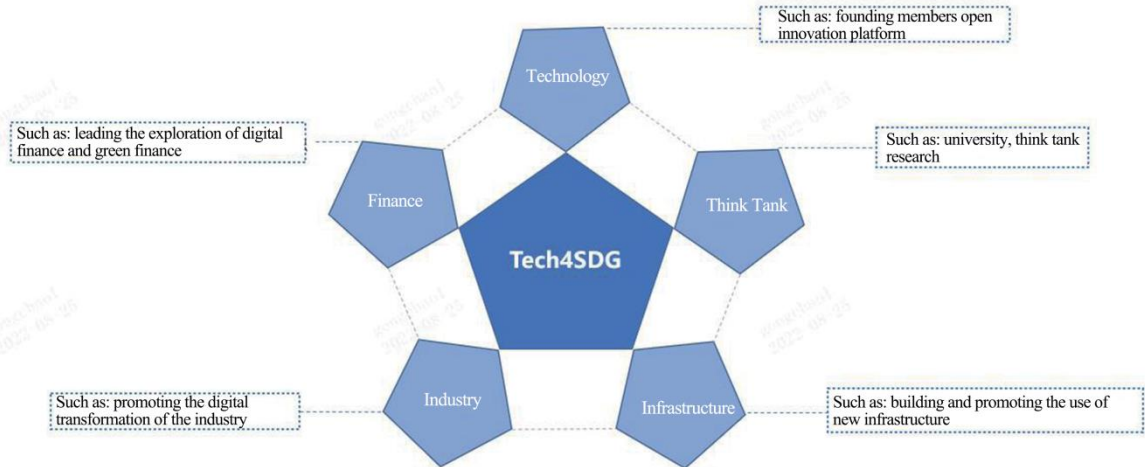
Five Tech4SDG Working Modules

It should be noted in particular that for the sake of the well-being of all humans, each member of the alliance undertakes voluntarily to promote the following:

1 The Overall Goal: Technology for Achieving the SDGs

2 Consensus: Human-centric and Controllable Technology

Cracking 3 Divides:

1) The Digital Economic Divide in Asia

2) The Supply Chain Divide in Asia

3) The Environmental, Social and Governance (ESG) Divide in Asia

4 Actions:

1) Digital infrastructure connectivity

2) The inclusive development of digital public services

3) Digital trust and ethical security

4) Digital social capability building

We will lead by example to promote the implementation of the above-mentioned initiatives. We welcome more institutions and individuals to join us.

Report Advisory Committee (listed alphabetically by initials):

Chi Ji   Member of International Advisory Committee, Tech4SDG, Member of Executive Committee, International Finance Forum

Cao Xiaobing   Council Member of Tech4SDG, Secretary General of the Green Intelligent New Economy Industry Alliance

Gu Qingyang   President of Tech4SDG, Associate Professor of Lee Kuan Yew School of Public Policy, National University of Singapore

Ji Weidong   Vice President of Tech4SDG, Dean of the China Institute for Social-legal Studies, Shanghai Jiao Tong University

Oussouby Sako   Vice President of Tech4SDG, President of the Japan International Metaverse Association

Song Min   Council Member of Tech4SDG, Dean of the Institute of International Finance Forum

Song Haitao   Council Member of Tech4SDG, Executive Dean of the Shanghai Artificial Intelligence Research Institute

Xue Lan   Council Member of Tech4SDG, Dean of Schwarzman Scholars, Tsinghua University

Xu Zhonghua   Council Member of Tech4SDG, Vice President of R&D, TotalEnergies (Asia)

Zhang Wang   Council Member of Tech4SDG, Vice President of SenseTime

Zheng Yongqiang   Council Member of Tech4SDG, Deputy General Manager and Chief Financial Officer of Mitsui Sumitomo Insurance (China)

Author:

James Ong   Dean of the Artificial Intelligence International Institute

Secretary General of Tech4SDG

E-mail: james.ong@origami-frontiers.com

Hiromi Komuro   Director General of the Japan International Metaverse Association

E-mail: xijp@yahoo.co.jp

Tian Feng   Secretary General of Tech4SDG

E-mail: tianfeng@sensetime.com

Gong Chao   Director of Technology Policy and Ethics Research, Institute for AI Industry Research, SenseTime

Executive Secretary General of Tech4SDG

E-mail: gongchao1@sensetime.com

Tech4SDG