2020 科技合作与创新共治

Global Cooperation and Governance of Science and Technology Innovation

浦江创新论坛

PUJIANG INNOVATION FORUM

中国·上海 Shanghai, China

2020.10.22–30

Conference Review

制作单位：上海浦江创新论坛中心

Produced by Shanghai Center for Pujiang Innovation Forum

CONTENTS

Opening Ceremony and Keynote Speech

Global Cooperation and Governance of Science and Technology Innovation

Editor's note: *2020 Pujiang Innovation Forum was held in Shanghai from October 22 to 30. With the theme of "Global Cooperation and Governance of Science and Technology Innovation", the Forum was consisted by 1 opening ceremony and plenary session, 1 special forum, and 16 special sub-forums focusing on policies, regional and urban issues, finance, entrepreneurs, future science, emerging technologies, the "Belt and Road", global health and development, and other topics. The collection of bulletins will bring together the important views and discourses of the speakers at the Forum by topics, and share the key outcomes of the Forum. This bulletin is a summary based on the speeches from the participating guests[1] of the Opening Ceremony and Plenary Session.*

LI Keqiang

Premier of the State Council of the People's Republic of China

Ana Brnabić

Prime Minister of the Republic of Serbia

LI Qiang

Secretary of CPC Shanghai Municipal Committee

International science and technology cooperation is a trend of the times. To achieve win-win cooperation, and to actively integrate into the global innovation network, continue improving the independent science and technology innovation capability in open cooperation, promote international communication and cooperation in technologies, talents, projects and other aspects, facilitate global science and technology progress through joint construction of innovation platforms and result sharing, and drive China's steady economic and social development in the long run is a major plan concerning the current and long-term development of China, and also an important support for China to implement the innovation-driven development strategy and accelerate the construction of a world sci-tech power.

I. Global Cooperation and Governance of Science and Technology Innovation has Become the Essential Core of Global Innovation and Development

1. To strengthen global cooperation and governance of science and technology innovation to jointly handle the new scientific and technological revolution and major global challenges. Global cooperation and governance of science and technology innovation is an important proposition corresponding to the development needs of all countries. As pointed out by LI Keqiang, Premier of the State Council, in the face of the sudden outbreak of COVID-19, China has strengthened its cooperation with the international community, shared its scientific research data and information, and participated in the research on the prevention and control and treatment strategies. China has made its contribution in the global fight against the pandemic. According to Ana Brnabić, Prime Minister of Serbia, the Serbian government will work with the Chinese government to seize the opportunities

1 Chinese guests include: LI Keqiang, Premier of the State Council of the People's Republic of China; LI Qiang, Member of the Political Bureau of the CPC Central Committee and Secretary of CPC Shanghai Municipal Committee; WANG Zhigang, Minister and Secretary of CPC Leading Group, MOST; XU Guanhua, President of Pujiang Innovation Forum and Academician of Chinese Academy of Sciences; GONG Zheng, Deputy Secretary of CPC Shanghai Municipal Committee and Mayor of Shanghai; DONG Yunhu, Chairman of Shanghai Committee of the CPPCC; ZHAO Qizheng, Vice Chairman of the Board of Directors of Pujiang Innovation Forum and Former Director of the State Council Information Office; YU Shaoliang, Deputy Secretary of CPC Shanghai Municipal Committee; LI Meng, Deputy Minister of MOST; CHENG Fubo, Vice Governor of Shaanxi Province; WU Qing, Member of the Standing Committee of CPC Shanghai Municipal Committee and Vice Mayor of Shanghai; YAO Qizhi, Academician of Chinese Academy of Sciences and Foreign Academician of National Academy of Sciences; SHI Yigong, President of Westlake University and Academician of Chinese Academy of Sciences; WU Manqing, General Manager of China Electronics Technology Group Corporation and Academician of Chinese Academy of Engineering; CHEN Kaixian, Academician of Chinese Academy of Sciences; CHEN Erzhen, Vice President of Ruijin Hospital, Shanghai Jiao Tong University School of Medicine; ZHANG Wenhong, Director of the Department of Infectious Diseases, Huashan Hospital, Fudan University. Foreign guests include: Ana Brnabić, Prime Minister of Serbia; Nenad Popović, Minister of Innovation and Technological Development, Serbia; Nikolaj Gilbert, President and CEO of PATH; Richard Hatchett, CEO of the Coalition for Epidemic Preparedness Innovations (CEPI); Lance Rodewald, Senior Advisor to China CDC.

XU Guanhua

President of Pujiang Innovation Forum; Academician of Chinese Academy of Sciences

WANG Zhigang

Minister and Secretary of CPC Leading Group, MOST

CHENG Fubo

Vice Governor of Shaanxi Province

in cooperation, enhance connectivity, facilitate digital transformation, and actively participate in the joint construction of the Digital Silk Road. According to LI Qiang, Member of the Political Bureau of the CPC Central Committee and Secretary of CPC Shanghai Municipal Committee, as the new round of scientific and technological revolution and industrial transformation is accelerating, and the digital world, smart society, and smart life are experiencing speedy development, Shanghai will firmly grasp the main direction in strengthening the source function of science and technology innovation to provide strong impetus for the improvement in urban level and core competitiveness, and offer high-level scientific and technological support for the accelerated new round of scientific and technological revolution and industrial transformation, the transformation of the scientific research system toward “open science”, the major breakthroughs in scientific theories and technological innovations, and the improvement in the well-being of people in different countries. As pointed out by WANG Zhigang, Minister and Secretary of CPC Leading

Andrei Fursenko

Aid to the President of the Russian Federation

Martina Hirayama

State Secretary for Education, Research and Innovation, Switzerland

Gusakov Vladimir Grigorievich

Chairman of the Presidium of the National Academy of Sciences of Belarus

Tuula Teeri

President of The Royal Swedish Academy of Engineering Sciences

Teck Seng Low

Chief Executive Officer, National Research Foundation, Singapore

Peter Major

Chair, United Nations Commission on Science and Technology for Development

Group, MOST, almost no country can independently handle the tide of the new scientific and technological revolution and industrial revolution and major global challenges such as climate change, energy resources and public health, and it is urgently needed to strengthen the communication and cooperation among scientific researchers from all over the world and facilitate the cooperation and governance of science and technology innovation among governments.

2. To strengthen global cooperation and governance of science and technology innovation to jointly construct a new development pattern. According to WANG Zhigang, strengthening cooperation in innovation capability is integral to the construction of a new development pattern supported by science and technology innovation, which will provide growth space, key focuses and the major supporting system for high-quality development. Therefore, China will continue to stick to an open, inclusive, and win-win international strategy for science and technology cooperation, and provide platforms for the global openness and cooperation on

Philip Campbell

Editor-in-Chief of Springer Nature

Michele Geraci

Former Vice-Minister of Economic Development, Italy, Economist

Nenad Popović

Minister for Innovation and Technological Development, Serbia

YAO Qizhi

The first Asian scientist wining the Turing Award, Academician of Chinese Academy of Sciences, and Foreign Academician of National Academy of Sciences

SHI Yigong

President of Westlake University, Vice Chairman of China Association for Science and Technology, and Academician of Chinese Academy of Sciences

WU Manqing

General Manager of China Electronics Technology Group Corporation and Academician of Chinese Academy of Engineering

science and technology. According to Nenad Popović, the Serbian Minister of Innovation and Technological Development, China and Serbia are dedicated to the cooperation in blockchain, AI, aerospace and other science and technology aspects, jointly facilitating the exchange of ideas and imagination as well as communication in knowledge and innovation, and creating a new pattern of the innovation ecosystem for the future. According to CHENG Fubo, Vice Governor of Shaanxi Province, Shaanxi is an important node of the "Belt and Road" and the frontline of China's opening up to the West. Shaanxi will further strengthen both domestic and global communication as well as cooperation on science and technology, proactively integrate itself into the construction of the grand landscape of the "Belt and Road" and the global innovation system, and accelerate the construction of an innovative province.

3. To strengthen global cooperation and governance of science and technology innovation in order to jointly promote the ethics of beneficial science and technology. As pointed out by WANG Zhigang, as science and technology innovation developments often comes ahead of codes of ethics, and emerging technologies and disruptive innovations may pose unpredictable moral and ethical risks, we shall attach importance to both the technological properties and the social properties of emerging fields such as AI, and construct the mechanisms for international cooperation and communication in data sharing, privacy protection, bioethics, etc. to jointly explore how emerging technologies will influence the existing social governance system. According to YAO Qizhi, the first Asian laureate of the Turing Award, Academician of Chinese Academy of Sciences, and Foreign Academician of National Academy of Sciences, if we want to further develop Super AI, we must at first ensure that it is as controllable and beneficial as atomic energy and gene editing.

II. Constructing an Open Cooperation Pattern and a Good Innovation Ecosystem is a Key Direction of Future Global Cooperation and Governance of Science and Technology Innovation

1. To create a new pattern of the open cooperation on science and technology. According to WANG Zhigang, looking to the future, China has a stronger desire to promote global cooperation and governance of science and technology innovation, and will integrate itself into the global innovation network in a more proactive manner to further facilitate the deeper national cooperation in multiple fields including fundamental research and global issues between scientists from all over the world and the science and technology community of China, and create an all-round, deep and wide-ranging pattern of open cooperation on science and technology. As pointed out by LI Qiang, science and technology innovation not only takes on the more and more obvious trend of disciplinary integration and penetration, but also becomes increasingly dependent on the cooperation with big platforms, major projects, and large teams in terms of its organization

CHEN Kaixian

Academician of Chinese Academy of Sciences

CAO Kefan

Chief Host of Shanghai Media Group, Media Ambassador of 2020 Pujiang Innovation Forum, Master of Medicine from School of Medicine, Shanghai Jiao Tong University

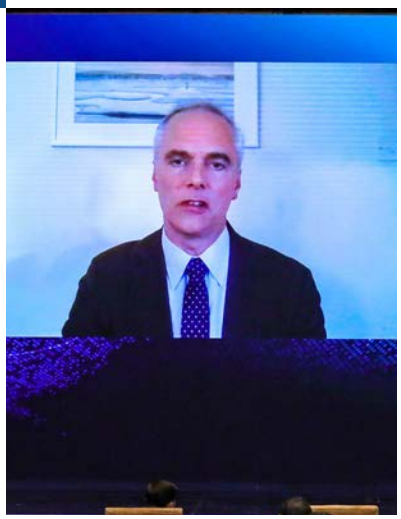
Nikolaj Gilbert

President and CEO of PATH

form. Therefore, in the future, we shall proactively participate in collaborative innovation, and further strengthen the source function of science and technology innovation.

2. To improve the international governance system of science and technology innovation. As pointed out by WANG Zhigang, the trend of global development of science and technology innovation is becoming increasingly clear, and the transnational and transregional circulation of various innovation elements is constantly accelerating. Platform innovation, collaborative innovation, and participatory innovation are extending rapidly, and the traditional closed organization model is transforming to a more open and inclusive organization model. In the future, we shall firmly grasp the development opportunities brought by digital technologies, facilitate the formation of a governance model adaptive to the transformation requirements of the open scientific and scientific research system and the digital scientific research organization model, and construct a good, globally open, inclusive and collaborative innovation ecosystem. According to Nenad Popović, Serbia has a solid academic foundation and world-class outstanding engineers and mathematicians. They welcome innovators from all over the world to participate in the research projects for the better life of mankind to pave a global channel for innovation governance with no national or academic boundaries.

3. To jointly handle global public health challenges such as COVID-19. As pointed out by WANG Zhigang, the global spread of COVID-19 makes people from all over the world deeply feel the real relevance and values of building a community with a shared future for mankind. As a conscientious power, China conscientiously performs its international duty in pandemic prevention and control, and will actively facilitate the construction of the international science and technology cooperation network for pandemic prevention and control in the post-pandemic era, to improve the capability to monitor public opinion on and prevent and control emerging and unpredicted infectious diseases. As emphasized by Richard Hatchett, CEO of the Coalition for Epidemic Preparedness Innovations (CEPI), collaboration is the only way to end the impact of a global pandemic. According to Nikolaj Gilbert, President and CEO of PATH, mankind faces lots of diseases, and innovation is the key to finding solutions to diseases, which requires creativity, cooperation and inspiration to ensure that we can overcome the common challenges. In the opinion of Lance Rodewald, Senior Advisor to China CDC, science and technology innovation and collaboration are required for the research into the effectiveness and other properties of the vaccines. As pointed out by CHEN Kaixian, Academician of Chinese Academy of Sciences, the pandemic has become a common enemy of all countries, and almost no country can stay immune from it. Therefore, we shall strengthen the communication and cooperation in the research into COVID-19, and facilitate the application and promotion of the research results. In the opinion of CHEN



Richard Hatchett

CEO of the Coalition for Epidemic Preparedness Innovations

CHEN Erzhen

Vice President of Ruijin Hospital, Shanghai Jiaotong Univesity

ZHANG Wenhong

Director of the Department of Infectious Diseases, Huashan Hospital, Fudan University

Erzhen, Vice President of Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, we shall work together to gain experience from the cases from all countries around the world, so as to explore the methods to reduce mortality, and promote the development of vaccines. According to ZHANG Wenhong, Director of the Department of Infectious Diseases, Huashan Hospital, Fudan University, cooperation and science and technology innovation of all countries are needed to realize the balance in global pandemic control and jointly handle the COVID-19 pandemic.

III. Create Critical Innovation Elements to Promote Global Cooperation and Governance of Science and Technology Innovation

1. Accurately judge the development directions and routes of major technologies to set new innovation directions. A clear technology development route plays a decisive role in promoting the orderly development of science and technology innovation. As indicated by WU Manqing, General Manager of China Electronics Technology Group Corporation and Academician of Chinese Academy of Engineering, it is all the more important for a country to correctly judge the development directions of major technologies and select the technology routes, and the mutual promotion of demand-driven development and problem-driven development may indicate the development direction of science and technology innovation. Currently, China may adopt more innovations, especially those led by its huge domestic market demand. In the opinion of YAO Qizhi, the purpose of AI is to truly replace intelligence and do better than intelligence. In the future, we shall attach importance to improving the efficiency of AI, extend its nature within the boundaries of social standards and laws, and deepen its interaction with other esoteric technologies.

2. Create high-quality innovation entities and cultivate high-level innovative talents to improve innovation capability. In the opinion of SHI Yigong, President of Westlake University and Academician of Chinese Academy of Sciences, emerging scientific and technological industries are derived from breakthroughs in core technologies, and core technologies are often derived from the original scientific discoveries made many years ago. The core technology innovations and original scientific discoveries are made by top scholars, and the top scholars often gather in top universities or scientific research institutes affiliated to top universities. Therefore, we shall work hard to explore a new university governance system applicable to the conditions of China, explore new science and technology evaluation standards that encourage innovation and are in line with China's national conditions, and explore how to cultivate top young innovative scientists with a sense of social responsibility. As expressed by WU Manqing, the role of backbone enterprises and innovative leading scientists as the entities is becoming increasingly prominent, leading the element agglomeration and resource optimization. The technological debates brought by the communication among scientists have led to new improve-

Lance Rodewald

Senior Advisor to China CDC

Opening Ceremony of the Cloud Exhibition of the Global Technology Transfer Fair and the Release of the Chinese Innovation Needs

ments, attracting more investments, forming larger industries, and bringing unlimited business opportunities, based on which scientists will also gather more resources and elements. According to CHENG Fubo, we shall accelerate the introduction and cultivation of a batch of international-level strategic science and technology talents, leading science and technology talents, and innovative teams, and give great support to science and technology talents for innovation and entrepreneurship, making them the main force of science and technology innovation.

3. Strengthen the close connection between innovation nodes to promote the integrated development of the innovation systems. As pointed out by WANG Zhigang, AI, big data, the Internet of Things and other new-generation information technologies are in accelerated integrative development with technologies in various fields, and evolving towards world-wide interconnection, collaborative sharing, integration of virtuality and reality, and high-level intelligence. The technological connection, organizational contact, labor division and sharing and talent networks

Inauguration Ceremony of Shanghai National Center for Applied Mathematics

among different entities on the innovation chain have become tighter, and the new trend of integrated innovation is both the logic behind science and technology development, and the inherent requirement of open innovation. In the opinion of WU Manqing, a system is the integration of interdependent systems, which meets a certain capability requirement through system association and connection. Every system, or every research institute, has its own management autonomy, operational independence, and physical distribution. A system has no right to intervene in the internal operation of other systems, but can only pay more attention to the relationship between each other. Such connection may lead to the emergence of capabilities, and the combination of different functions may generate stronger capabilities, leading to continuous evolution of science and technology innovation.

The Policy Forum

Policy Principles and Tools to Promote Innovation Cooperation

Editor's note: *The Policy Forum, with the theme of "Policy Principles and Tools to Promote Innovation Cooperation", well-known experts and scholars at home and abroad had discussions on the new trends of global cooperation in science and technology innovation policies, how to make China's science and technology more internationalized, how to provide the world with more high-quality public goods and other topics. This bulletin is a summary based on the reports from participating guests[1] of the Policy Forum, and is intended for reference.*

WANG Yuan

Professor, chairman of Science and Technology Financial Promotion Association of China; Former President of Chinese Academy of Science and Technology for Development

HE Defang

Deputy Secretary General, Ministry of Science and Technology

HU Zhijian

President of Chinese Academy of Sc ience and Technology for Development

Currently, the world economy and global economic governance system has entered the phase of adjustment, characterized by the surging trend of "deglobalization" and protectionism. However, the national innovation systems of each country are more interconnected than that at any time in history. Governments are positively getting themselves integrated into the global innovation chain to facilitate innovation cooperation through strategic planning, factor flow, policy supply, and interactions between main bodies of innovation, etc. The participating guests agreed unanimously that against this background, it is urgently needed to have comprehensive discussions on global policy innovation and the development of new policy tools, to improve the effect of global cooperation on science and technology innovation.

I. A New Situation in Global Cooperation on Science and Technology Innovation and New Challenges in Policy Innovation

On the one hand, megatrends and great challenges are reshaping the new landscape of global cooperation on science and technology innovation. As pointed out by HE Defang, Deputy Secretary General, Ministry of Science and Technology, the new round of scientific and technological revolution and industrial transformation is accelerating; big data, AI, and the Internet are leading the wave of technicalization; new technologies such as blockchain are in accelerated development and application with an increasing impact on the society. Meanwhile, people are now facing severer common challenges including climate change, desertification control, and food safety, and the COVID-19 pandemic has had a great influence on the global patterns of economic and political governance, with impact on international cooperation. According to HU Zhijian, President of Chinese Academy of Science and Technology for Development, global digital governance is also one of the major challenges we are facing currently, and the transformation of digital technologies, digital scientific research, digital trade, artificial intelligence, etc. have brought new challenges from all aspects such as data security, personal interests, infrastructure, and trade rules. In the opinion of Steven Popper, Senior Economist at the RAND Corporation, US, at present the global knowledge network is developing rapidly, especially in science and technology, and thus we can regard it as a new "invisible university". He thought that with the increasingly fierce global competition in various fields, China and America must go along a path of both competition and cooperation in the future, and shall fully recognize the differences between each other, so as to maximize the benefits and better understand each other. As expressed

1 Participating guests include: HE Defang, Deputy Secretary General, Ministry of Science and Technology; HU Zhijian, President of Chinese Academy of Science and Technology for Development; WANG Yuan, Former Executive Vice-President of Chinese Academy of Science and Technology for Development; WANG Jun, Deputy Director, Shaanxi Provincial Science and Technology Department; DU Debin, Dean of the School of Urban and Regional Sciences, East China Normal University; Steven Popper, Senior Economist at the RAND Corporation, US; Doris Fischer, Professor at University of Würzburg, Germany.

WANG Jun

Deputy Director, Shaanxi Provincial Science and Technology Department

Du Debin

Dean of the School of Urban and Regional Sciences, East China Normal University; Director of the Innovation Strategy Research Center of the Strategic Research Base of the Ministry of Educ

Steven W. Popper

Senior economist at the RAND Corporation

by DU Debin, Dean of the School of Urban and Regional Sciences, East China Normal University, the COVID-19 pandemic has caused unprecedented global control and decoupling, and the control measures go against the global pandemic prevention, and even the pandemic prevention within the countries implementing the control measures.

On the other hand, China has made positive progress in science and technology innovation policies and legislation. As pointed out by HE Defang, the science and technology innovation policies and legislation shall not only promote the development of science and technology and advance with the times, but also enable the close interaction between science and technology innovation and the policies and laws in economy, society, people's livelihood, finance, culture and other fields for systematic planning and coordination. By vigorously implementing innovation-driven development strategies, constantly optimizing policies and gradually realizing the regulation of governance, China has now basically established a legal system with comprehensive coverage, complete range and diversified tools, promoting the quick improvement of our innovation capability. In the opinion of Steven Popper, China's science and technology policy system focuses more on the directions of resource utilization, and can maintain the consistency and coherence of policies, which is a good example for global practices in science and technology innovation policies. According to Doris Fischer, Professor at University of Würzburg, Germany, the relevant policies in China Industry 2025 are considered to be quite influential industrial policies. As expressed by WANG Jun, Deputy Director, Shaanxi Provincial Science and Technology Department, Shaanxi Province has implemented comprehensive and deep reforms in science and technology program management, achievement commercialization, talent development, innovation governance, and other aspects, and has achieved good effects.

II. Accelerating the Construction of the Environment for Innovation Policies to Promote Global Cooperation on Science and Technology Innovation

Firstly, pay more attention to improving the institutional environment. As pointed out by HE Defang, we shall further improve the systems and mechanisms in terms of fundamental research, talents, regions, scientific research ethics, etc., break the obstacles to innovation, and stimulate innovation vitality, to provide good institutional guarantee for innovation. According to WANG Jun, new requirements have been raised on the supply of national and regional innovation policies and systems from macroscopic aspect with the arrival of the era of innovation ecosystem; thus, we shall insist on being problem-oriented, constantly deepen reforms, and promote science and technology innovation and development with system and mechanism innovation. From the perspective of Doris Fischer, innovation policy is defined as establishing quite friendly environment for innovations in education, science and research in a broader sense, and we shall jointly establish the standard for good and effective innovation polices. In the opinion of Steven Popper, we shall realize that the market is complementary to the government;

Doris Fischer

Professor, University of Würzburg

when market signals are insufficient to fully support innovation actions, the government shall take intervention measures to motivate researchers to improve their research level and quality.

Secondly, focus more on building a good innovation ecosystem. As pointed out by HE Defang, we shall establish a policy system centering on quality, contribution and performance, implement inclusive and prudent supervision on emerging industries, and explore new supervision models. Meanwhile, we shall intensify the punishment on research misconduct, and adhere to the attitude of zero tolerance. We shall emphasize the inclusiveness of innovation policies, further highlight the support for pre-competitive technologies, focus more on the support for science-and-technology-based SMEs, further strengthen the protection of intellectual properties, and improve the market access system for new technologies, new products and new businesses. According to WANG Jun, in terms of the commercialization of scientific and technological achievements, we shall focus on promoting the organic integration of science and technology, enterprises, finance, human resources, intermediary agents and other factors, constructing a good ecosystem of scientific and technological achievement commercialization. In the opinion of DU Debin, Beijing, Shanghai, and the Guangdong-Hong Kong-Macao Greater Bay Area are developing towards the international standard and striving to be an innovation center with global influence. Meanwhile, cities in the central and western regions of China such as Chengdu, Xi'an, Chongqing, and Wuhan shall also develop into important innovation centers, and own the conditions to be science and technology innovation centers with international influence.

Thirdly, be more active to get integrated into the global innovation network. As pointed out by HE Defang, in face of the profound changes and great challenges, we shall maintain strategic willpower, stick to the bottom-line thinking, unswervingly implement high-level opening up and innovation, and actively seek layout to deal with the core challenges. In the opinion of HU Zhijian, in terms of digital trade, we shall further promote the "Belt and Road", and accelerate the combination of digital technologies and real economy, covering the rules of digital trade, the related positions on globally unified governance, and a digital platform with new models and new business types of global influence; in terms of artificial intelligence, we shall stick to the inclusive and flexible governance concept, participate in the formulation of international AI governance principles, establish the international collaborative network of AI governance, and set up the international AI governance exchange platform. According to DU Debin, during the global pandemic, international science and technology cooperation is of particular significance. Especially, maintaining the healthy development of medicine and hygiene is an important direction in the fight against the pandemic. Hence, all countries, especially the major powers, shall work hand in hand to defeat the common enemy of mankind. As expressed by Steven Popper, there are differences between the Chinese and American scientific research systems, and by making better use of these differences and mutual complements, we may better stimulate innovation, improve innovation, and develop cooperation.

The Regional & Urban Forum

Making Joint Efforts to Create an Innovative Urban Agglomeration through Wisdom, Collaboration, and Sharing

Editor's note: *The Regional & Urban Forum, with the theme of "Making Joint Efforts to Create an Innovative Urban Agglomeration through Wisdom, Collaboration, and Sharing", experts and scholars at home and abroad had in-depth discussions on topics including regional science and technology innovation and cross-regional science and technology cooperation, focusing on the Yangtze River Delta, Yunnan, Shaanxi and other regions along the "Belt and Road". This bulletin is a summary based on the reports from participating guests[1] of the Regional & Urban Forum, and is intended for reference.*

HUO Jiazhen

Professor, Executive Associate Dean of the Chinese Institute of Science and Technology Management, Tongji University

RUAN Qing

Deputy Director of Shanghai Municipal Development & Reform Commission; Deputy Director of Yangtze River Delta Regional Cooperation Office; Dean of Shanghai Academy of Development Ref

WU Zhiqiang

Professor and Vice President of Tongji University; Member of Chinese Academy of Engineering; Member of German Academy of Science and Engineering (acatech); Member of Royal Swedish

Building central cities and urban agglomerations of science and technology innovation with distinct features, strong functions, complementary advantages and balanced layout facing the future is a major plan concerning the current and long-term development of our country, and also an important support for our country to deeply implement the innovation-driven development strategy and accelerate the construction of a world sci-tech power.

I. Science and Technology Innovation has Become a Key Variable Leading High-quality Regional Development

1. The integrative development of the Yangtze River Delta has entered a new phase led by science and technology innovation cooperation. In the future, the competitiveness of a country will be decided by world-class innovative urban agglomerations, and innovative urban communities led by global science and technology innovation cities and composed of multiple innovation centers. As an important pole in the innovation-driven development of our country, the Yangtze River Delta has officially entered a new stage of its integrative development. As pointed out by RUAN Qing, Deputy Director of Shanghai Municipal Development & Reform Commission and Deputy Director of Yangtze River Delta Regional Cooperation Office, seeing from General Secretary Xi's speech during the meeting in Hefei, Anhui Province on August 20, 2020, the integrative development of the Yangtze River Delta has entered the third stage characterized by coordinative innovation-driven development with science and technology innovation and industrial innovation as the main battlegrounds, and the effect of cross-regional science and technology cooperation is a critical benchmark of the high-quality integrative development of the Yangtze River Delta. According to WU Zhiqiang, Academician of Chinese Academy of Engineering and Vice President of Tongji University, to realize higher-quality integrative development, the Yangtze River Delta must accelerate the integration of science and technology innovation on the basis of the integration of original infrastructure.

2. Science and technology innovation provides a strong driving force for high-quality regional development. In the opinion of DONG Baotong, Director-General of Science & Technology Department of Yunnan Province, in the current national economic map, southwestern provinces and municipalities such as Yunnan, Guizhou, Sichuan and Chongqing are developing and growing stronger and stronger. By vigorously promoting and applying advanced technologies, Yunnan has achieved significant results in programs of overcoming poverty and addressing difficulties with the help of science and technology. As present, Yunnan is sparing no effort to create "three

1 Participating guests include: RUAN Qing, Deputy Director of Shanghai Municipal Development & Reform Commission and Deputy Director of Yangtze River Delta Regional Cooperation Office; WU Zhiqiang, Academician of Chinese Academy of Engineering and Vice President of Tongji University; Michele Geraci, Senior Economist, and Former Undersecretary of State at the Italian Ministry of Economic Development; MA Xianping, Deputy Mayor of Xi'an City, Shaanxi Province; DONG Baotong, Director-General of Science & Technology Department of Yunnan Province; Bruno Lanvin, Executive Director of INSEAD Global Indices; Marco Kamiya, Senior Economist and Inter-regional adviser, Knowledge & Innovation Branch, UN-HABITAT.

Michele Geraci

Former Vice-Minister of Economic Development, Italy, Economist

MA Xianping

Deputy Mayor of Xi'an City

DONG Baotong

Director-General of Science & Technology Department of Yunnan Province

world-class cards", namely green energy, green food and healthy living destination. As pointed out by MA Xianping, Deputy Mayor of Xi'an City, Shaanxi Province, Xi'an City owns rich science and education resources, and tops the country in terms of the comprehensive advantages in science and technology innovation; it is now creating a "global capital of hard science and technology" with all its efforts from four dimensions, namely supporting the R&D of hard science and technology, unclogging the commercialization of hard science and technology, cultivating enterprises of hard science and technology, and strengthening the industries of hard science and technology. According to Michele Geraci, Senior Economist, and Former Undersecretary of State at the Italian Ministry of Economic Development, for Europe, under the restrictions of population and resources, the future development may completely depend on technological revolution to promote digital economy and green development.

II. Optimizing Resource Allocation is an Important Path of Improving Regional Innovation Capability

1. Improving the efficiency of resource allocation is the key to improving urban competitiveness. According to Marco Kamiya, Senior Economist and Inter-regional Adviser, Knowledge & Innovation Branch, UN-Habitat, different cities will face different challenges in the future development, and the quick contact within the urban system and the unimpeded communication among people are the key to improving urban labor productivity. As pointed out by Bruno Lanvin, Executive Director of INSEAD Global Indices, the COVID-19 pandemic is greatly changing the global urban landscape, and the cities that can integrate technologies, leadership and solid living infrastructure with common behavioral culture, and optimize the allocation of various resources, can better endure the devastation caused by such crises.

2. Collaborative allocation of innovation resources is the prerequisite for achieving the high-quality integrative development of a region. In the opinion of WU Zhiqiang, the difficulties in the integrative development of the Yangtze River Delta mainly lie in the lack of collaborative governance organizations for regional innovation clusters, the lack of scientific evaluation of regional science and technology elements, and the lack of intelligent collaborative allocation of science and technology elements. As pointed out by RUAN Qing, we shall further facilitate the close cooperation among the cities in the Yangtze River Delta, especially those with innovation resources, and strengthen the inter-urban cooperation and governance of innovation. Meanwhile, we shall collaboratively allocate innovation resources and elements, promote the agglomerative development of scientific and technological infrastructure, and facilitate the collaborative development of major national science and technology innovations. For example, in terms of brain science and brain-inspired science, the number of relevant scientific research institutes in the Yangtze River Delta accounts for about 50% of the national total. In the future, we shall strengthen cooperation and collaborative innovation, and establish a national team to undertake major national development projects, promote the output of major achievements, and support high-quality regional development.

3. Taking advantage of the inherent strengths to get full access to domestic and foreign resources is the key to shaping regional value. Firstly, let's see from the perspective of strengthening the do-

Bruno Lanvin

Executive Director of INSEAD Global Indices

Marco Kamiya

Senior Economist, Inter-regional Adviser, Knowledge & Innovation Branch, UN-HABITAT

mestic capacity of resource absorption. According to DONG Baotong, Yunnan has geographical advantage, and its future development direction will be opening up. Therefore, we shall give full play to its regional advantage, utilize global innovation resources through high-level opening up, and try to attract 100 talents from the surrounding countries and regions annually in the next 3 years for innovation and entrepreneurship, to deepen the exchange of international science and technology talents, construct joint-labs and science and technology parks, and carry out technology transfer to create an intelligence-gathering Yunnan, and constantly improve the radiating force of science and technology innovation for South Asia and Southeast Asia to make Yunnan a regional science and technology innovation center. In the opinion of MA Xianping, on the basis of its advantageous resources, Xi'an shall strengthen the interconnection with the Yangtze River Delta in the future, and focus on collaborative innovation in terms of the rebuilding of basic industrial capabilities, the development of key and core technologies, the joint establishment of scientific research teams for the development of technologies, the construction of university science parks and achievement commercialization bases, the implementation of major science and technology projects and big science projects, etc. Secondly, let's see from the perspective of deepening the mode of international resource exchange. Michele Geraci believed that the connotation of the "Belt and Road" Initiative shall be constantly deepened. Apart from the simple transfer of containers at the ports, knowledge exchange shall also be strengthened. In the future, China and Europe shall carry out multi-layer cooperation and communication, including scientific and technological communication, cultural communication, and health communication derived from the COVID-19 pandemic, to jointly shape the regional value.

III. Main Strategies to Strengthen Collaborative Cooperation and Enhance the Effect of Innovation Cooperation

At present, the most important challenges that the human society is facing include climate change, rising inequality, and decline in trust in global institutions, and technologies, innovations, and talents are the three key elements of handling these challenges. We shall optimize the inter-regional allocation of innovation elements, improve the cooperation model, and strengthen innovation governance to jointly deal with these crises.

1. Optimize the allocation of innovation elements to realize mutual complementarity. To strengthen inter-regional science and technology cooperation and realize high-quality integrative development, we shall first identify the key elements affecting the improvement in regional scientific and technological innovation capacity. With the help of AI, WU Zhiqiang and his team have researched into and identified the key elements affecting the improvement in urban innovation capability, which include R&D/GDP, FDI/GDP, university students, number of young entrepreneurs out of ten thousand people, GDP per capita, density of leisure and cultural service facilities, etc., and proposed the "gap-addressing theory" for the innovation within the Yangtze River Delta, which helps optimize the inter-regional allocation of elements, i.e. help address the weaknesses of a city with the extra strengths of another city within the same region. According to the theory, the breakthrough point for the integrative development of science and technology innovation in the Yangtze River Delta will be matching and addressing the weaknesses of a city with the strengths of another city to realize the optimal allocation of urban innovation elements. As suggested by RUAN Qing, the science and technology cooperation of the Yangtze River Delta shall not only research into the known fields, but also explore the larger unknown fields; we shall make good use of both our own resources and the resources from others, and contribute our strengths to form the "large bucket" of the Yangtze River Delta while building our own "small buckets".

2. Improve the science and technology cooperation model to enhance the cooperation effect. According to MA Xianping,

we may compare enterprises to fish, and the government to water. The government needs to provide fish (enterprises) with good, clean and extensive water area (the business environment) for their growth, and facilitate the free flow and healthy development of various innovation elements. As pointed out by Michele Geraci, during the COVID-19 pandemic, Chinese and European scientists have built an open cooperation mechanism, hoping to facilitate the top-down reform of the governance model of governments in the future, deeply understand and learn from the development model of China, and improve the Sino-European science and technology cooperation model on the basis of the good knowledge innovation foundation of Europe, so as to produce greater benefits. In the opinion of Marco Kamiya, in face of the problems and challenges in urban development, we may find solutions by introducing enterprise investments, VC, and other supports. UN-Habitat is trying to set up challenge funds and challenge awards, and providing capital and funds to support the transformation of ideas for solving problems into specific projects that can be implemented.

3. Grasp the law of innovation to strengthen the cooperation and governance of innovation. Based on relevant researches by scholars, in terms of the distribution of innovation resources such as patents and papers, global innovation centers gather in few cities, presenting the status of "towering and conical distribution"; in terms of the global innovation development pattern, the top 3 science and technology innovation clusters are the Tokyo-Yokohama cluster, the Shenzhen-Hong Kong-Guangzhou cluster, and the San Jose-San Francisco cluster. In the opinion of RUAN Qing, we shall attach full importance to the role of innovation cities in gathering innovation elements and resources, and grasping the development law and features of science and technology innovation is the prerequisite for promoting the science and technology cooperation in the Yangtze River Delta. To create the science and technology innovation community of the Yangtze River Delta, we shall first promote the close cooperation among cities with innovation resources, especially the cooperation and governance of innovation among the central cities. Inspired by the integrative development of the Yangtze River Delta, DONG Baotong pointed out that we shall strengthen cooperation and communication among the provinces in southwest China in the future, and the innovation cooperation among southwestern cities will be the key focus. Bruno Lanvin called for cities, as the talent agglomeration center and the natural adaption site for AI solutions, to play a greater role on the global stage of science and technology innovation through trans-boundary cooperation and the participation of the new generation of young people, so as to contribute more to the development of new globalization.

The Future (Science) Forum

Innovation, Co-governance and Collaboration in Climate Change Research

Editor's note: *The Future (Science) Forum, with the theme of "Innovation, Co-governance and Collaboration in Climate Change Research", well-known experts and scholars at home and abroad had in-depth discussions on the influence of global climate change, the critical issues, cutting-edge technologies, and solutions about handling climate change, and other topics. This bulletin is a summary based on the speeches from the participating guests[1] of the Future (Science) Forum.*

JIANG Xujia
Senior Editor, Nature

Myles Allen
Professor of University of Oxford

Denise Mauzerall
Professor of Princeton University

Climate change has brought an unprecedented influence over the global natural ecosystem and the economic and social development. It has become an international consensus to effectively handle climate change and realize sustainable development through science and technology innovation and international cooperation. Under the framework of the Paris Agreement, countries are actively exploring how to handle climate change with science and technology innovation through "Intended Nationally Determined Contributions". The participating guests agreed unanimously that all countries shall actively promote global cooperation and governance, set up the thinking of sustainable development, facilitate the R&D and application of clean energy and the decarbonization technologies, jointly develop a "win-win" solution for economic development and energy saving and emission reduction through multilateral coordination, and maintain the beautiful home of mankind.

I. Handling of Climate Change Requires Innovative R&D and Application of Cutting-edge Technologies

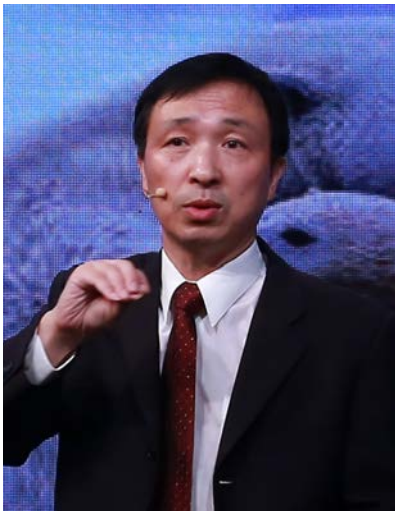
Firstly, effective handling of climate issues needs innovative results in cutting-edge technologies. As pointed out by Myles Allen, Professor, University of Oxford, CO_2 emissions are the most important factor causing global climate change, which mainly come from burning of fossil fuels and industrial emissions. The R&D of "decarbonization technologies" is crucial to the reduction of carbon emissions. Traditional methods such as afforestation can only temporarily seal CO_2, and the only way to mitigate the impact of fossil fuels on the climate lies in the CO_2 capture and storage technology, i.e. the technology to collect CO_2 from industrial sources and compress it into liquid, then inject the liquid into the lithosphere of the Earth's crust for permanent sealing. As the research by Denise Mauzerall, Professor of Princeton University shows, we may use renewable energy (such as solar energy) to realize low-carbon electricity generation to reduce air pollution and greenhouse gas emissions, and thus improve the climate and public health. However, sulfur hexafluoride (SF6), used as the insulation material, produces greenhouse gas 36,000 times more than CO_2, and its life span is as long as 3,200 years. Therefore, it is necessary to replace SF6 with new materials to truly realize low-carbon electricity generation.

Secondly, further policy guidance and encouragement is required to achieve technological effectiveness. As pointed out by Myles Allen, although the carbon capture technology is comparatively mature, and has been applied in Norway for 30 years, there are few CO_2 capture and storage devices throughout the world; only 40 million tons of CO_2 is injected into the Earth's crust every year, and the amount of CO_2 emitted into the atmosphere is over 1,000 times (40 billion tons) as much as this amount. The mass implementation of the technology is hindered mainly by two

1 Participating guests include: Myles Allen, Professor, University of Oxford; Denise Mauzerall, Professor of Princeton University; GUAN Dabo, Senior Researcher of University of Cambridge, and Distinguished Professor at Tsinghua University; HE Jianfeng, Senior Researcher of Polar Research Institute of China; ZHANG Jiansong, Chief and Senior Reporter of Xinhua News Agency Shanghai Bureau; JIANG Xujia, Senior Editor, Nature.

GUAN Dabo

Senior Member of University of Cambridge, Distinguished Professor at Tsinghua University



HE Jianfeng

Senior Researcher of Polar Research Institute of China

ZHANG Jiansong

Chief and Senior Reporter of Xinhua News Agency Shanghai Bureau

factors: (1) the lack of market incentives; the high cost makes it impossible for enterprises to construct relevant facilities in a large scale; (2) absence of industry codes; the obligation to recycle CO_2 is not regarded as the entry threshold of the fossil fuel industry. In the opinion of GUAN Dabo, Senior Researcher of University of Cambridge, and Distinguished Professor at Tsinghua University, corresponding cooperation mechanisms are badly needed for the promotion of the carbon capture technology to overcome the financial difficulties. According to Denise Mauzerall, more R&D investments are required to realize the use of decarbonized clean energy and environmental-friendly materials (such as the replacement of SF_6), and incentive policies of the government are required to encourage enterprises to take actions.

II. Constructing an All-society Governance System is the Basic Prerequisite for Handling Climate Change

Firstly, it shall become a common obligation of all people in the society to save energy and reduce emissions. According to Denise Mauzerall, it is crucial to mobilize all social forces in the next decades to minimize greenhouse gas emission, which is not only the focus of the energy department, but also an important task for other departments such as the agricultural department and the food department. Apart from CO_2, we shall also pay attention to the emission of oxynitrides, CO and other substances. In addition, the efforts of ordinary citizens are also indispensable for achieving the goals set in the Paris Climate Agreement. Myles Allen and other scholars jointly researched into the influence of the relevant conferences held by the American Geophysical Union over climate change, then pointed out that the total emissions produced by the conferences were equivalent to that would be produced by traveling from the Earth to the Sun for several times, as an international conference would involve long trips and produce many emissions. Adoption of online conferences is helpful in reducing emissions, and it is thus one of the obligations that the academic world shall undertake to handle the climate issues.

Secondly, the sustainable thinking of the public shall be cultivated. Climate issues are affecting people's lives, and people's behavior can also influence the climate. In the opinion of GUAN Dabo, we shall cultivate everyone's sustainable thinking in daily behaviors, and regard sustainability as a true fashion. In terms of science popularization and policy communication, we shall present the abstract concept of climate change to the public in a concrete way to make the public realize the major impact of temperature change on their lives, thus changing the unsustainable consumption patterns, reducing excessive consumption, and containing carbon emissions at source.

III. Global Cooperation is the Fundamental Way to Handle Climate Change

Firstly, global cooperation is necessary for jointly handling climate change. As pointed out by GUAN Dabo, climate change is a global public issue, and it is the responsibility of all countries to find out how to address the issue in the most sustainable way. We need an applicable global cooperation mechanism to guide every region to choose a suitable implementation plan; meanwhile, there must be pioneers who take the lead in taking actions and making efforts to reduce carbon emissions.

According to Myles Allen, in terms of handling climate change, the challenge we face is that all parties are waiting, hoping that others will make changes first, but it is crucial that all economies shall work together. While the United Kingdom has world-leading offshore wind power technology, its carbon emissions only account for about 1% of the global total. However, it does little to other countries, as the United Kingdom's investment in the technology has not made it more affordable. In the opinion of HE Jianfeng, Senior Researcher of Polar Research Institute of China, global cooperation is a must for developing greater awareness, for formulating better policies, and for realizing the sustainable development of the polar ecosystem. All research projects concerning polar marine environment and climate change are completed under the model of international joint research. In recent years, the polar climate change is comparatively severe, thus new mechanisms of international cooperation are required.

Secondly, it will be the focus of future global cooperation to drive energy saving and emission reduction in various countries. As pointed out by GUAN Dabo, the final effectiveness of the handling of climate change is mainly subject to the least-developed countries or the last country to take actions. In the past three years, the total carbon emission growth in small countries including Vietnam and Cambodia almost offset the emission reduction efforts made by other countries. From another point of view, however, small countries are also where the opportunities for addressing the climate issues lie in in the future. Therefore, we shall help the small countries go along the path of industrialized economic development in a sustainable way. In the opinion of Myles Allen, Europe and the United Kingdom shall not only consider achieving the goal of zero carbon emission in the most effective way, but also displaying and promoting the useful technologies to the small countries with rapidly increasing carbon emissions as a correct policy model, which may be a more valuable practice.

Thirdly, global cooperation shall take regional difference into consideration. Global cooperation doesn't mean that there is only one way to address the climate issues. As pointed out by Denise Mauzerall, countries have multiple ways to handle climate change, and there shall be many different potential opportunities in the packaged solutions, which shall be selected on the basis of the advantages and resources of different regions. For example, in terms of renewable energy, the western China utilizes its own advantages to adopt "Transporting the Natural Gas from the West to the East", and littorals such as Saudi Arabia may support the global solar power generation with abundant sunlight there. As agreed by JIANG Xujia, Senior Editor, Nature, in order to handle climate change, we shall choose the most suitable method among all options for each region and develop "customized" policies, to achieve the best results.

The Future (Science) Forum

Developments of Novel Quantum Devices and Quantum Computing

Editor's note: *The Future (Science) Forum, with the theme of "Developments of Novel Quantum Devices and Quantum Computing", well-known experts and scholars at home and abroad had in-depth discussions on the frontiers and future developments of novel quantum devices and quantum computing. This bulletin is a summary based on the speeches from the participating guests[1] of the Future (Science) Forum.*

SHEN Jian

Professor of Department of Physics, Director of Institute for Nanoelectronic Devices and Quantum Computing, Fudan University, Director of Nanofabrication Laboratory

ZHANG Renhe

Vice president of Fudan University, Member of Chinese Academy of Sciences

XIE Xincheng

Deputy Director of National Natural Science Foundation of China, Professor of School of Physics, Peking University, Member of Chinese Academy of Sciences

The new technologies based on quantum devices and quantum computing are not only new development direction for information technology with performance superior to modern computing, but also the revolutionary force driving the development of the next-generation information technology, which will have great influence on the global development of information technology and the related industries. On October 16, 2020, General Secretary Xi Jinping emphasized in the 24th group study session held by the Political Bureau of the CPC Central Committee on the research and application prospects of quantum science and technology that we shall fully understand the importance and urgency of promoting the development of quantum science and technology, strengthen the strategic planning and systematic layout for the development of quantum science and technology, identify the major trends, and take the initiative in this field. The participating guests agreed unanimously that world sci-tech powers are successively deploying the layout of quantum information technology, releasing science and technology strategies, seizing the frontiers of the next-round scientific and technological development to accelerate the development of quantum science and technology, and promoting the high-quality economic and social development. China shall grasp opportunities to proactively deploy the layout of quantum computing, precise measurement and novel quantum devices to win the global competition.

I. The Current Development Situation of Quantum Devices and Quantum Computing

Firstly, the development of quantum science and technology will lead the scientific and technological development in the future. As pointed out by ZHANG Renhe, Academician of Chinese Academy of Sciences and Vice President of Fudan University, frontier research based on quantum computing is advancing rapidly, with emerging disruptive influence on numerous fields such as materials science and technology and AI, and will direct the direction of the new round of scientific and technological revolution and industrial transformation. As pointed out by DU Jiangfeng, Academician of Chinese Academy of Sciences and Vice President of University of Science and Technology of China, quantum science and technology can be divided into three subfields: quantum computing,

1 Participating guests include: ZHANG Renhe, Academician of Chinese Academy of Sciences and Vice President of Fudan University; XIE Xincheng, Academician of Chinese Academy of Sciences, Deputy Director of National Natural Science Foundation of China, and Professor of School of Physics, Peking University; DU Jiangfeng, Academician of Chinese Academy of Sciences and Vice President of University of Science and Technology of China; XU Hongxing, Academician of Chinese Academy of Sciences, Academician of the World Academy of Sciences, and Professor of School of Physics and Technology, Wuhan University; JIA Jinfeng, Distinguished Professor of Shanghai Jiao Tong University, and Academic Leader of the Laboratory of Low Dimensional Physics and Interface Engineering, Shanghai Jiao Tong University; SHEN Jian, Professor of Department of Physics, Fudan University.

DU Jiangfeng

Professor and Vice President of University of Science and Technology of China, Member of Chinese Academy of SciencesComputing, Fudan University, Director of Nanofabrication Laboratory

XU Hongxing

Professor of School of Physics and Technology of Wuhan University, Deputy Dean of Wuhan University Institute for Advanced Study, Member of Chinese Academy of Science

JIA Jinfeng

Distinguished Professor of Shanghai Jiaotong University, Academic Leader of the Low-Dimensional Physics and Interface Engineering Laboratory of Shanghai Jiaotong University

quantum communication or quantum cryptography, and quantum precision measurement or quantum metrology. Relating to multiple fields including laser, superconductor, magnetic resonance, and radar, quantum mechanics has played a substantial role in the information era, and is today the basis of the second quantum revolution. When a technology is developed to a perfect level in extreme conditions, it will definitely lead to the discovery of new scientific phenomena and the development of new technologies. As pointed out by XU Hongxing, Academician of Chinese Academy of Sciences, Academician of the World Academy of Sciences, and Professor of School of Physics and Technology, Wuhan University, there are various kinds of options and methods for quantum devices and quantum computing, and the better we understand the microcosmic world of quantum, the more accurate calculation results we can get.

Secondly, there are two great challenges in quantum computing: maintenance of the quantum coherence of the system and the error correction capability. According to XIE Xincheng, Academician of Chinese Academy of Sciences, Deputy Director of National Natural Science Foundation of China, and Professor of School of Physics, Peking University, generally speaking, the emergence of the quantum system and quantum coherence requires extreme conditions such as a condensed-state system under super-low temperature with super-small size, which are often difficult to maintain, and will result in quantum decoherence when not satisfied. However, as topological properties are not subject to external factors and may maintain the quantum properties, they have become an important subfield of quantum computing. According to JIA Jinfeng, Distinguished Professor of Shanghai Jiao Tong University, and Academic Leader of the Laboratory of Low Dimensional Physics and Interface Engineering, Shanghai Jiao Tong University, while quantum computing has a much more stronger computing capability than classical computers do and can solve some problems that classical computing can't, it also has some weaknesses such as the high error rate and the high cost of error correction. Topological quantum computing needs no error correction on the hardware level, but as real non-Abelian anyons have not been found, topological quantum computing is currently the option in the slowest development.

Thirdly, the application of quantum computing still has a long way to go. In the opinion of DU Jiangfeng, the principle of quantum computing is clear, but the related technologies and processes still need constant improvement, with a certain level of technological threshold required to enable the actual application, which is a long journey. According to XU Hongxing, the development of novel quantum devices and quantum computing is based on our understanding and knowledge of the quantum world, and is a process of gradual development and mutual iteration which cannot be accomplished in one move.

II. The Major Future Directions for Quantum Devices and Quantum

Computing

Firstly, quantum computing will be the iconic technology of the post-Moore era. As pointed out by ZHANG Renhe, Academician of Chinese Academy of Sciences and Vice President of Fudan University, quantum computing is the inevitable outcome of the breakthroughs in the classical physical limit in terms of the size of chips, and an iconic technology of the post-Moore era. According to DU Jiangfeng, quantum computing may solve some problems faced by classical computers, such as quantum effect and thermal dissipation. We already have 46 quantum computing options. For some physical and chemical processes, quantum simulation may be realized through quantum computing. According to JIA Jinfeng, fermions and Majorana fermions with the same antiparticles may be used to form Majorana zero modes, which have three characteristics: zero-energy peak, tapered-space distribution, and uniform spin. Majorana zero modes may be used for quantum computing, and are currently a hot spot of research.

As pointed out by DU Jiangfeng, with processes and technologies similar to the existing silicon power processes and technologies, quantum well, quantum bit, and superconducting quantum bit are among the hot research fields. AI algorithms based on quantum have been realized, and quantum computers will definitely coexist with classical computers even if they are successfully developed in the future.

Secondly, quantum precision measurement will be used in a wide range of fields in the future. As pointed out by DU Jiangfeng, quantum coherence has laid a solid foundation for quantum precision measurement. The quantum precision measurement technology can enhance the spectroscopic sensitivity and spatial sensitivity of nuclear magnetic resonance by a million times and the signal sensitivity by 10 billion times, thus transforming solid-state spectroscopy to liquid-state spectroscopy, and realizing the measurement of single-molecule protein. The milestone work has provided unicellular measurement with technological support. He pointed out that in the next 5–10 years, precise measurement may be used to provide extreme conditions for scientific detection and exploration to make new scientific discoveries and realize new technological inventions, and may also be applied in life sciences, chemistry, physics and other fields, and create some new interdisciplines.

Thirdly, the R&D of quantum devices will enter a fast track. According to XU Hongxing, nano optical cavity is a new kind of widely-used quantum device integrating all the characteristics of an optical cavity with such properties as the quantum tunneling effect and space electronics, which will greatly facilitate the research and development of material science. Waveguide-based quantum devices realize transmission through waveguide, and can realize the coherence and construction of two photons in a network, which decides the output, and thus enable the production of some logic devices, which can be used as the power components of the semiconductor plasmon and realize simple calculation.

The 1st Global Health and Development Summit

Scientific Innovation in Global Health Governance

Editor's note: *The 1st Global Health and Development Summit, with the theme of "Scientific Innovation in Global Health Governance", well-known experts and scholars at home and abroad shared the positive results that the global communities had achieved in promoting health governance, and had in-depth discussions on the global health governance system, the future health governance strategies and the construction of the global cooperation network. This bulletin is a summary based on the speeches from the participating guests[1] of the Global Health and Development Summit.*

WU Yuanbin

Director-General of Science And Technology For Social Development, MOST

LU Min

General Engineer, Science and Technology Commission of Shanghai Municipality

ZHUANG Mudi

Secretary of Shanghai's Fengxian District Party Committee

The outbreak of COVID-19 has made global health system construction and governance a topic of global attention. As pointed out by General Secretary Xi Jinping, science and technology is the most powerful weapon of mankind against diseases, and mankind can never defeat catastrophes or pandemics without the help of scientific developments and technological innovations. Science and technology has played an important role in the global fight against the pandemic. While harboring the hope of defeating the pandemic, people also see the important value of science and technology in linking global health systems and achieving global health governance. The participating guests agreed unanimously that we shall always uphold the philosophy of "a community with a shared future for mankind", work with scientific research institutes, international organizations, government departments and enterprises to explore how to establish the global health governance system with science and technology cooperation as the tie, thus protecting human health and ensuring human safety with more effective science and technology innovations.

I. Science and Technology Innovation is the Most Powerful Weapon against Global Health Issues

Science and technology innovation supports the global fight against COVID-19. According to WU Yuanbin, Director-General of Science and Technology for Social Development, MOST, in response to the outbreak of COVID-19, a scientific research team led by the Ministry of Science and Technology has been established under the joint prevention and control mechanism of the State Council to tackle the crisis. Focusing on five research directions, namely, virology and etiology, detection technologies and products, clinical treatment and drugs, R&D of vaccines, and construction of animal models, the team has organized the superior scientific research power of

1 Participating guests include: WU Yuanbin, Director-General of Science and Technology for Social Development, MOST; LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality; ZHUANG Mudi, Secretary of CPC Fengxian District Committee, Shanghai; Steve Davis, Senior China Strategy Advisor of Bill & Melinda Gates Foundation and Interim Director of Bill & Melinda Gates Foundation Beijing Office; Lance Rodewald, Senior Advisor to China CDC; XUE Lan, Director and Professor of China Institute for Science and Technology Policy at Tsinghua University; XU Jianrong, Country Director for China and Chief Representative of Shanghai Office of Project HOPE; David Kaslow, Vice President and CSO of PATH; XU Fujie, Deputy Director of Beijing Office, Bill & Melinda Gates Foundation; FENG Linglin, Director and Researcher of Drug Development Office, Shanghai Institute of Planned Parenthood Research; Andrew WONG, Business Development Director, Yunnan Walvax Biotechnology Co., Ltd.; WANG Xiuli, Director and Associate Professor, Center for Social Media Research, Peking University; WANG Chen, Member of Institute for International Development and Cooperation, Chinese Academy of International Trade and Economic Cooperation, Ministry of Commerce; Craig Anderson, Chief Representative of the George Institute for Global Health (China); LU Hongzhou, Secretary of the CPC Committee of Shanghai Public Health Clinical Center; LI Xiuling, Secretary of the CPC Committee and General Manager, Shanghai Institute of Biological Products Co., Ltd.; NIE Xiaowei, Assistant Executive Director of Alliance of International Science Organizations in the Belt and Road Region (ANSO) Secretariat.

Steve Davis

Senior China Strategy Advisor Interim Director for the China Country Office Chief Representative of Bill & Melinda Gates Foundation Beijing Office

NIE Xiaowei

Deputy Director of the Secretariat, the International Union of Scientific Organizations One Belt, One Road (ANSO)

Lance Rodewald

Senior Advisor to China CDC

China to coordinate and promote scientific research, and has achieved positive results. As pointed out by Steve Davis, Senior China Strategy Advisor of Bill & Melinda Gates Foundation and Interim Director of Bill & Melinda Gates Foundation Beijing Office, COVID-19 has completely changed our expected schedule of global heath R&D and innovation, and the primary task is to develop test reagents, drugs and vaccines. In just a few months, countries around the world have developed new test reagents that can be mass produced and widely used. In the opinion of Lance Rodewald, Senior Advisor to China CDC, vaccines are an important tool for public health, which can help us to control diseases. The 2030 Immunity Agenda states that the immunological community shall use vaccines most effectively, for which innovation shall be the priority. As expressed by LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality, after the outbreak of the pandemic, Shanghai quickly established a municipal-level emergency science and technology development team, made full use of the strengths of scientific research institutes, hospitals and enterprises to carry out emergency scientific and technological research, and has made important breakthroughs in test reagents, the fast-testing technology, mobile cabin laboratory for nucleic acid detection, medical devices and equipment, vaccines, antibody drugs, and other major technologies and products. According to ZHUANG Mudi, Secretary of CPC Fengxian District Committee, science and technology empowerment is the basis of health and development. From the profound changes caused by the pandemic, people have seen the important role of science and technology in linking global health systems and achieving global health governance. As pointed out by Andrew WONG, Business Development Director, Yunnan Walvax Biotechnology Co., Ltd., science and technology innovation and global cooperation is imperative in dealing with global crises. The diagnosis, treatment and prevention of COVID-19 all rely on the power of science and technology.

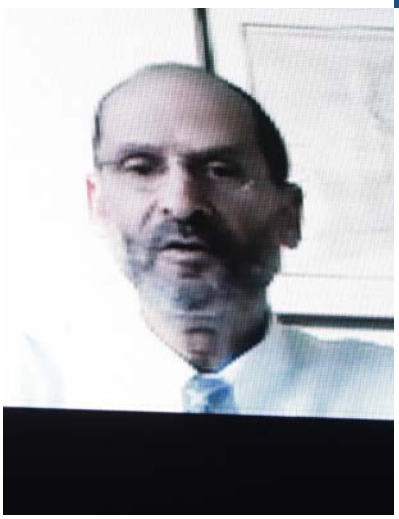
The pandemic situation has put innovative products under the spotlight of the world. The current pandemic is full of uncertainty, so the development, production and manufacturing of test reagents, drugs, and vaccines have become the common focus of the science and technology communities, industrial communities, and capital communities of all countries and global health organizations. Daivd Kaslow, Vice President and CSO of PATH, introduced that according to statistics released by CDC of America, during 2011 to 2020, vaccines saved around 23.3 million people. Relevant organizations such as PATH pay much attention to financial issues, risks, regulatory barriers and policy barriers in the R&D, commercialization and marketization of innovative vaccines. In the opinion of Lance Rodewald, immunization is the safest and most effective method of disease prevention and control for all ages, and is also an investment with high returns. Through immunization, America has saved around 1 trillion dollars of eco-

XUE Lan

Dean of Schwarzman Scholars, Tsinghua University, and Director of China Institute for Science and Technology Policy at Tsinghua University (The Role of Global Health in Global Governance)

XU Jianrong

Country Director for China and Chief Representative of Shanghai Office of Project Hope Foundation (Material Maternal and Child Health and Global Health)



David Kaslow

Vice President, CSO and Director of the Center for Vaccine Innovation and Access, PATH, and Chairman of WHO Advisory Committee on Vaccine Product Development (Vaccines and Global Health)

nomic and social costs. He pointed out that our goal is to realize the wide use of vaccines by next year so as to control the global pandemic.

II. Global Cooperation is the Key to Handling Global Health Issues

Consensus on global health and comprehensive governance of hazards is being reached at a faster speed. As pointed out by WANG Chen, Member of Institute for International Development and Cooperation, Chinese Academy of International Trade and Economic Cooperation, Ministry of Commerce, science and technology innovation and cooperation are of great importance in dealing with global crises. The diagnosis, treatment, and prevention of COVID-19 all rely on the power of science and technology. Therefore, the importance and necessity of global cooperation, especially multi-lateral cooperation, is further highlighted. In the opinion of XUE Lan, Director and Professor of China Institute for Science and Technology Policy at Tsinghua University, with the distinct differences of all counties in economic and political systems, great challenges and extremely complicated situation of controlling and preventing global health risks are laying ahead. Hence, the global governance of public health based on risk control might be an effective tool for global health governance in the future.

The global cooperation network of medicine and medical treatment is being formed at an accelerated speed. XU Fujie, Deputy Director of Bill & Melinda Gates Foundation Beijing Office, said that partnership can enhance the accessibility of vaccines more quickly; a lot of vaccine products can be bidden under the international system of the Global Alliance for Vaccines and Immunisation. Then, countries at all levels of incomes will have access to vaccine products. According to LU Min, during the pandemic, Shanghai enterprises such as United Imaging and Liferiver as representatives of Chinese brands have provided support for the global fight against the pandemic. These companies are also integrating themselves into the global innovation network in a more proactive manner, contributing “Shanghai Power” to global health and development. XU Jianrong, Country Director for China and Chief Representative of Shanghai Office of Project HOPE, introduced that Shanghai Children’s Medical Center, as a project constructed by both Shanghai Municipal People's Government and Project HOPE, is a typical example of China’s introducing advanced technologies and equipment from abroad. According to LI Xiuling, Secretary of the CPC Committee and General Manager, Shanghai Institute of Biological Products Co., Ltd., the institute is actively pushing forward the process of getting the WHO pre-certification of MMR, which has been listed as a prioritized purchase project in WHO. As pointed out by Andrew WONG, the WHO pre-certification enables companies to have more opportunities to cooperate with international organizations in projects on vaccines, and also to introduce more projects. FENG Linglin, Director and Researcher of Drug Development Office, Shanghai Institute of Planned

XU Fujie

Deputy Director of Health Innovation and Cooperation for the China Country Office of Bill & Melinda Gates Foundation

FENG Linglin

Family Planning Project (Shanghai Institute of Planned Parenthood Research)

Andrew WONG

HPV Vaccine Development (Shanghai Zerun Biotechnology Co., Ltd.)

Parenthood Research, also pointed out that through pre-certification, Shanghai Dahua Pharmaceutical Co., Ltd. has achieved rapid export growth.

The formation of the global layout of international health and development organizations is accelerating. According to Steve Davis, Bill & Melinda Gates Foundation is working with the Coalition for Epidemic Preparedness Innovations (CEPI), the Global Alliance for Vaccines and Immunisation (GAVI) and the World Health Organization (WHO) to jointly launch the COVAX to accelerate the R&D of COVID-19 vaccines. At present, 90 medium-and-high-income economies including China have agreed to join the COVAX program. As he mentioned, CEPI quickly competed its registration in Shanghai this April, and PATH also established its representative office in Shanghai. As pointed out by WU Yuanbin, China's participation in the COVAX program will accelerate the progress of making the COVID-19 vaccines of China global public products, help China make its contributions to improving the accessibility and affordability of vaccines in developing countries.

III. Future Global Health Governance Presents Both Opportunities and Challenges

First of all, we shall give better play to science and technology innovation in handling future health challenges. Firstly, rich technological reserves are essential to handling future health challenges. In the opinion of LU Hongzhou, Secretary of the CPC Committee of Shanghai Public Health Clinical Center, we may research into the existing viruses and bacteria with potential pathogenic threats to humans in the earthly environment through extensive international cooperation programs to nip potential threats to global public health in the bud, and lay a foundation for the R&D of future vaccines and drugs. XU Fujie also pointed out that innovation and cooperation are essential for addressing global health issues. Secondly, it is necessary to give better play to the new-generation information technologies in global health governance. As mentioned by Craig Anderson, Chief Representative of the George Institute for Global Health (China), traditional methods may not be able to give quick response to unpredicted pandemics in the future, but we may be able to judge the situation of pandemics more precisely with the help of new-generation information technologies such as big data and AI.

Secondly, we shall give better play to global network in controlling major unpredicted pandemics. In the opinion of NIE Xiaowei, Assistant Executive Director of Alliance of International Science Organizations in the Belt and Road Region (ANSO) Secretariat, all countries shall work hand in hand to deal with the pandemic, establish an emergency cooperation mechanism for global pandemic prevention and control, and a mechanism for sharing relevant information on viral sequences, virus tracking, drug screening, vaccine development, etc., quicken the response to public health emergencies, strengthen top-level design, and improve the national health governance systems. As

WANG Xiuli

New Media Project of Peking University (Communication Project, Raise Awareness of Global Health)

WANG Chen

Chinese Academy of International Trade and Economic Cooperation

LI Xiuling

General Manager, Shanghai Institute of Biological Products Co., Ltd. (Traditional Vaccine)

pointed out by XUE Lan, global health governance requires the cooperation of all countries. We shall strengthen the scientific research into global health, including knowledge of virus characteristics and R&D of drugs. Meanwhile, we shall also strengthen the global coordination and cooperation on the strategies for dealing with the pandemic, and develop communication standards for the personnel and goods of all countries, to reduce the recurrence risk of the COVID-19 pandemic.

Thirdly, we shall give better play to new media in promoting disease prevention and control. As pointed out by WANG Xiuli, Director and Associate Professor, Center for Social Media Research, Peking University, innovative communication strategies are an important means of supporting global health governance that can ensure the smooth operation of more health projects. We shall further use the "whole-course media" based on 5G network technology, the "holographic media" based on big data mining, the "all-member media" based on high-quality information, and the "whole-course media" with multiple economic and social functions, and provide strong policy making support and public opinion guarantee for pandemic prevention and control and global health governance through direct, efficient, real-time and multidimensional information transmission.

The "Belt and Road" Seminar

Jointly Building Mutual Trust and Interaction in Science and Technology Innovation

Editor's note: *The "Belt and Road" Seminar, with the theme of "Jointly Building Mutual Trust and Interaction in Science and Technology Innovation under the 'Belt and Road' Initiative", well-known experts and scholars at home and abroad had in-depth discussions on issues such as the practices, common challenges and policy effectiveness of the cooperation on science and technology innovation under the "Belt and Road" Initiative. This bulletin is a summary based on the reports from the participating guests[1] of the "Belt and Road" Seminar, and is intended for reference.*

HU Zhijian

President of Chinese Academy of Science and Technology for Development

Branislav Djordjevic

Director of Institute of International Politics and Economics, Serbia

Manzoor Hussain Soomro

Chairman of ECOSF, Pakistan

Mutual trust is the basic prerequisite for cooperation, and interaction is the only way to cooperation. Focusing on the construction of the "Innovation Journey" and building an innovation community requires full mutual trust and strong support of the countries along “the Belt and Road” in terms of science and technology innovation. The participating guests agreed unanimously that significant achievements have been made in numerous fields through the cooperation on science and technology innovation among the “Belt and Road” countries, with increasingly enhanced cooperation and mutual trust, and constantly deepened cooperation and exchanges. In the future, we shall further strengthen the interaction between science and technology policies and innovation measures, build a network of think tanks on science and technology innovation policies, deepen the cooperation and exchanges on science and technology innovation, and create a “Belt and Road” innovation community to contribute the power of science and technology innovation to the new round of economic globalization.

I. Mutual Trust, Interaction and Open Cooperation Lead to Significant Achievements in the Cooperation on Science and Technology Innovation under the “Belt and Road” Initiative

Firstly, expanded openness and enhanced mutual trust lead to significant achievements in the cooperation on science and technology innovation under the “Belt and Road” Initiative. As pointed out by Branislav Djordjevic, Director of Institute of International Politics and Economics, Serbia, China and Serbia have established excellent and fruitful science and technology cooperation, and achieved significant progress on the cooperation in the government level, space technologies, science and technology parks, industrial parks, etc. According to Liu Hong, Director of Nanyang Centre for Public Administration, Nanyang Technological University, Singapore, a mechanism has been formed for the bilateral cooperation between China and Singapore. China and Singapore held the 13th Bilateral Cooperation Association Meeting; Suzhou Industrial Park, Tianjin Eco-city, and the China-Singapore (Chongqing) Demonstration Initiative

1 Participating guests include: Branislav Djordjevic, Director of Institute of International Politics and Economics, Serbia; Manzoor Hussain Soomro, Chairman of ECOSF, Pakistan; Wang Yiwei, Professor of School of International Studies, Renmin University of China; Edna Pasher, Dean of Israel Smart Cities Institute; Chen Baoming, Deputy Director of Talent Exchange Center, Ministry of Science and Technology of the People’s Republic of China; Chang Jiang, Vice President and Researcher of Northwest University; Liu Hong, Director of Nanyang Centre for Public Administration, Nanyang Technological University, Singapore; Wang Wen, Professor of Chongyang Institute for Financial Studies, Renmin University of China; Wang Delu, Director of Greatwall Strategy Consultants; Kitipong Promwong, Director of the Office of Thailand Science and Education Leading Group; Yan Lijin, Chairman of China Silk Road Group; Tang Zhimin, Director of Center for China-ASEAN Studies, Panyapiwat Institute of Management; Hu Zhijian, President of Chinese Academy of Science and Technology for Development.

WANG Yiwei

College of International Relationship, Renmin University of China

Edna Pasher

Dean of Smart City Research Institute, Israel

CHEN Baoming

Deputy Director of Talent Exchange Center, Ministry of Science and Technology of the People's Republic of China

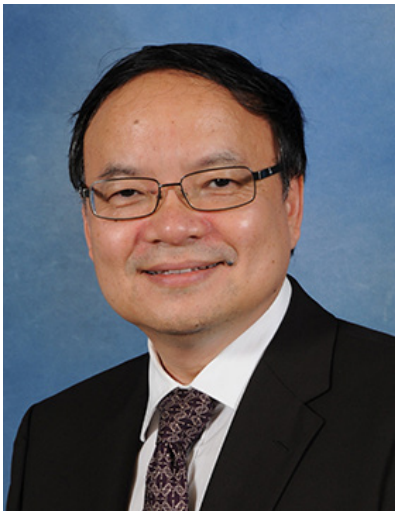
on Strategic Connectivity are playing an increasingly important role in bilateral cooperation; the establishment of the Sino-Singapore International Joint Research Institute (SSIJRI) has promoted the science and technology cooperation between the two countries to a new level. According to Manzoor Hussain Soomro, Chairman of ECOSF, Pakistan, the establishment of the Belt and Road International Science Education Coordinating Committee secures the extensive cooperation between China and Pakistan involving the scientific research units, universities, enterprises and other institutions along the "Belt and Road", and facilitates the coordinated development and common prosperity in the international science education.

Secondly, cooperation on science and technology innovation helps the "Belt and Road" countries to jointly fight against the COVID-19 pandemic. In the opinion of Kitipong Promwong, Director of the Office of Thailand Science and Education Leading Group, the COVID-19 pandemic has exposed the structural weaknesses and defects of Thailand's economy, with vulnerable groups at the grassroots level being the first to be affected by the pandemic. The Belt and Road Science and Technology Cooperation Alliance has become a platform for countries to share their experience and make exchanges, which helps Thailand to enhance its understanding of the pandemic, learn about how to achieve economic and social recovery through science and technology innovation, and better facilitate the regional cooperation on science and technology innovation. As pointed out by Wang Delu, Director of Greatwall Strategy Consultants, science and technology parks are serving more and more as the pioneers in the fight against the pandemic, and almost all science and technology parks in China have been engaged in the fight against the pandemic, as have those in many countries across the world, and those along the "Belt and Road" play a huge role.

Thirdly, cooperation on science and technology innovation guides and supports the economic and social development of the countries and regions along the "Belt and Road". As pointed out by Wang Yiwei, Professor of School of International Studies, Renmin University of China, the "Belt and Road" innovation serves the 2030 SDGs of the United Nations, and aims to improve the well-being of all humans in the world; it is the innovation that establishes a global connectivity partnership. As pointed out by Wang Wen, Professor of Chongyang Institute for Financial Studies, Renmin University of China, the "Belt and Road" Initiative facilitates innovations in the global governance model, and the countries and regions along the "Belt and Road" are also enjoying the gradually-emerging huge benefits from the implementation of the development and innovation model in finance, trade and technologies of the "Belt and Road". According to Edna Pasher, Dean of Israel Smart Cities Institute, opening up and innovation is the soul of global cities, and innovations are derived from global cooperation; the most important thing to do is to build an infrastructure to support urban construction, and

CHANG Jiang

Vice President of Northwest University



LIU Hong

Dean of Nanyang Graduate School of Public Administration, Nanyang Technological University, Singapore

WANG Wen

Chongyang Research Institute, Renmin University of China

establish a connection with the cities across the world. The "Belt and Road" Initiative has created connections and interactions between different cities and groups. In the opinion of Tang Zhimin, Director of Center for China-ASEAN Studies, Panyapiwat Institute of Management, both China and Thailand attach great importance to science and technology cooperation. China is an important partner of Thailand in terms of science and technology innovation; China and Thailand have frequent personnel exchange and technology transfer, and have established multiple platforms to promote the cooperation on talents, knowledge, R&D, etc.

II. Facilitate New Development in the Cooperation on Science and Technology Innovation under the "Belt and Road" Initiative in the Principle of Achieving Shared Growth through Discussion and Collaboration

Firstly, science and technology lights up innovations, and the "Belt and Road" cooperation will demonstrate the bright prospects of digital economy. In the opinion of Yan Lijin, Chairman of China Silk Road Group, digitization, networking and intelligentization are driving the process of economic globalization, and the Digital Silk Road is an organic combination of the development of the digital economy and the "Belt and Road" Initiative, and the inevitable outcome of the globalization of digital economy, which will promote the rapid development of the global economy. The global "infrastructure of digital trade" will provide solutions to issues such as payment, logistics and mutual trust in information in international trade, work with the United Nations to develop innovation cooperation with the "Belt and Road" countries, work hard to create a trading system featuring freedom, fairness and integrity, and establish a new order. According to Edna Pasher, Tel Aviv has a become a model for the cooperation between Chinese and European cities, demonstrating to the cities along the "Belt and Road" how to build a development path of establishing smart cities through Sino-European urban cooperation projects, achieve sustainable urban development, and realize co-creation and sharing of knowledge.

Secondly, science and technology helps build future dreams, and the "Belt and Road" cooperation will shape the new model of education and talent training in the new era. As pointed out by Chen Baoming, Deputy Director of Talent Exchange Center, Ministry of Science and Technology of the People's Republic of China, "innovation-driven" essentially means "talent-driven", and science and technology policies actually act on people. Science and technology policies shall be based on talents or brainpower and creativity, and it is quite important to combine science and technology with education. The reform and coordination of education and innovation shall be strengthened; the scientific research activities with people as the starting point and foundation are becoming increasingly important, so the talent policies shall be more people-oriented for creating a good environment for the cooperation among science and technology talents. According to Chang

Kitipong Promwong

Director of the Office of Thailand Science and Education Leading Group

YAN Lijin

Chairman of China Silk Road Group

TANG Zhimin

Director of Center for China-ASEAN Studies, Panyapiwat Institute of Management

Jiang, Vice President and Researcher of Northwest University, the Northwest University will establish a sound funding system, improve the administrative services, recruit outstanding overseas students from the “Belt and Road” countries, and cultivate a batch of educated international talents who can shoulder the important task of the “Belt and Road” construction. As pointed out by Manzoor Hussain Soomro, technologies are of great importance to the cultivation of qualified talents and human resources. The rapid development of emerging technologies is widening the gap between school education and technologies, so more innovative approaches to science education shall be adopted to cultivate three important capabilities: complex problem solving, critical thinking skills, and creativity. Meanwhile,, the Belt and Road International Science Education Coordinating Committee focuses on key and core technologies including AI, blockchain, VR, AR, the Internet of Things, robots, UAVs, 3D printing and automation, to cultivate capabilities applicable to future work.

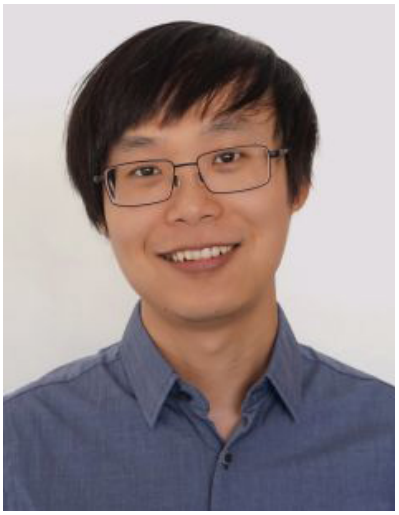
The Young Elite Scientist (YES) Summits

Seeing Scientific Research Through The Eyes of Young Scholars

Editor's note: *From the outlook on scientific research in a pandemic world to career advice for upcoming scientists, a group of promising young researchers from Westlake University, Stanford University, New York University, and the California Institute of Technology talked about science research today and tomorrow. This bulletin is a summary based on the reports from the participating guests[1] of the Emerging Technology Forum, and is intended for reference.*

Sean Sanders

Director and Senior Editor for Custom Publishing for the journal Science, Program Director for Outreach, Science/AAAS



Zibo CHEN

Winner of the 2019 Science Young Scientist Awards, California Institute of Technology, Cell and Molecular Biology

Shuo CHEN

Winner of the 2019 Science Neurode regulation Awards, New York University, Neurosurgery

On October 27, 2020, five accomplished young scientists gathered virtually for the Young Elite Scientist (YES) Summit. Science/ AAAS teamed up with the Pujiang Innovation Forum to host this summit, which "focuses on the power of young people to be agents of change," according to moderator Sean Sanders, director and senior editor for Custom Publishing for Science magazine.

I. Pursuing science during a pandemic

In the midst of the COVID-19 pandemic, the summit participants talked about ways to move forward. One method is by outsourcing some processes, such as sequencing, according to Zibo Chen, a postdoctoral fellow working on synthetic biology at the California Institute of Technology in Pasadena.

Shruti Naik, an assistant professor studying immunology at NYU Langone Medical Center in New York City, envisioned remotely controlling equipment in a lab. Although she doesn't envision labs built completely in silicon, she noted: "We have to rethink the way our labs are structured, the physical structure itself, right?"

Scientists could also refocus some of their work toward health care. For example, Shuo Chen, a postdoctoral fellow studying neuroscience at NYU Grossman School of Medicine in New York City, encouraged scientists to consider how they could develop translational opportunities from their work.

No matter what is happening, people around the world will continue to benefit from determined efforts to reduce climate change, according to Matthew Savoca, a postdoctoral marine-ecosystems researcher at Stanford University's Hopkins Marine Station in California. He pointed out that either humans can make changes for the better or the environment will impose unwanted changes. The need to make such choices will live long after the pandemic subsides, he added.

II. Creating a career

With the Pujiang Innovation Forum emphasizing networking and the importance of young scientists, Sanders asked the panelists for advice they would give to even younger scientists starting out. Bai advised the next generation to find research that they love and to "never give up."

Naik added that young women pursuing careers in science should get "comfortable with being uncomfortable," because it's a common feeling. For exam-

1 Participating guests include: Sean Sanders, Director and Senior Editor for Custom Publishing for the journal Science, Program Director for Outreach, Science/ AAAS; Zibo CHEN, Winner of the 2019 Science Young Scientist Awards, California Institute of Technology, Cell and Molecular Biology; Shuo CHEN, Winner of the 2019 Science Neurode regulation Awards, New York University, Neurosurgery; Matt SAVOCA, Winner of the 2018 Science Young Scientist Award, Hopkins Marine Station, Stanford University; Shruti Naik, Winner of the 2018 Prize in Regenerative Medicine and Cell Therapy, NY University Langone Health; Rui BAI, Outstanding Young Author Representative of Science, Postdoctoral Fellow, Westlake University; Jackie Oberst, Assistant Editor for Custom Publishing at Science/ AAAS

Matt SAVOCA

Winner of the 2018 Science Young Scientist Award, Hopkins Marine Station, Stanford University

Shruti Naik

Winner of the 2018 Prize in Regenerative Medicine and Cell Therapy, NY University Langone Health

Rui BAI

Outstanding Young Author Representative of Science, Postdoctoral Fellow, Westlake University

ple, she pointed out that uncomfortable situations can arise when finding yourself in conflict with a mentor, speaking in front of an audience, and disagreeing with colleagues about a hypothesis. But she noted that most scientists must deal with these challenges, and it's okay to feel uncomfortable when facing them.

Uncomfortable or not, it's important that young scientists find ways to network—which is more than making a list of acquaintances. In a talk about careers after COVID-19, Jackie Oberst, assistant editor for Custom Publishing at Science/ AAAS, said, "Networking is creating a group of acquaintances and associates and maintaining it through regular communication for mutual benefit."

Building global networks will create the most innovation. As Bai said: "People from different cultures and backgrounds will have different cognitive and critical thinking modes, and it will bring brainstorming and promote many exciting ideas."

Article source: https://www.sciencemag.org/advertorials/pujiang-innovation-forum-and-yes-summit-seeing-scientific-research-through-eyes-young

Jackie Oberst

Assistant Editor for Custom Publishing at Science/ AAAS

The First World Tech-transfer Manager Summit

Chinese Needs, Global Responses

Editor's note: *The First World Tech-transfer Manager Summit, with the theme of "Chinese Needs, Global Responses", well-known experts and scholars at home and abroad had in-depth discussions on topics including the commercialization of fundamental research, the development path of the transfer and commercialization of scientific and technological achievements, the construction of the ecological network for achievement commercialization, and the career development of technology transfer agencies and tech-transfer managers. This bulletin is a summary based on the reports from the participating guests[1] of the World Tech-transfer Manager Summit, and is intended for reference.*

CHEN Yujian

Head of Minhang District, Shanghai Municipal

LU Min

General Engineer, Science and Technology Commission of Shanghai Municipality

Andy Sierakowski

Co-chairman of International Technology Transfer Network

Currently, the commercialization of scientific and technological achievements is stepping into the phase of flourishment with major opportunities, and the circulation and integration of the elements of the technology market is exerting a broad and profound impact on the progress on economic and social development. The participating guests agreed unanimously that we shall constantly improve the ecological network for the commercialization of scientific and technological achievements, give full play to the role of technology transfer agencies and tech-transfer managers in tying technologies and the market, better drive the commercialization of scientific and technological achievements, and go further to explore a development path for the transfer and commercialization of scientific and technological achievements in line with the characteristics of China.

I. Constantly Improve the Ecological Network for the Commercialization of Scientific and Technological Achievements

Firstly, we shall strengthen the source of scientific and technological achievements of universities and institutes. As pointed out by Andy Sierakowski, Co-chairman of International Technology Transfer Network, from the perspective of R&D characteristics, groundbreaking technologies are mainly from public departments such as universities and institutes. Universities shall facilitate the integration of their scientific research into the economic and social development, give play to the source of achievements, and drive the transformation and upgrading of industries. The government shall offer multi-party support, including developing clear intellectual property protection policies, investing in scientific research and human resources, and constructing advanced R&D infrastructures. In the opinion of Gil Granot-Mayer, Former CEO, Yeda Institute, the basic scientific research of universities is the main source of major breakthroughs in technological innovations; as the process from basic scientific research to product commercialization is long, we shall guide scientists to change their mindsets and actively engage in industrial fields, and encourage application- and product-oriented fundamental research and applied fundamental research. Meanwhile, we shall encourage entrepreneurs to step into universities, and establish good partnership with universities by setting

1 Participating guests include: CHEN Yujian, Head of Minhang District, Shanghai Municipal; LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality; Andy Sierakowski, Co-chairman of International Technology Transfer Network; Gil Granot-Mayer, Former CEO, Yeda Institute; Russ Shaw, London Tech Ambassador and Chairman of Global Tech Advocates; GUO Shugui, President of China Technology Exchange; TAO Yuanxing, Chairman of China Technology Market Association; CHEN Baiqiang, Deputy Director, Technology Transfer Center, Beijing Institute of Technology (BIT); SHI Gefu, General Manger of Beijing Peihongwangzhi Technology Co., Ltd.; WANG Wen, Vice Dean of Science and Technology and Education Development Research Institute, Xi'an Jiaotong University; YU Xiaojing, Director of Shanghai Xuhui Ceyuan Health Intelligent Technology Achievement Transformation Development Center.

Russ Shaw

London Tech Ambassador and Chairman of Global Tech Advocates

ZHOU Jing

Party Branch Secretary and Deputy Director of Shanghai Technical market Management Office

TAO Yuanxing

Chairman of China Technology Market Association

up joint labs, technology centers, and other relevant entities in universities, so as to facilitate the commercialization of major technological achievements of universities, and lead industrial upgrading.

Secondly, we shall integrate the force of the international innovation network. In the opinion of Russ Shaw, London Tech Ambassador and Chairman of Global Tech Advocates, to construct a global technology network platform, we shall aggregate the innovation force of scientific researchers, enterprises and investors to co-create value. For example, Global Tech Advocates (GTA), a global basic-level community of science and technology has gathered 15,000 practitioners in different fields to secure interdisciplinary, cross-level, and cross-border cooperation, and solve the specific problems faced by technical departments and in the emerging technologies under the leadership of technological leaders. As suggested by Gil Granot-Mayer, we shall set up industry-university-research cooperation projects and facilities in or around universities, to encourage the industrial community to establish a better and closer partnership network with universities. In the opinion of YU Xiaojing, Director of Shanghai Xuhui Ceyuan Health Intelligent Technology Achievement Transformation Development Center, we shall create a new international, professional and integrative ecosystem for achievement commercialization. As noted by GUO Shugui, President of China Technology Exchange, the economic development is currently adopting the dual circulation. From the perspective of the technology market, the interior circulation involves the cooperation among technology transaction agencies, and the exterior circulation is about integrating relevant industrial entities (such as assessment agencies, advisory agencies and representative agencies) at home and abroad to form national and international cooperation networks, thus enhancing the operational efficiency of the technology market.

II. Continuously Improve the Operating Model of Technology Transfer Agencies

Firstly, we shall improve the administrative mechanism to make it more suitable to achievement commercialization. In the opinion of CHEN Baiqiang, Deputy Director, Technology Transfer Center, Beijing Institute of Technology (BIT), while the policy barriers hindering the commercialization of scientific and technological achievements have been basically removed, and the commercialization of scientific and technological achievements has stepped into the phase of rapid development with major opportunities, the traditional administrative model is preventing the service system for the commercialization of scientific and technological achievements of universities from meeting the development needs. Technology Transfer Center, BIT implements the new development model of technology transfer agencies sticking to the principle of “commercialized management + marketized operation” to secure the development direction and the priority position of the commercialization of

CHEN Baiqiang

Deputy Director, Technology Transfer Center, Beijing Institute of Technology (BIT)

GUO Shugui

President of China Technology Exchange

SHI Gefu

General Manger of Beijing Peihongwangzhi Technology Co., Ltd., Founder of Science Hero

scientific and technological achievements of the university through commercialized management, and give play to the market strengths to break the boundary between the achievements of scientific research and the market to get good results through marketized operation. In the opinion of YU Xiaojing, in the Chinese market, technology demand and technology supply often complement each other, and all achievement commercialization platforms shall facilitate the innovations in the matching methods for demand and supply on the basis of the development characteristics of both ends.

Secondly, we shall develop service methods that are more suitable to the modern technology market. As pointed out by GUO Shugui, to construct a modern technology market, we shall constantly launch innovative service products with the help of advanced technologies: (1) further professionalize the services, and provide professional services attaching importance to industrial characteristics; (2) realize the

Shanghai Ceremony of Shanghai International Textile Technology Innovation Center

WANG Wen

Vice president of Xi'an Jiaotong University Science and Technology and Education Development Research Institute

YU Xiaojing

Director of Shanghai Xuhui Ceyuan Health Intelligent Technology Achievement Transformation Development Center

whole-process and comprehensive services for achievement commercialization, and further refine project selection and matching; (3) integrate technology transactions with the capital market, and constantly explore the financing services for science and technology enterprises, the valuation and evaluation of scientific and technological achievements, and other aspects. In the opinion of WANG Wen, Director of National Technology Transfer Centre, Xi'an Jiaotong University, technology transaction agencies shall become four-in-one agencies combining the functions of "a technology transfer agency + a science and technology innovation foundation + a new-type R&D institution + a science and technology incubator", to provide whole-process services, i.e. providing services corresponding to customer needs from the formation of operating entities to late financing and even the construction of premises and environmental assessment.

Thirdly, we shall standardize a service process complying with the law of achievement commercialization. As pointed out by YU Xiaojing, the process from the output of achievements to the evaluation, intellectual property layout, value judgment, business model design, and final commercialization must be standardized to ensure the capability of agencies to provide professional services and develop sustainably, among which, to establish regional TTO platforms for the transfer and commercialization of achievements is a critical factor. With the model applied by the technology transfer office as a reference, we shall cooperate with scientific research teams to grasp research progress and intention of commercialization in a timely manner on the supply side of technologies, and identify market needs and application capability on the demand side of technologies, with technology transfer agencies providing professional services in between.

Signing Ceremony for Tech-Transfer Service Agencies with Minhang Demonstration Zone

Signing Ceremony for International Technology Channels with Minhang Demonstration Zone

III. Work Hard to Build High-level Tech-transfer Manager Teams

Firstly, the market requirements for tech-transfer managers are becoming increasingly demanding. In the opinion of SHI Gefu, General Manger of Beijing Peihongwangzhi Technology Co., Ltd., Founder of Science Hero, tech-transfer managers are responsible for managing and operating technologies, and commercializing and industrializing technologies to create business value. The expectations of tech-transfer managers from the modern market have long gone beyond simple transaction facilitation, and tech-transfer managers are required to have 5 basic capabilities, namely the capability to identify and evaluate technologies and industries, the capability to integrate abundant information resources, the capability to plan commercialized applications and manage intellectual property, the capability to control financial resources, and the capability to manage relevant affairs of various kinds.

Secondly, we shall strengthen the cultivation of high-level tech-transfer managers. In the opinion of TAO Yuanxing, Chairman of China Technology Market Association, the career development of tech-transfer managers is currently not well-established, and the lacking in tech-transfer manager teams, the limited service capacity, the poorly-established mechanisms of market assessment and supervision, and other problems have become the bottlenecks for the development of the tech-transfer manager market in China, so it is an urgent need to strengthen the cultivation of tech-transfer manager teams. According to YU Xiaojing, achievement commercialization managers shall be patient professionals knowing technologies, finance, the market and operations well, with the spirit of craftsmanship and passion. To respond to the urgent market demand for tech-transfer managers, we shall start from building technology transfer service teams, and gather experts in certain fields to develop the comprehensive capabilities of a team. In the opinion of WANG Wen, tech-transfer managers shall be full-time professionalized and localized workers. In particular, the professionalization of tech-transfer managers is an effective way to cultivate stable tech-transfer manager teams. National Technology Transfer Centre, Xi'an Jiaotong University has proposed a recognition system for professional tech-transfer managers, trying to build a professional team of tech-transfer managers similar to that of "lawyers".

The Entrepreneur Forum

Mutual Integration and Co-Creation, Science and Technology Boosts the Integrative Development of the Yangtze River Delta

Editor's note: *The Entrepreneur Forum, with the theme of "Mutual Integration and Co-Creation, Science and Technology Boosts the Integrative Development of the Yangtze River Delta", well-known experts at home and abroad had discussions on the driving force for the integrative and high-quality development of the Yangtze River Delta driven by science and technology innovation and the relevant issues with regional economic and social development as the focus. This bulletin is a summary based on the reports from the participating guests[1] of the Entrepreneur Forum, and is intended for reference.*

DUAN Junhu

Deputy Director of Torch High Technology Industry Development Center, Ministry of Science and Techology

LU Min

General Engineer, Science and Technology Commission of Shanghai Municipality

CHEN Qing

Chief of the department of Incubator Management Torch High Technology Industry Development Center, Ministry of Science and Technology

As emphasized by General Secretary Xi Jinping at the symposium on solidly advancing the integrative development of the Yangtze River Delta, we shall focus on "integration" and "high quality" as the two key words, well complete the major tasks, do the work with firm faith and strong motivation for tangible outcomes, and facilitate continued progress in the integrative development of the Yangtze River Delta. We shall also promote the cooperation on innovation and entrepreneurship in an all-round way, which is of great importance for promoting the regional flow of innovation elements, increasing urban innovation vitality, and deepening the connectivity, integration and mutual complementarity among cities. The participating guests agreed unanimously that the Yangtze River Delta shall work hard to promote high-quality innovation and entrepreneurship, break administrative barriers, enhance policy coordination, and strengthen cohesiveness and cooperation to create a national pilot and demonstration zone of integrative and high-quality development.

I. Stepping across Geographical Boundaries to Advance the Integration of Innovation and Entrepreneurship in the Yangtze River Delta

Firstly, the Yangtze River Delta has laid a solid foundation for the integration of innovation and entrepreneurship. As pointed out by DUAN Junhu, Deputy Director of Torch High Technology Industry Development Center, Ministry of Science and Technology, overall, the innovation and entrepreneurship level of the 3 provinces and 1 municipality in the Yangtze River Delta is high. There are a total of 1,540 incubators and 1,981 maker spaces in the Yangtze River Delta, accounting for nearly 30% and 25% of the national total, and both the number of enterprises under incubation with intellectual property rights and that with investment or financing support located in the region account for over 40% of the national total. According to LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality, the Yangtze River Delta Science and Technology Resource Sharing Service Platform has agglomerated 35,546 (sets of) large scientific instruments, 2,665 shared scientific research bases, and more than 200,000 science and technology talents

1 Participating guests include: DUAN Junhu, Deputy Director of Torch High Technology Industry Development Center, Ministry of Science and Technology; LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality; CHEN Qing, Chief of the Department of Incubator Management of Torch High Technology Industry Development Center, Ministry of Science and Technology; LIU WEI, Dean of the Research Institute, CSG Smart Science & Technology Co., Ltd.; JIN Xia, Cofounder and Chairman of Hsmap; ZHOU Tao, General Manager of the Business Department of China Construction Bank Shanghai Branch; ZHOU Dongliang, General Manager of Jiangsu Swood Zhihui Venture Services Co., Ltd.; ZUO Wei, Senior Director of Marketing, Betta Pharmaceuticals Co., Ltd.; WEI Yiyu, Chairman of Hefei National University Science Park Development Co., Ltd.; XIE Jihua, General Manager of Shanghai Yangpu Science and Technology Business Incubator Center Co., Ltd.; RUAN Wenjun, Managing Partner of Yonggui Dongke Equity Investment Fund Co., Ltd.

LIU WEI

Dean of the research Institute, CSG Smart Science & Technology Co., Ltd.

JIN Xia

Cofounder and chairman of Hsmap

ZHOU Tao

General Manager of the Business Department of China Construction Bank Shanghai Branch

in the region. The technology transaction market of the Yangtze River Delta is developing actively. Last year, the Yangtze River Delta completed nearly 15,000 contract technology transactions with a total value of CNY 43 billion.

Secondly, joint efforts shall be taken to establish the innovation ecosystem of the Yangtze River Delta. As pointed out by CHEN Qing, Chief of the Department of Incubator Management of Torch High Technology Industry Development Center, Ministry of Science and Technology, to develop the Yangtze River Delta, we shall further break the administrative barriers, enhance policy coordination, and enable the smooth flow of elements on a larger scale, which is conducive to giving play to the comparative advantages of each region, realizing more reasonable labor division, pooling the forces for stronger cohesion, and promoting high-quality development. In the opinion of LIU Jian, Assistant to the Dean of the Institute for Fintech Research, Tsinghua University, for the innovative and integrative development of the Yangtze River Delta, the construction of the innovation ecosystem is of the greatest importance, which involves policy coordination, talent attraction, business incubation, industry agglomeration, financial capital, etc. As pointed out by LU Min, the science and technology departments of Shanghai, Jiangsu, Zhejiang and Anhui work hand in hand to accelerate the construction of the regional innovation community, jointly serve the national strategies, jointly establish the innovation ecosystem of the Yangtze River Delta through the combination of science and technology plans, innovation platforms and innovative brand activities, create innovation demonstration points and corridors of innovation-driven development with distinct features, and work hard to enhance the regional comprehensive competitiveness, to build the Yangtze River Delta into a new landmark of innovation and entrepreneurship on the western coast of the Pacific.

Thirdly, geographical boundaries shall be broken to explore the new forms of industry incubation for the Yangtze River Delta. As pointed out by CHEN Qing, on the one hand, we shall facilitate transregional business incubation, tightly integrate the incubators in the Yangtze River Delta, realize the interconnection of qualifications and certifications among enterprises under incubation in the Yangtze River Delta, and allow the enterprises in incubators to operate at an address different from the registration address; on the other hand, we shall establish professional industry incubators in the segments of vertical industries under the coordination of the leading enterprises and realize the integration of upstream and downstream industry chains. According to LU Min, Shanghai is exploring the way to advance the construction of demonstrative platforms and carriers for the integrative development of the Yangtze River Delta, facilitating the pilot general exchange of the “science and technology innovation vouchers” within the Yangtze River Delta, and helping the 9 cities of the G60 S&T Innovation Corridor in the Yangtze River Delta to realize agglomeration and interrecognition of science and technology

Release of Shanghai Scientific and Technological Entrepreneurship Trend Study Report (2016-2019)

resources, intercommunication of science and technology policies, and inter-recognition of science and technology platforms.

II. Agglomerating Innovation Resources to Advance the Innovation and Upgrading of the Industry Chain of the Yangtze River Delta

Firstly, the advantageous resources of each region shall be agglomerated to realize the re-upgrading of industry innovation. According to LIU WEI, Dean of the Research Institute, CSG Smart Science & Technology Co., Ltd., in terms of seizing the opportunities provided by the integration of the Yangtze River Delta to build the core competitiveness of enterprises, CSG chooses to improve the technology level of the industry chain. Headquartered in Shanghai G60 S&T Innovation Corridor, and with plants and R&D institutions in Hefei, Hangzhou and Suzhou to integrate the local technological, customer and industry resources, CSG integrates the technologies of the AI team in Shanghai, the 5G electricity Internet team in Hefei, and the intelligent robotic logistics equipment team in Suzhou, combine the technological strengths of the smart grid and the automotive equipment manufacturing industry, and graft and combine the manufacturing resources and product resources to establish a complete service chain covering all links from production to consumption.

Secondly, the "new capital construction" of the industry where data intelligence precisely matches innovation elements shall be constructed. In the opinion of JIN Xia, Cofounder and Chairman of Hsmap, "data-driven" will become the new model of industry development, and it is necessary to construct the innovation infrastructure with industry database as the basis and industry internet platforms as the media and change the traditional way of industrial organization and coordination, to realize the high-quality industry development in the Yangtze River Delta. By precisely matching the innovation elements for industrial development through data intelligence and the coordination network, entrepreneurs will transform themselves from enterprisers into innovative product organizers, which will dramatically enhance the innovation efficiency. Meanwhile, the dynamic cloud map of the industry chain updated in real time shall be formed through the digital foundation of the "industry brain"; through the intelligent analysis of the cloud map of the industry chain, it may be possible to know in real time which parts of the industry chain of the Yangtze River Delta require extension, complementation or strengthening, and thus realize precise governance.

III. Innovating Service Models to Improve New Drivers of Regional Development

Firstly, more funds and "working capital" shall be given to small and micro enterprises through fintech innovation. In the opinion of ZHOU Tao, General Manager of the Business Department of China Construction Bank Shanghai Branch, the difficult and expensive financing for SMEs have long been a key

Release Proposal for Joint Incubation of Sci-tech Enterprises in the Yangtze River Delta

problem constraining innovation and entrepreneurship. To solve this problem, with inclusive finance as the bank-wide strategy and data as the credit element, China Construction Bank has explored the new inclusive finance model with 5 features, namely mass customer acquisition, precise profiling, automated approval, intelligent risk control, and comprehensive service, and thus has effectively addressed the key issue of information asymmetry in small and micro enterprises.

Secondly, the whole-cycle service model combining science and technology finance with entrepreneurship services shall be created. To entrepreneurs, professional guidance and services are required for corporate governance, policy applicability, product sales, flow of funds, introduction of equity financing, and other issues, in addition to financing. In the opinion of LIU Jian, in terms of science and technology innovation, the construction of the ecosystem is of the greatest importance, but it could never be completed without financial capital support. According to ZHOU Tao, China Construction Bank gives play to the advantages of linking financial capital and social resources, to set entrepreneur harbors, and provides SMEs with the whole-lifecycle entrepreneurship services of "finance + incubation + industry" in a commercialized and professional way. With the combination of "financing and intelligence integration" and through investment-loan coordination and other methods, more energetic startups may be cultivated and more jobs may be created to realize the virtuous cycle of "innovation–entrepreneurship-employment".

Thirdly, the systematic service system shall be improved to promote achievement commercialization and resource allocation. In the opinion of XIE Jihua, General Manager of Shanghai Yangpu Science and Technology Business Incubator Center Co., Ltd., Shanghai shall realize the "1+X+N" system of technology transfer and science and technology innovation services in the Yangtze River Delta. "1" refers to Shanghai Technology Exchange, which is a hub; "X" means contacting more innovation service agencies; "N" means serving more enterprises and industries, and guiding small enterprises to realize independent innovation and complete the great mission of high-quality development. According to WEI Yiyu, Chairman of Hefei National University Science Park Development Co., Ltd., for the personal issues encountered by start-ups in different stages of entrepreneurship, service agencies such as parks and incubators shall provide precise services through a series of resource matching and allocation. Through precise incubation services, Hefei National University Science Park has realized an identification rate of HNTEs within the park of over 40%, and a proportion of HNTEs getting financing of over 50%.

Green Technology Bank Summit Forum

Innovation-driven Green Development: Accelerating the Construction of a Market-oriented Green Technology Innovation System

Editor's note: *Green Technology Bank Summit Forum, with the theme of "Innovation-driven Green Development: Accelerating the Construction of a Market-oriented Green Technology Innovation System", well-known experts and scholars at home and abroad had in-depth discussions around the construction of green technology bank, and the green technology innovation practices in the Yangtze River Delta. This bulletin is a summary based on the reports from the participating guests[1] of the Green Technology Bank Summit Forum, and is intended for reference.*

XIE Wenlan

Deputy Director of Shanghai Science and Technology Commission, Secretary General of the Steering Committee of the Green Technology Bank

CHEN Mingbo

Deputy Secretary-General of Shanghai Municipal People's Government

XU Jun

Deputy director of department of social development

Green Technology Bank is an important commitment to implement the UN 2030 Agenda for Sustainable Development, a critical initiative to promote the sustainable development of China, and also a significant carrier for Shanghai to shape the new drivers of development in the new era. The participating guests agreed unanimously that green technology innovation is an important driving force to promote China to adhere to green development and realize high-quality economic growth, and in order to construct a market-oriented green technology innovation system, we shall give play to the coordination and supporting role of multiple subjects, including constructing a highly efficient green technology bank platform, a complete and well-established green capital market, and a mature and effective intellectual property system.

I. Progress and Results of the Construction of Green Technology Bank

Firstly, extensive international innovation cooperation has been carried out. According to Minelik Alemu Getahun, Assistant Director General, World Intellectual Property Organization and Counselor to Green Technology Bank Institute, World Intellectual Property Organization (WIPO) provides extensive support for the global green technology initiatives, connecting the providers and demanders of green science and technology, and effectively constructs a global innovation ecosystem focusing on green science and technology through their online databases and acceleration programs. He pointed out that WIPO has established close cooperation relationship with Green technology Bank since 2018. So far, Green Technology Bank has submitted 23 items of green science and technology, covering five of the seven categories of science and technology, including the wind power generation technology, the intelligent water and fertilizer integration technology, and the one-stop oil and gas field wastewater treatment technology. Green Technology Bank shares a common vision with WIPO, and plays a pivotal role in WIPO's initiative to promote the development of green technologies.

Secondly, the Green Technology Standard System of China has been established. In 2019, the Guidance on the Construction of a Market-oriented

1 Participating guests include: H.E Kitti Settha Pandita Cham Prasidh, Senior Minister, Minister of Industry, Science, Technology & Innovation, Kingdom of Cambodia; CHEN Mingbo, Deputy Secretary-General of Shanghai Municipal People's Government; ZHOU Hanmin, Vice Chairman of Shanghai Committee of CPPCC and Vice Chairman of the International Finance Forum; XU Jun, Second-level Inspector of Department of Science and Technology for Social Development, Ministry of Science and Technology; Minelik Alemu Getahun, Assistant Director General, World Intellectual Property Organization; MA Jun, Director of China Green Finance Committee of China Society for Finance and Banking; XIE Wenlan, Deputy Director of Science and Technology Commission of Shanghai Municipality, and Secretary General of the Steering Committee of the Green Technology Bank; and ZHU Junhao, General Manager of Green Technology Bank (Shanghai) Science and Technology Development Co., Ltd.

WANG Zhen

Director of Administration Center of Green Technology Bank

ZHOU Hanmin

Vice Chairman of Shanghai Committee of CPPCC and Vice Chairman of the International Finance Forum

Minelik Alemu

Assistant Director General, World Intellectual Property Organization, Advisor Committee of theGreen Technology Bank Academy

Green Technology Innovation System was issued by National Development and Reform Commission and the Ministry of Science and Technology, requiring effective and accurate evaluation of green technology applications. In the opinion of ZHU Junhao, General Manager of Green Technology Bank (Shanghai) Science and Technology Development Co., Ltd., the establishment of the green technology evaluation system contributes to the transfer, commercialization, demonstration and application of the advanced applicable technologies in the field of ecological and environmental protection, making the ecological and environmental protection industry a new growth point. Based on the three main principles of cooperativity, professionalization and intelligentization, a lot of attempts concerning the system have been made to meet the market needs, and screen the green technology applications through scientific evaluation process management. As pointed out by MA Jun, Director of China Green Finance Committee of China Society for Finance and Banking, currently for China's green finance system, a series of definition standards shall be set up, including the standards for green credit and loan, green bonds, and green projects, and it

MA Jun

Director, Chairman of China Green Finance Committee of China Society for Finance and Banking

ZHANG Rongqing

Head of the National Green Development Fund

ZHU Junhao

General Manager of Green Technology Bank (Shanghai) Science and Technology Development Co., Ltd.

is estimated that more definition standards and regulations concerning green technologies will be introduced in the future.

Thirdly, the green technology innovation has been promoted to lead the industrial development. As pointed out by ZHANG Rongqing, General Manager of the National Green Development Fund Co., Ltd., the entire green industry has entered a new development stage represented by seeking increment from existing stock, and the expansion and increase in both increment and existing stock, and green technologies have become one of the core elements leading the industrial development. Settled in Shanghai, the two national-level functional platforms, National Green Development Fund and Green Technology Bank, need to explore and support each other, to jointly promote the development of the green industry and the construction of green civilization in China. According to MA Jun, by improving the incentive mechanism of green finance, China has formed the world's largest green bond market as well as the Green Private Equity Fund, and also introduced a batch of innova-

tive products. All these have created a favorable investment and financing environment for the greater development of green technologies.

II. Suggestions on Promoting the Innovation Development of Green Technologies

On the one hand, we shall make great efforts to cultivate SMEs in green technology innovation. As pointed out by Minelik Alemu Getahun, currently the innovative SMEs have become an important component of the innovation ecosystem. Playing a pivotal role in economic activities, they not only facilitate growth and create jobs, but also enhance social cohesion and contribute a lot to the environmental sustainability. In his opinion, the innovation capability of SMEs in green technology innovation can be strengthened by formulating intellectual property strategies: (1) the acquisition of patents can release signals to investors and other partners in the market and demonstrate their potential for cooperation, and the company's disclosure of the proportion of green innovation technologies can promote the sharing of patent portfolios of different companies; (2) with the help of the online technology exchange platform, the intellectual property system can also drive green and sustainable innovation, and facilitate various forms of cooperation, exchanges and partnerships.

On the other hand, we shall actively promote the construction of the green finance system. As pointed out by ZHOU Hanmin, Vice Chairman of Shanghai Committee of CPPCC and Vice Chairman of the International Finance Forum, green finance not only supports the green and ecological development, but more importantly, it leads a new trend. In the opinion of MA Jun, (1) We shall make great efforts to support the linkage of investment and credit in science and technology; (2) We shall support banks to invest in green funds on a pilot basis under The Basel III Accord; (3) We shall cultivate a batch of PEs and VCs focusing on green technologies; (4) We shall provide support for insurers to develop insurance products supporting green technologies, and support and guide more insurers and pension funds to engage in PE and VC industries, so as to providing longer investment horizon for the PEs and VCs supporting the green projects. According to ZHANG Rongqing, green funds shall well play their role as the drivers for industrial development and value mining, the bridges between state-owned economy and social capital, and the pioneers in facilitating industrial breakthrough and exploring new models, to guide and promote the high-quality development of the green industry in China.

The Science & Technology Finance Forum

Technology, Finance and Sustainable Development

Editor's note: *The Science & Technology Finance Forum, with the theme of "Technology, Finance and Sustainable Development", well-known experts and scholars at home and abroad had in-depth discussions on FinTech development, infrastructure construction, sustainable development, etc. This bulletin is a summary based on the reports from the participating guests[1] of the Science & Technology Finance Forum, and is intended for reference.*

ZHANG Jun

Deputy District Director of Jing'an District, Shanghai

CHEN Sijie

General Manager of YICAI

XIAO Feng

Vice Chairman of China Wanxiang Shareholding Co., Ltd.

In addition to the upgrading and reconstruction of financial industry chain, and the creation of new industry opportunities, scientific and technological advance can also help the financial industry to use new technological means to serve a wider range of users at a lower cost and in a more efficient and fair way, realizing the synergy between short- and long-term benefits, and promoting the accomplishment of sustainable economic growth goals. The participating guests agreed unanimously that against the current backdrop of the in-depth and coordinated development of science and technology and finance, we shall firmly grasp the historic opportunity, expand the application domain of fintech, strengthen the construction of industry standards, and constantly improve the ecosystem for the in-depth integrative development of science and technology and finance.

I. Science and Technology Empowers Finance and Facilitates the Innovative Transformation of the Financial Industry

Firstly, technological progress accelerates innovations in the business model of the financial industry. In recent years, a new round of technological revolution has been accelerated, bringing a disruptive change to the financial industry. As pointed out by ZHANG Jun, Deputy Governor of Jing'an District, the role of fintech as a driver for the development of the financial industry is increasingly prominent. As noted by CHEN Sijie, General Manager of YICAI, the rapid development of big data, cloud computing, AI, blockchain and other technologies is the driving force supporting the financial industry in deeply digging into needs and enhancing efficiency while reducing costs, which have dramatically enhanced the efficiency of traditional finance, addressed the key problems in traditional finance, and laid a foundation for the sustainable development of the society, the economy, and the environment. In the opinion of XIAO Feng, Vice Chairman of China Wanxiang Shareholding Co., Ltd., technologies accelerate the realization of scenario-based financial services, promote the sinking of financial services into commercial infrastructures, and develop new financial service models, i.e. "providing bank services everywhere except for banks". As pointed out by LIAN Ping, Chief

1 Participating guests include: ZHANG Jun, Deputy Governor of Jing'an District, Shanghai; CHEN Sijie, General Manager of YICAI; ZHANG Mingxi, Director of the Institute of Science and Technology Investment, Chinese Academy of Science and Technology for Development; XIAO Feng, Vice Chairman of China Wanxiang Shareholding Co., Ltd.; LIAN Ping, Chief Economist of ZhiXin Investment, Director of ZhiXin Investment Research Institute, and Chairman of China Chief Economist Forum; WANG Sunan, Secretary of CPC Committee and President of Shanghai Branch of Shanghai Pudong Development Bank; LIU Bin, Director of China (Shanghai) Pilot Free Trade Zone Institute, and Office of Financial Research, Pudong Academy of Reform and Development; SUN Rui, Senior Advisor and Executive Director of the Green Finance Center, Paulson Institute; Xu Qing, Head of Financial Sustainable Development Program of UNDP in China; LU Yong, General Manager of Shanghai Data Exchange Corp. and Director of Shanghai Data Innovation Center; LIN Chunjie, Vice President of YICAI Research Institute.

LIAN Ping

Chairman of China Chief Economist Forum

WANG Sunan

President of Shanghai Branch of Shanghai Pudong Development Bank

LIN Chunjie

Vice President of YICAI Research Institute

Economist of ZhiXin Investment, Director of ZhiXin Investment Research Institute, and Chairman of China Chief Economist Forum, the fintech big data technology enable efficient credit enhancement of customers, and the intelligent investment counselor technology can cover a large amount of long-tail customers that traditional financial institutions can't serve, thus effectively extending the "antennas" of financial services.

Secondly, technological progress significantly reduces the transaction costs of the financial industry. In the opinion of XIAO Feng, the integrative innovation of digital technologies leads to dramatic changes in the structure of transaction costs. For example, e-commerce or service platforms on the Internet dramatically reduce the search costs, an important part of transaction costs; blockchain significantly reduces the cost of trust in transactions as an infrastructure of trust; precise portrait and precise matching enabled by AI and big data greatly reduce the cost of matching in transactions; cloud computing applications greatly reduce the costs of computing and data interaction in transactions in the increasingly digitalized and virtualized business. According to LIAN Ping, on the one hand, the financial industry has significantly reduced the costs in different aspects by utilizing financial technologies; on the other hand, new technologies may reduce the operational costs of IT itself, and the cloud computing based on big data has changed the traditional way of deploying infrastructures, which has significantly lowered the costs for financial institutions to purchase and maintain software and hardware.

II. Finance Serves Science and Technology and Supports the Continuous Development of Science and Technology Innovation

Firstly, the multi-layer capital market further supports science and technology innovation. As pointed out by ZHANG Mingxi, Director of the Institute of Science and Technology Investment, Chinese Academy of Science and Technology for Development, China has a total of nearly 3,000 enterprises with angel investment, venture capital (VC) and private equity (PE), and the quantity keeps growing at a rate of 15%–20%. China has become the second largest power of VC. Meanwhile, the listing on the Sci-Tech Innovation Board, and the reform of the Growth Enterprise Market and the New OTC Market vigorously lead the capital market to increase investment in science and technology innovation. As pointed out by WANG Sunan, Secretary of CPC Committee and President of Shanghai Branch of Shanghai Pudong Development Bank, Shanghai Pudong Development Bank has launched five products, namely maker loan, science and technology performance loan, little giant credit loan, right-including loan and listing loan to serve the science and technology innovation enterprises in different development phases. As of the end of October, the Shanghai Branch has served over 7,000 science and technology enterprises and achieved a loan balance of 29 billion with a bad loan ratio of lower than 0.5%.

LIU Bin

Director of Shanghai Academy of Free Trade Area, Pudong Academy of Reform and Department and Office of Financial Research

XU Qing

Head of Financial Sustainable Development Program of UNDP in China

LU Yong

General Manager of Shanghai Data Exchange Corp., Director of Shanghai Data Innovation Center

Secondly, the ecosphere of science and technology finance is being gradually formed. As pointed out by ZHANG Mingxi, China's ecosystem of science and technology finance has basically taken shape and is being gradually improved, in which the science and technology insurance system is comparatively well-established and includes basic guarantee, finance and financing, professional and exclusive guarantee, providing the innovative enterprises in China (property, responsibilities, personnel, intellectual property) with corresponding patent insurance, which strongly supports enterprise innovation. In the opinion of WANG Sunan, science and technology enterprises need not only loan financing, but also equity financing, consulting services for the M&A of investment banks, supporting government policies, etc. Institutions of various kinds shall jointly build the ecosphere of science and technology finance to serve science and technology enterprises. Shanghai Branch of Shanghai Pudong Development Bank has established partnership with more than 200 institutions including the government, parks, PV, VC, and leading science and technology enterprises.

III. Existing Problems in Science and Technology, Finance and Sustainable Development and the Related Suggestions

Major Problems: On the one hand, the development of fintech mainly faces four bottlenecks. In the opinion of LIAN Ping, the R&D capability concerning fintech in terms of basic and critical technologies is still limited; the number of fintech talents is relatively small; the fintech industry standards and safety codes are to be improved; financial regulation is not keeping up with the application of fintech in the wealth management industry. On the other hand, there are still several weaknesses in the development of science and technology finance. As pointed out by ZHANG Mingxi, compared with America, a financial power, China still has some weaknesses in terms of science and technology finance. Firstly, there is a certain gap between the two countries in financial size. The total capital under the management of America is USD 444 billion, while that under China is only CNY 1 trillion. Secondly, there is a gap in terms of the industrial capabilities concerning venture capital. China invests little in high-tech industries, especially in infant and mid-term projects, while America invests small amounts but in the long term, with an average investment period (about 7 years) longer than that of China (about 4.4 years). Thirdly, the ability of the banking industry and the insurance industry to control the risks presented by, discover the value of, and find innovative enterprises and SMEs is to be further enhanced. Fourthly, the exit mechanism of the stock market needs to be further improved.

Major suggestions: in terms of fintech, on the one hand, the application of fintech shall be expanded. According to LIAN Ping, financial institutions shall be encouraged to strengthen fintech applications such as cloud computing, big data, blockchain and AI, and shall be supported by various related science

HUANG Wei

Host Presenter of YICAI

and technology projects. According to XIAO Feng, it is necessary to apply the principles of open source, openness, sharing, and co-governance to all financial infrastructures, and regulate them with both the governance mechanism and the incentive mechanism with the help of formulas, algorithms, and the economic incentive model; a new business model based on the new generation of public commercial infrastructures shall be established. On the other hand, we shall strengthen the construction of industry standards and regulate the development of science and technology. As suggested by LIAN Ping, we shall direct and support fintech-related researches into industry standards, safety, commercialization and other fields, and accelerate the release and formation of the application standard system and industry codes of the fintech industry to facilitate the industrial development. Meanwhile, it is also necessary to develop and regulate science and technology, solidify the infrastructures for comprehensive statistics and risk monitoring, and work hard to improve the science and technology application level in terms of macroprudential regulation and microcosmic behavioral regulation. In terms of science and technology finance, we shall guide venture capital institutions to increase investment in the "patient funds". As suggested by ZHANG Mingxi, we shall constantly improve the guiding force of venture capital to the investment in emerging industries, instead of making easy money, and return to the position of VC investment in long-term investment. In the opinion of WANG Sunan, time is currently the major problem for science and technology finance services. For a technology to develop into an industry, lots of know-how needing to be mastered with time, so we shall not jump the gun. In terms of the ecosystem, we shall deepen and improve the ecosystem of science and technology finance. As pointed out by ZHANG Mingxi, China's ecosystem of science and technology finance shall be more open and inclusive, and constantly adapt to the adjustments to the economic structure of China through the reform of the multi-layer capital market. In particular, the capital market shall lead the new round of technological revolution and industrial transformation during the formation of the new economic driver.

The Emerging Technology Forum (Forum on Mathematics and Industrial Innovations)

Development of Applied Mathematics

Editor's note: *The Emerging Technology Forum (Forum on Mathematics and Industrial Innovations), with the theme of "Development of Applied Mathematics", well-known experts and scholars at home and abroad had in-depth discussions focusing on the fundamental researches, industrial practices, talent cultivation, platform construction and other issues concerning applied mathematics. This bulletin is a summary based on the reports from the participating guests[1] of the Emerging Technology Forum (Forum on Mathematics and Industrial Innovations), and is intended for reference.*

LI Jun

Director of Shanghai Center for Mathematical Sciences, Professor of School of Mathematical Science, Fudan University, and Co-Director of Shanghai Center for Applied Mathematics

ZHOU Wenneng

Deputy Director of Department of Basic Research, MOST

JI Xiaoye

Inspector of Science and Technology Commission of Shanghai Municipality

Mathematics is not only the basis of natural science, but also the foundation of the development of major technological innovations. Often the mathematical strength affects national strength. Almost every major discovery has something to do with the development of mathematics, and mathematics has become an indispensable pillar in such fields as aerospace, national defense and security, biomedicine, information, energy, ocean, artificial intelligence, and advanced manufacturing. The participating guests agreed unanimously that it is necessary to accelerate the construction of national centers for applied mathematics, set up effective platforms for the cross and blending development of applied mathematics and modern industry in the new era, establish the communication mechanism between mathematicians and enterprise and industry leaders, and comprehensively improve the level of integrative innovation between mathematics and industrial applications.

I. Critical Directions of the Coordinated Development of Applied Mathematics and the Industry

Firstly, we shall strengthen the systematic layout for innovative development of mathematics. In January, 2018, the State Council published the Several Opinions on Comprehensively Strengthening Basic Scientific Research, which clearly expressed that we should strengthen the research in basic mathematics and moderately increase our attention on key basic disciplines such as mathematics and physics. In January, 2019, the Ministry of Science and Technology, the Ministry of Education and Chinese Academy of Sciences jointly formulated the Plan on Strengthening Research in Mathematical Sciences, clearly indicating the direction and route for supporting the development of basic mathematics constantly and stably and strengthening the research in applied mathematics. As pointed out by ZHOU Wenneng, Deputy Director of Department of Basic Research, MOST, mathematical sciences play an important role in promoting science and technology innovation and serving national strategies; with an increasingly significant role of mathematics as the source supplier of and leader for scientific innovations, an enhanced research in applied mathematics has become a key to guarantee the breakthrough innovations in the core fields of China. Beijing, Shanghai, Guangzhou,

1 Participating guests include: ZHOU Wenneng, Deputy Director of Department of Basic Research, MOST; JI Xiaoye, Inspector of Science and Technology Commission of Shanghai Municipality; LI Jun, Director of Shanghai Center for Mathematical Sciences, Professor of School of Mathematical Sciences, Fudan University, and Co-Director of Shanghai Center for Applied Mathematics; JIN Shi, Dean of the Institute of Natural Sciences, Shanghai Jiao Tong University, and Co-Director of Shanghai Center for Applied Mathematics; LIN Wei, Professor of School of Mathematical Sciences, Fudan University, Director of the Basic Theory and Key Technology Laboratory of Intelligent and Complex Systems; LV Changhong, Professor and Doctoral Supervisor of East China Normal University, CHENG Jin, Professor of School of Mathematical Sciences, Fudan University; FENG Jinzhang, General Manager of AECC Commercial Aircraft Engine Co., Ltd.; XU Li, Co-founder and CEO of SenseTime; XUAN Xiaohua, Chairman of UniDT (Shanghai) Co., Ltd.; and YU Kai, Co-founder and Chief Scientist of AISpeech.

JIN Shi

Dean of the Institute of Natural Sciences, Shanghai Jiao Tong University, Co-Director of Shanghai Center for Applied Mathematics, and Director of the Key Laboratory of Scientif

and other cities have positively initiated the construction of centers for applied mathematics based on the local needs of economical and industrial development. In February, 2020, the Ministry of Science and Technology issued a document to approve 13 national centers for applied mathematics, encouraging these centers to actively undertake national strategies, and fully explore and solve the technical "bottlenecks", to bring new vitality to the scientific innovation and industrial technological revolution of China.

Secondly, we shall enhance the connection and integration with industrial applications. In the opinion of CHENG Jin, Professor of School of Mathematical Sciences, Fudan University, as the expressions of research issues are different between the mathematics community and the industry community, which restrict the integrative development of mathematics and industry, we shall establish a bridge for communications between the two sides as soon as possible to promote the in-depth connection and integration between the high-technology industry and mathematical applications. As pointed out by FENG Jinzhang, General Manager of AECC Commercial Aircraft Engine Co., Ltd., the development of industrial technologies in many limiting cases cannot be realized through tests, and need to be explored and demonstrated by means of applied mathematical sciences; however, currently the industry community is still insufficient to transform engineering issues and technical issues into scientific issues, making it harder to integrate mathematics into the industry. According to LV Changhong, Professor and Doctoral Supervisor of East China Normal University, in the past and still at present, many enterprises was and remains unaware of the "needs of mathematics", restricting enterprises to seize the opportunity to realize mathematical transformation and upgrading; the ability of mathematical researchers to abstract real problems also has direct effect on their objective of serving the industry better. As expressed by XU Li, Co-founder and CEO of SenseTime, the high degree of integration between AI and mathematics and physics makes these high-tech industries more dependent on the innovations and development of mathematics in the future.

Thirdly, we shall cultivate a batch of talents in applied mathematics for the industry. As pointed out by LV Changhong, in order to cultivate talents in applied mathematics to better serve the industrial development, the curriculum system of applied mathematics in universities shall be set with different specialties, though the basic mathematics subjects can be much the same. According to Cheng Jin, the talents in applied mathematics shall be equipped with not only strong mathematical thinking ability, but also solid computational capability. In the opinion of FENG Jinzhang, in the future, enterprises will need more talents that can discover, define and solve problems with their applied mathematics ability. As pointed out by XU Li, the cultivation of talents in applied mathematics shall focus on the cultivation of their applied mathematics ability, and we shall also encourage those talents in applied mathematics to initiatively explore research issues between the industry community and the mathematics community.

II. Relevant Suggestions on Accelerating the Construction of National Centers for Applied Mathematics

Firstly, we shall develop the centers for applied mathematics into critical hubs. According to the suggestions of Cheng Jin, it is necessary to set up the "Enterprises-Mathematics" Salon with the support of Shanghai Center for Applied Mathematics as soon as possible as the "mathematical problems" of the industry community can only be figured out when mathematicians and entrepreneurs work together. In the opinion of YU Kai, Co-founder and Chief Scientist of AISpeech, Shanghai Center for Applied Mathematics shall well play its role as a major platform, to lead the establishment of industry alliances, better promote the development of the research force in applied mathematics, and accelerate the highly integrative development of mathematics and the industry.

Secondly, we shall cultivate key talents with the support of the national centers for applied mathematics. According to JIN Shi, Dean of the Institute of Natural Sciences, Shanghai Jiao Tong University, and Co-Director of Shanghai Center for Applied Mathematics, Shanghai Center for Applied

Mathematics shall not only focus on improving its applied mathematics research ability and industrial connection ability, but also cultivate a batch of "engineering doctors" and build a team of applied mathematics talents with stronger industrial connection ability for industrial development with the support of Shanghai Center for Applied mathematics, to better serve and promote the development of the science and technology innovation practices of Shanghai. As pointed out by YU Kai, we shall organize various kinds of talent training programs such as "summer school training" and "extracurricular practice" with the support of Shanghai Center for Applied Mathematics, to help more students majoring in mathematics walk out of campus to participate in the practices of linkage between mathematics and the industry, learn about and look for breakthroughs in mathematical applications.

Thirdly, we shall strengthen the support for the "bottleneck" key and core technologies. As suggested by JIN Shi, Shanghai Center for Applied mathematics shall take the initiative to undertake the national strategies and missions, and lead the establishment of mathematics-industry joint research teams in the key "bottleneck" fields such as integrated circuit and AI, to further play the basic role of mathematics in serving science and technology innovation and industrial practices. In the opinion of FENG Jinzhang, applied mathematics plays a critical role in some fields of key and core technologies, including the R&D and design of aerospace gas turbines and other major equipment; thus we shall gather a batch of leading talents in applied mathematics, devote ourselves to making breakthroughs in some major fields, and promote high-quality development through science and technology innovation.

The Emerging Technology Forum

The Fourth Paradigm: Scientific Data on Cloud

Editor's note: *The Emerging Technology Forum, with the theme of "The Fourth Paradigm: Scientific Data on Cloud", well-known experts and scholars at home and abroad had in-depth discussions on how to facilitate the opening up and sharing of scientific data through cloud computing and other advanced technology architecture to provide new solutions to the science and technology innovation and business development in the cloud era. This bulletin is a summary based on the reports from the participating guests[1] of the Emerging Technology Forum, and is intended for reference.*

ZHU Yue

Deputy Director of the Administrative Center of Shanghai R&D Public Service Platforms

SU Jing

Director of National Science&Technology Infrastructure

FU Guoqing

Vice Chairman of Science and Technology Commission of Shanghai Municipality

In the era of S&T 4.0, scientific data has become the important basic strategic resources for the science and technology innovation and economic and social development of a nation. The opening and sharing of scientific data has also become a national strategy. Cloud computing has provided a good platform for the gathering and intercommunication of scientific data, and European and American developed countries have taken cloud computing as a national scientific infrastructure to facilitate the sharing and reuse of scientific data. The participating guests agreed unanimously that science and technology innovation has stepped into the data-driven era of the fourth paradigm, and we shall make the most of the new-generation information technologies to better mine, collect and use scientific data to facilitate science and technology progress and innovation-driven development.

I. Science and Technology Innovation Steps into the Data-driven Era of the Fourth Paradigm

Firstly, data-intensive scientific researches are a trend of the times. As pointed out by Su Jing, Director of National Science & Technology Infrastructure, the massive scientific data has rapidly driven scientific researches to an unparalleled era of big data, and the fourth paradigm for data-intensive scientific researches has been developing rapidly. As pointed out by Fu Guoqing, Vice Chairman of Science and Technology Commission of Shanghai Municipality, with the rapid development of the digital economy represented by the Internet, cloud computing and big data, scientific data has become the science and technology resources with the fastest transmission speed, the widest-reaching influence, and the most extensive prospects for development and application, and science and technology innovation has stepped into the data-driven era of the fourth paradigm. In the opinion of Zhu Yue, Deputy Director of the Administrative Center of Shanghai R&D Public Service Platform, as the cornerstone of science and technology innovation, scientific data has become an important strategic resource for the national science and technology innovation and economic and social development. To better mine, collect and use scientific data has become the primary task of national science and technology innovation and economic and social development. According to Zhang Jiarui, CTO of Shanghai Science and Technology Innovation Resources

1 Participating guests include: Su Jing, Director of National Science & Technology Infrastructure; Fu Guoqing, Vice Chairman of Science and Technology Commission of Shanghai Municipality; Philippe Sansonnetti, Chief Scientist of Institut Pasteur of Shanghai, Chinese Academy of Sciences, Academician of French Academy of Sciences, Foreign Academician of the National Academy of Sciences, Academician of the German National Academy of Sciences, Academician of the Royal Swedish Academy of Engineering Sciences, and Member of the Royal Society; Jin Li, Academician of Chinese Academy of Sciences and Executive Vice President of Fudan University; Zhao Guoping, Academician of Chinese Academy of Sciences and Chief Scientist of Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences; Zhu Yue, Deputy Director of the Administrative Center of Shanghai R&D Public Service Platform; Zhang Jiarui, CTO of Shanghai Science and Technology Innovation Resources Center; Huang Yunsong, CEO of QingCloud.

Zhang Jiarui

CTO of Shanghai Science and Technology Innovation Resources Center

Philippe Sansonnetti

Member of the French Academy of Sciences, Foreign Member of the US National Academy of Sciences, Member of the Deutsche Akademie Der Natursforscher Leopoldina, Member of the Sweedish Academy of Biotechnology, Fellowship of the Royal Society, Principal Investigators, The Center for Microbes, Development and Health, Institut Pasteur of Shanghai Chinese Academy of Sciences

JIN Li

Academician of Chinese Academy of Science, Executive Vice President in Fudan University, Principal of Shanghai Medical College of Fudan University

Center, digitization, networking, and intelligentization are advancing and changing the way everyone works and lives, so is the science and technology field.

Secondly, the fourth paradigm driven by data has three major features. Feature 1: massive data. As pointed out by Su Jing, with the construction of large scientific installations, the implementation of major scientific experiments and the wide use of pervasive scientific sensors and sensor networks which constantly generates massive scientific data, scientific data has become a strategic and basic resource for scientific researches. According to Philippe Sansonnetti, Chief Scientist of Institut Pasteur of Shanghai, Chinese Academy of Sciences, massive data can be generated in all research processes. With the development and revolution of science and technology, the methods to acquire data are becoming increasingly convenient and diversified, and the data processing methods are also becoming more powerful, leading to a qualitative leap in every research. In the opinion of Jin Li, Academician of Chinese Academy of Sciences and Executive Vice President of Fudan University, the first step for the scientific researches under the fourth paradigm is to acquire massive data through “measurement”, which is the prerequisite for analysis. According to Zhao Guoping, Academician of Chinese Academy of Sciences and Chief Scientist of Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences, biology has experienced three revolutions, and with each revolution, the amount of data continues to grow. The 3rd revolution at the beginning of the 21st century has pushed biology into a convergence phase of life sciences, physics and engineering, and the data volume has reached the TB level.

Feature 2: association and sharing. In the opinion of Philippe Sansonnetti, the exchange and intercommunication of data is very important. In the researches into infectious diseases in biology, the entire development process of microbes involves the interaction among genetics, chemistry, genomes, etc., and all research processes can generate a large amount of data and will require mutual interaction. In the opinion of Huang Yunsong, CEO of QingCloud, a research will be pointless if data is not shared or intercrossed. There are many teams in Shanghai engaged in the researches into microbial and viral infectious diseases, which are intercrossed. In such cases, both the form of the public cloud and that of the industry research cloud are critical.

Feature 3: efficient discovery. In the opinion of Jin Li, while the traditional scientific research is problem-driven, the scientific research under the fourth paradigm in the era of big data is problem-creating, and the core is to create problems by generating a large amount of data. The two paradigms can

ZHAO Guoping

Molecular Microbiologist, Academician of Chinese Academy of Sciences, Principal Investigators, Biomedical Big Data Center, Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences

HUANG Yunsong

QingCloud CEO, and Eclipse Committer

complement each other and enhance the efficiency of scientific researches. According to Huang Yunsong, cloud computing can enhance the efficiency of data processing, enabling researchers to find out the logic and relevance from data in a faster speed.

II. The Embodiment of the Fourth Paradigm of Science in Biomedicine

On the one hand, big data effectively supports the cutting-edge researches in the field of biomedicine. As pointed out by Philippe Sansonnetti, all people have microbes forming microbiota in their bodies, which exist in various parts of human skin. As new sequencing and bioinformatics methods can help scientific researchers learn about the conditions of the entire microbiota, both the volume of relevant data collected and the overall data complexity are getting higher and higher. According to Zhao Guoping, epidemiology is the science that investigates the diseases and health conditions in the population and their influence and determinants, as well as the strategies and measures for disease prevention and treatment and health promotion. Each level in the process of epidemic research can generate a large amount of data, which can effectively support relevant researches.

On the other hand, data acquisition and analysis is permeating into the innovation chain of the life and health industry in an all-around way. According to Jin Li, the innovation chain of the life and health industry under the new paradigm mainly includes: (1) achieving breakthroughs in a batch of critical technologies in life and health and clinical diagnosis and treatment with precise measurement as the orientation to promote health management and the R&D of medical equipment; (2) discovering new biomarkers and developing new diagnostic reagents and products through the precise measurement of healthy and ill populations; (3) analyzing the genetic basis and the pathogenic mechanism of the phenotypes in health and disease to acquire novel drug targets and combinations to provide new original drugs with source support; (4) mining the big data on phenome maps to explore the methods for phenotypic genome-wide association study and form health management data product series and intelligent auxiliary diagnosis systems.

III. Suggestions for Biomedicine Researches under the New Scientific Paradigm

Firstly, data accumulation shall be done well with an all-out effort. From the dimension of the application goals and basic understanding, Zhao Guoping has classified biomedicine researches and put them in 4 quadrants: (1) the applied basic researches in Pasteur's quadrant, which are the researches that seek to extend the knowledge boundary and are influenced by the application goals; (2) the applied researches in Edison's quadrant, which are the pure applied researches not seeking for a comprehensive understanding of a specific subject; (3) the accumulation of data/samples in the NCBI quadrant; (4) the basic researches in Bohr's quadrant, which are driven only by cognitive needs and not guided by practical application. Among them, the accumulation of data/samples is the fundamental work which can never be done well without national support. According to Jin Li, promoting the International Big Science Project with national support can effectively solve the relevant data collection and data security problems.

Secondly, the epidemiology researches under the new paradigm shall be valued. Philippe Sansonnetti pointed out that this year's COVID-19 outbreak has reminded researchers to pay more attention to the interactions among different microbiota, and conduct investigations to deal with various bacteria and viruses. Interventions based on the adequate understanding of pathogens will be more effective in case of an

infection. In the opinion of Zhao Guoping, researches into infectious diseases shall be incorporated into the system of infectious disease prevention and treatment. Regular contact and effective scientific research cooperation shall be established among relevant units of disease control, medical care, research and education institutions, to realize the exchange and sharing of information and resources on a safe and controllable basis of win-win performance.

Thirdly, the "isolated data island" phenomenon shall be prevented. In the opinion of Philippe Sansonnetti, although massive data can be generated during the researches into biology and infectious diseases, a lot of them will be lost for various reasons. Therefore, we need joint support and cooperation, as well as open scientific exchange and sharing. As pointed out by Jin Li, the quality of big data is of great importance to the establishment of data standards. The acquisition, use and sharing of phenotypic big data involves many problems, including individual privacy, data rights, management of human genetic resources, and network security. These problems can be partly solved with the help of the International Big Science Project and other international cooperation methods. According to Huang Yunsong, digital twin technologies can help researchers realize the effective reproduction of the virus transmission process, and the basic structure of the technologies, which shall be definitely globally integrated, requires global cooperation.

The Emerging Technology Forum

New Opportunities for IoT Development and New Drivers for the Digital Economy

Editor's note: *The Emerging Technology Forum, with the theme of "New Opportunities for IoT Development and New Drivers for the Digital Economy", well-known experts and scholars at home and abroad had in-depth discussions on the new opportunities and new scenes for the IoT technology based on the latest technological updates, classical cases and experience as the focus. This bulletin is a summary based on the reports from the participating guests[1] of the Emerging Technology Forum, and is intended for reference.*

CAO Amin

Vice president of Shanghai Academy of Science & Technology

WANG Yu

Deputy Secretary of the CPC Committee of the Science and Technology Commission of Shanghai Municipality

QIN Wenbo

President of Shanghai Academy of Science & Technology

New technologies such as the IoT and the Industrial Internet are gradually becoming the new drivers for the high-quality development of the new economy. China has been attaching great importance to the development of emerging technologies represented by AI and IoT, and the development of the digital economy. As pointed out by General Secretary Xi Jinping, we shall proactively develop the new-generation information technology industry and the digital economy to facilitate the deep integration of the Internet, the IoT, big data, satellite navigation and AI with the real economy. The participating guests agreed unanimously that the artificial intelligence of things (AIoT) has irreplaceable technological advantages in facilitating the supply-side structural reform, promoting the high-quality economic development, and driving the fine urban management, and we shall accelerate the effective transformation of IoT and other new technologies into real productivity to support the high-quality regional development.

I. The Current Development Situation and Trends of the IoT Industry

1. As pointed out by WANG Yu, Deputy Secretary of the CPC Committee of the Science and Technology Commission of Shanghai Municipality, in terms of the basis of development and future deployment, Shanghai is vigorously promoting the development of the new-generation information technologies represented by AI and the IoT as well as the development of the industry. During the “13th Five-year Plan”, the departments of science and technology management in Shanghai, in partnership with relevant departments, facilitated the construction of the urban IoT, realized the full coverage of technical network in districts including Yangpu District, Hongkou District, Putuo District, and Jing’an District, and formed an innovative administrative model of discovering, judging and handling urban management issues in advance, which supported the urban information governance. During the “14th Five-year Plan”, Shanghai will continue to promote the development of key and core technologies such as the integrated circuit processes, core equipment, materials, parts and components, facilitate the development of the intersecting theory of AI technology, encourage the R&D of computing frameworks and basic software and hardware, support the evolution and R&D of key technologies

1 Participating guests include: WANG Yu, Deputy Secretary of the CPC Committee of the Science and Technology Commission of Shanghai Municipality; QIN Wenbo, President of Shanghai Academy of Science & Technology; YUAN Tao, Chairman of Zhangjiang Group; FENG Songlin, Researcher and Former Dean of Shanghai Advanced Research Institute, Chinese Academy of Sciences; SONG Zhiqun, Chief Engineer of CETC Network & Communications Co., Ltd. and Chief Scientist of China Electronics Technology Group Corporation; HUANG Xiusong, Director of Technical Center, Shanghai International Port (Group) Co., Ltd. and Deputy Commander-in-Chief of the Construction Headquarters of Yangshan Deep Water Port, Shanghai International Port (Group) Co., Ltd.; CAO Ming, Vice President of Huawei Wireless Network Product Line; ZHENG Lei, Vice President, Shanghai QUETCL Wireless Solution; Gunnar Grün, Deputy Director of Fraunhofer IBP; Przemyslaw Komarnicki, Head of Energy Systems and Infrastructures of Fraunhofer IFF.

YUAN Tao

Chairman of Zhangjiang Group

in 5G on the basis of new infrastructure construction, facilitate the technological innovations in the industrial IoT for the collaborative optimization of the integrated terminal, edge computing and cloud computing, and accelerate the cultivation of new engines for the digital economy. As pointed out by QIN Wenbo, President of Shanghai Academy of Science & Technology, both AI and the IoT are the scientific research fields that Shanghai Academy of Science & Technology focuses on and makes huge investment in. During the "14th Five-year Plan", the academy will work hard to make a batch of achievements with social influence in science and technology innovation, platform support, featured professional services, achievement commercialization and other fields. According to YUAN Tao, Chairman of Zhangjiang Group, Zhangjiang has gathered over 200 major enterprises in the key links of the IoT industry, and has also established relevant platforms such as the Microsoft AI & IoT Insider Lab unveiled last year, which can provide enterprises with technical support in the development of IoT products and solutions, and promote the deep integration and innovative development of the digital transformation of such industries as technological innovation and manufacturing, retail, biomedicine, integrated circuits and urban construction. This year, the development plan of Zhangjiang for AI clusters was formally released, aiming to actively explore more possibilities for the Internet of Everything.

2. As pointed out by SONG Zhiqun, Chief Scientist of China Electronics Technology Group Corporation, in terms of development direction and path, nowadays, the dominant position of smart development of the IoT is mainly driven by the supply side and the demand side. On the one hand, in terms of the supply side, the rapid development of the electronic information technology as a whole has led to reduction in the costs of hardware, data platforms, and AI algorithms, which has significantly lowered the platform threshold of using AIoT; on the other hand, in terms of the demand side, against the backdrop of the all-around commercialization of 5G, the increase in data scale and the improvement in quality based on "connections" have significantly expanded the application scope of the AIoT and promoted the development the whole AIoT. In his opinion, the reconstruction of the traditional industry chain is required for the development of the AIoT, which needs not only the adaptability to the characteristics of traditional industries, but also the construction of the most suitable architecture system for industrial AI empowerment with ecological partners, covering components, AI algorithms, platforms, solutions and basic services.

3. In the opinion of CAO Ming, Vice President of Huawei Wireless Network Product Line, in terms of development opportunities and challenges, there are plenty of opportunities and challenges for 5G+IoT development at present. At the strategic level, the national strategy of new infrastructure construction has accelerated the 5G construction, and the pandemic has further driven the demand for 5G. A wide range of industries are embracing the new 5G technology and proactively exploring the reform of 5G-based applications. At the industrial level, 5G in China has made rapid progress in R&D and testing, infrastructure, application implementation, and ecological construction and so on. The commercial industrial applications have also penetrated into a large number of industries in the last year, with rapid growth in industrial pilot exploration. At the market level, as of October 2020, 600,000 base stations have been put into use in China, with over 150 million connections, ranking the first in the world. According to the prediction of Groupe Speciale Mobile Association (GSMA), China will account for 70% of global 5G connections in 2020. ZHENG Lei, Vice President, Shanghai QUETCL Wireless Solution also noted that the development of 5G + IoT is faced with numerous challenges. In terms of technology, the commercialization of 5G only has a short history, and the technology requires gradual iteration in commercial use as it is not fully mature. In terms of operator, 5G has high energy consumption, high operating costs, as well as a long payback period of network construction, making it difficult to bear the costs. In terms of terminal, the investment in production and research is high while the ROI is low, and the terminal is still in the phase of commercial verification

testing. In terms of consumption, the expenses stay high as the cost of 5G products is high. In terms of the industry chain, chips, modules, terminals, networks, expenses and industrial applications are still under constant optimization.

II. Key Directions for the Application of New IoT Technologies in the Future

1. According to FENG Songlin, Researcher and Former Dean of Shanghai Advanced Research Institute, Chinese Academy of Sciences, in terms of smart city, during the practice of Shanghai Lingang smart city, the new-generation information and communication technology has played an important role in enabling management and access via one website. Examples include the tracking and active discovery of people, vehicles and objects throughout the journey, the UAV-enabled periodic tour and warning, the peripheral vision of AI enabling a much more cost-effective data plan, and an accuracy rate of smart dispatch of over 90%. SONG Zhiqun introduced the progress on the planning of the digital city in the East Rongcheng Subarea of Xiong'an New Area, with construction goals including the simultaneous deployment of omnipresent smart sensing facilities covering the entire physical city, the construction of an urban digital mirror reflecting the virtual and real blending as well as the symbiotic development of all elements of the urban space, and the creation of an environment of global intelligence for the construction of a world-leading digital city with deep learning capabilities.

2. As pointed out by HUANG Xiusong, Deputy Commander-in-Chief of the Construction Headquarters of Yangshan Deep Water Port, Shanghai International Port (Group) Co., Ltd., in terms of smart port, with the upgrading of traditional ports enabled by the communication technology, AI technology, the IoT, big data, and cloud computing in recent years, Shanghai completed the construction of the automated port of Yangshan Phase IV in 2017. Yangshan Phase IV is currently the largest automated container port in the world, and also the first to carry out smart improvement; it has completed full automation of the production, organization, planning, production process control and equipment handling. He also pointed out that the construction and management of smart ports will be an inevitable trend in future port development, and multi-goal and multi-constraint IoT data calculation will be used to realize cooperation, high efficiency and safety.

3. According to Gunnar Grün, Deputy Director of Fraunhofer IBP, in terms of smart architecture, District Energy Concept Adviser tool developed by the Fraunhofer Society on the basis of the IoT technology is helpful to the reinforcement of people's concept of planning the future energy in a region. With the help of this tool, excellent energy control strategies for buildings were proposed, and the building energy was optimized for the Stuttgart and Kassel project of Germany. In the opinion of Przemyslaw Komarnicki, Head of Energy Systems and Infrastructures of Fraunhofer IFF, we shall create new business service models by creating various digital assessment systems and applications and using all their energy operation centers with continuous improvement in VR, new algorithms, empowerment of consumer participation, digitalization, etc., to support more economical and efficient system operation and more stable technologies.

The Emerging Technology Forum (Innovation and Development Summit of Carbon Fiber Composite Industry)

Collaborative Innovation and Interactive Development

Editor's note: *The Emerging Technology Forum (Innovation and Development Summit of Carbon Fiber Composite Industry), with the theme of "Collaborative Innovation and Interactive Development", well-known experts and scholars at home and abroad had discussions on how to build an ecosphere of the carbon fiber composite industry chain for the Yangtze River Delta rooted in Shanghai focusing on the innovative development of the carbon fiber composite industry in China. This bulletin is a summary based on the reports from the participating guests[1] of the Emerging Technology Forum, and is intended for reference.*

HE Dongbin

Deputy Head of Jinshan District, Shanghai

LIU Jian

Head of Jinshan District, Shanghai

WANG Ye

Vice Chairman of Science and Technology Commission of Shanghai Municipality

Carbon fiber composites are the key material supporting the innovative development of aerospace, rail transit, new energy vehicles, wind power equipment and other strategic emerging industries. In 2019, the global demand for carbon fiber reached 100,000 tons for the first time. The participating guests agreed unanimously that the global carbon fiber composite industry will welcome its great development period in the future, and the Yangtze River Delta shall strengthen collaborative innovation, create an ecosphere of industry coordination for development, and lead the rapid development of the carbon fiber composite industry of China.

I. Industrial Applications and Development Trends of Carbon Fiber Composites

Firstly, carbon fiber composites are a key strategic material. As pointed out by LIU Jian, Deputy Secretary of CPC Committee and Governor of Jinshan District, Shanghai, carbon fiber composites are known as “the king of new materials”, and the carbon fiber composite industry is a basic and strategic emerging industry encouraged by China, which is fairly important to such national industries as the aerospace industry and the major equipment industry. As pointed out by WANG Ye, Deputy Director of Science and Technology Commission of Shanghai Municipality, carbon fiber composites are the key material supporting the innovative development of the high-end equipment for aerospace, rail transit, wind power, and other industries. The consumption of carbon fiber composites has become an important indicator for the advanced nature of technologies and the equipment level.

Secondly, the industry has a promising prospect and its applications are becoming more diversified. As pointed out by HUANG Xiangyu, Deputy General Manager of Sinopec Shanghai Petrochemical Co., Ltd., the development of low-cost carbon fiber technologies has promoted the wide application of carbon fiber in the industrial domain, and the industry size has reached 100,000-ton level. According to LIN Gang, General Manager of ATA Carbon Fiber Tech. Guangzhou Co., Ltd., and Deputy Secretary-General and Vice Chairman of Special Committee on Composite Materials for Wind Power Engineering,

1 Participating guests include: LIU Jian, Deputy Secretary of CPC Committee and Governor of Jinshan District, Shanghai; WANG Ye, Deputy Director of Science and Technology Commission of Shanghai Municipality; Vice Governor of Jinshan District, Shanghai; YANG Qing, Deputy General Manager of Shanghai Carbon Fiber Composite Innovation Institute; Sun Lijun, Secretary of CPC Committee and President of Shanghai Jinshan Second Industrial Zone Development Co., Ltd.; YU Jianyong, Academician of Chinese Academy of Engineering, and Deputy Secretary of the CPC Committee and President, Donghua University; HUANG Xiangyu, Deputy General Manager of Sinopec Shanghai Petrochemical Co., Ltd.; YI Xiaosu, Chief Professor of Advanced Materials and Composites, University of Nottingham Ningbo China; LIN Gang, General Manager of ATA Carbon Fiber Tech. Guangzhou Co., Ltd., and Deputy Secretary-General and Vice Chairman of Special Committee on Composite Materials for Wind Power Engineering, Chinese Society for Composite Materials.

YANG Qing

Deputy General Manager of Shanghai Carbon Fiber Composite Innovation Institute

SUN Lijun

Secretary of CPC Committee and President of Shanghai Jinshan Second Industrial Zone Development Co., Ltd.

YU Jianyong

Academician of Chinese Academy of Engineering; Deputy Secretary of the CPC Committee and President, Donghua University

Chinese Society for Composite Materials, it is expected that the size of the global carbon fiber industry will reach 260,000 tons/year by 2025, and 630,000 tons/year by 2030. At present, America and Japan are the major gathering place for the carbon fiber composite industry, and other countries including China, South Korea and Turkey are working hard to catch them up. As he pointed out, the development of the carbon fiber composite industry is no longer driven by aerospace solely; it has stepped into a phase with multiple drivers including aerospace, wind power, hydrogen energy, rail transit and construction.

Thirdly, technological innovation drives the rapid development of the industry. As pointed out by HUANG Xiangyu, technological innovations in carbon fiber play an important role in facilitating the industrial development. He mentioned that the Shindo method2 has brought about the development of PAN-based carbon fiber and started the mass production of carbon fiber, which formed the rudiment of industrial development. Innovations in carbonization technologies have greatly enhanced the mechanical properties of carbon fiber, facilitated the leap in PAN-based carbon fiber technology, and inaugurated the application of carbon fiber in national defense and the military industry. After the technological exchange between America and China, a partnership between the powerful has been established. High-performance carbon fiber products are emerging, expanding the application domain of the carbon fiber industry. The products have also been applied successfully to large civil aircrafts, making the size of the carbon fiber industry exceed 50,000 tons. The development of low-cost carbon fiber technologies has enabled the large-scale use of carbon fiber in the industrial domain, leading to an industry size of over 100,000 tons.

Fourthly, the future development shows four major trends. (1) Low cost. In the opinion of LIN Gang, it is an international trend to reduce the cost of carbon fiber composites. High performance and low cost are not contradictory, and we may facilitate performance enhancement and cost reduction with technological advancements. As pointed out by HUANG Xiangyu, there are five technological paths to the cost reduction of carbon fiber: adopting alternative precursor technologies, using new production processes and technologies, reducing the energy consumption of oxidation and carbonization, recycling, and expanding production scale. (2) High performance. As pointed out by YI Xiaosu, Chief Professor of advanced materials and composite materials at the University of Nottingham Ningbo China, while carbon fiber composites have excellent properties such as high specific strength and high specific modulus, they are also brittle. Therefore, it is necessary to reinforce and toughen the material, improve its conductivity, solve the lightning strike problem, etc. We shall design and produce products on the basis of the characteristics of carbon fiber composites, such as apply modular and integrated manufacturing. According to HUANG Xiangyu, the performance of carbon fiber composites is decided by the performance of car-

HUANG Xiangyu

Deputy General Manager of Sinopec Shanghai Petrochemical Co., Ltd

YI Xiaosu

University of Nottingham Ningbo China

LIN Gang

General Manager of ATA Carbon Fiber Tech. Guangzhou Co., Ltd.; Deputy Secretary-General and Vice Chairman of Special Committee on Wind Power, Chinese Society for Comp

bon fiber. Theoretically, the strength of carbon fiber may reach 180GPa, but the highest strength we have ever achieved so far is only 7GPa. (3) Versatility. According to YI Xiaosu, functionalization is currently an important development direction for carbon fiber composite for America and Europe. Multi-purpose materials with an integrated structure are required. (4) Greenness. According to YI Xiaosu, for the greenization of carbon fiber technologies, we shall firstly use green materials such as natural resin as raw materials, secondly adopt reusable and degradable biomass auxiliary materials and new technologies that can reduce consumption, and thirdly adhere to recycling.

GUO Xiangyu

Host of Shanghai Jinshan TV Station

II. The Current Development Situation of the Carbon Fiber Composite Industry in China

Firstly, the carbon fiber industry of China has stepped into the rapid development period. According to LIN Gang, China has enterprises such as Jilin Tangu, Zhongfu Shenying, Guangwei Composite Material, and SPC focusing on carbon fiber, with small tow carbon fiber as the major product; the enterprises have their own process and equipment technologies without major technological obstacles, and the product performance and quality are being improved steadily. However, carbon fiber in China still has weaknesses in high-end application, as its market share in the global aerospace market is only 6%, and that in the wind power market is also very low. As pointed out by YI Xiaosu, compared with America and Europe, China's adoption of carbon fiber composites in large aircrafts is the lowest, and there is still much space for further development. As pointed out by YANG Qing, Deputy General Manager of Shanghai Carbon Fiber Composite Innovation Institute, compared with developed countries, China still needs to improve the innovations in carbon fiber composites, especially the collaborative innovation, and platform enterprises providing innovative services are needed.

Secondly, while the carbon fiber industry in the Yangtze River Delta led by Shanghai has obvious advantages, it also has some weaknesses. As pointed out by YANG Qing, Shanghai has a complete industry chain of carbon fiber composites and a solid foundation for the links from raw materials to industrial applications; it also has strong enterprises in the field, and gathers well-known universities and institutes specializing in the R&D of carbon fiber

and its composites. As pointed out by HUANG Xiangyu, the enterprises in the Yangtze River Delta almost cover every element of the entire industry chain; the supply of raw materials and end needs are developing remarkably; innovative talents are gathering; the advantages in industrial development are significant. Meanwhile, however, there are also some problems and weaknesses. For example, there is a large gap in terms of molds, engineering R&D, market services, etc.; there are numerous manufacturers of relevant raw materials and equipment, leading to serious homogeneous competition with a serious shortage of high-end products; enterprises are not mature enough in technologies with the absence of corresponding R&D and process support, and a systematic and serialized development model for the carbon fiber industry chain has not been formed, etc.

III. Suggestions on Facilitating the Development of the Carbon Fiber Composite Industry in China

Firstly, we shall attach importance to the layout of technological R&D and coordinate the direction of industrial development. According to YU Jianyong, Academician of Chinese Academy of Engineering, Deputy Secretary of the CPC Committee and President, Donghua University, carbon fiber is a field of continuous innovation, development and advancement; we shall arrange the layout in advance in terms of the R&D of basic end and key technologies, and other aspects. In the opinion of HUANG Xiangyu, we shall build the innovation chain with the industry chain as the core, arrange the layout of the industry chain on the basis of the innovation chain, create the industrial ecosystem, and facilitate the industrial development. As pointed out by LIN Gang, it is an urgent need to arrange the layout of the next-generation technologies for the national science and technology development strategy for carbon fiber, and our policies for industrial development shall attach importance to the forward design of carbon fiber equipment and the R&D of new processes. Next, we shall strengthen R&D design and technical services: (1) arrange the layout of the next-generation carbon fiber technologies with the development of new carbon fiber precursor compounds, and the formation mechanism of and preparation technologies in the carbonization structure as the focus; (2) attach importance to the independent forward design of carbon fiber composite equipment and the R&D of new processes; (3) create an ecosystem for the industry chain of original and independent innovations. He pointed out that the scope of the industry is quite huge, and instead of walking back into plagiarism and price war, we shall adopt staggered development, extend the boundary, get respective advantages, and establish close partnership, to realize healthy development.

Secondly, we shall create an ecosphere of innovative development for the industry with Shanghai as the leader. As pointed out by HUANG Xiangyu, the manufacturing industry, science and technology, and the service industry jointly form an ecosphere. The

manufacturing industry involves the production of materials and equipment, relevant processes, etc.; science and technology involves research into basic science and material technologies as the technical support; the service industry involves various services. These are the components of the ecosphere, and we shall make the industry chain healthier through the ecosphere. We shall create the ecosphere of carbon fiber composites of Shanghai on the basis of the economic circle of the Yangtze River Delta, and construct public service platforms for R&D and commercialization, develop technological innovations in high-performance carbon fiber composites, facilitate the R&D of light and eco-friendly materials, promote the transformation of new technology industries, and incubate innovative enterprises for transportation (large aircrafts, navigation, aerospace, rail transit), energy (wind power, hydrogen energy), high-end machinery manufacturing, and other fields of application.

Agenda for Pujiang Innovation Forum 2020

2020.10.22（Thursday）	
15:00-18:00	**Opening Ceremony and Plenary Session (Main Forum)** **Zijin Hall, 1F, Convention Center**
15:00-16:15	**Opening Ceremony**
Chair	**XU Guanhua,** President of Pujiang Innovation Forum; Academician of Chinese Academy of Sciences
15:00-15:25 Welcome Address	Video speech from LI Keqiang, Premier of the State Council of the People's Republic of China
	Video speech from Ana Brnabić, Prime Minister of Serbia, the Country of Honor
	Address by LI Qiang, Secretary of CPC Shanghai Municipal Committee
	Address by CHENG Fubo, Vice Governor of Shaanxi Province, the Province of Honor
15:25-15:30 Ceremony	**Opening Ceremony of the Cloud Exhibition of the Global Technology Transfer Fair and the Release of the Chinese Innovation Needs**
	Inauguration Ceremony of Shanghai National Center for Applied Mathematics
15:30-15:35	**Greetings from World S&T Leaders**
15:35-16:15 Keynote Speech	**WANG Zhigang,** Minister and Secretary of CPC Leading Group, MOST
	Nenad Popović, Minister for Innovation and Technological Development, Serbia
16:15-16:25	**Break**
16:25-18:00	**Plenary Session**
Host	**CAO Kefan,** Chief Host of Shanghai Media Group, Media Ambassador of 2020 Pujiang Innovation Forum, Master of Medicine from School of Medicine, Shanghai Jiao Tong University
16:25-17:20 Keynote Report	**YAO Qizhi,** the first Asian scientist wining the Turing Award, Academician of Chinese Academy of Sciences, and Foreign Academician of National Academy of Sciences
	SHI Yigong, President of Westlake University, Vice Chairman of China Association for Science and Technology, and Academician of Chinese Academy of Sciences
	WU Manqing, General Manager of China Electronics Technology Group Corporation and Academician of Chinese Academy of Engineering
17:20-18:00 Special Dialogue	**Nikolaj Gilbert,** President and CEO of PATH
	Richard Hatchett, CEO of the Coalition for Epidemic Preparedness Innovations
	CHEN Kaixian, Academician of Chinese Academy of Sciences
	CHEN Erzhen, Vice President of Ruijin Hospital, Shanghai Jiaotong Univesity
	ZHANG Wenhong, Director of the Department of Infectious Diseases, Huashan Hospital, Fudan University
	Lance Rodewald, Senior Advisor to China CDC

2020.10.23（Friday）	
09:00-12:00	**The Policy Forum** **Policy Principles and Tools to Promote Innovation Cooperation** **Organizer：Chinese Academy of Science and Technology for Development** **Zijin Hall, 1F, Convention Center**
Theme Interpretation	Currently, the world economy and global economic governance system has entered the phase of adjustment, characterized by the surging trend of deglobalization and protectionism. However, the national innovation systems of each country are more interconnected than that at any time in history. Governments are building up a global innovation chain to facilitate innovation cooperation through strategic planning, factor flow, policy supply, and interactions between main bodies of innovation, etc. At the same time, non-traditional security threats such as Major Public Health Emergencies put forward new requirements and challenges to the global technological innovation governance system and mechanism. Against this background, it has become a common concern to discuss policy innovation and develop new policy tools to enhance the efficiency and interactions of global innovation. To be specific, this sub-forum discusses the following topics: how to make China's science and technology more internationalized and provide the world with more high-quality public goods; how to effectively promote coordination and cooperation between governments and public health departments, medical care institutions, scientific research institutions, enterprises, supporting institutions, international organizations and the general public, to fight against major public health emergencies such as COVID-19 pandemic; how to truly realize the connection and integration between science and technology innovation policies and economic policies, industrial policies and educational policies; how to implement more policies for the good of all; and how to efficiently regulate while at the same time be inclusive to the new technologies, new business forms and new models brought by digital transformation.
Chair	**WANG Yuan,** Professor, Chairman of Science and Technology Financial Promotion Association of China; Former President of Chinese Academy of Science and Technology for Development
09:00-11:30 Keynote Speech	**HE Defang,** Deputy Secretary General, Ministry of Science and Technology
	HU Zhijian, President of Chinese Academy of Science and Technology for Development
	WANG Jun, Deputy Director, Shaanxi Provincial Science and Technology Department
	Du Debin, Dean of the School of Urban and Regional Sciences, East China Normal University; Director of the Innovation Strategy Research Center of the Strategic Research Base of the Ministry of Education, Director of the Shanghai American Innovation and Development Research Center
	Steven W. Popper, Senior Economist at the RAND Corporation
	Doris Fischer, Professor, University of Würzburg
11:30-12:00	**Panel Discussion**

2020. 10.23（Friday）	
09:00-12:10	**The Future (Science) Forum** **Developments of Novel Quantum Devices and Quantum Computing** **Organizer：Fudan University** **Yulan Hall, 2F, Convention Center**
Theme Interpretation	The development of modern society relies largely on the classical computers guided by Moore's Law. With Moore's law approaching its fundamental limit, the efficiency of classical computer has been reaching its bottleneck. Quantum materials and quantum computing not only point towards a new direction to solve this issue, but also provide a revolutionary force to promote the next generation of information technology and industrial development. This forum will bring together the leading scientists in the field of quantum materials and quantum information to discuss the frontier results in quantum devices and quantum computing. This forum will focus on exchange new ideas to provide the revolutionary concepts and applications, and aim at the future development of quantum information technology in our country.
Chair	**SHEN Jian,** Professor of Department of Physics, Director of Institute for Nanoelectronic Devices and Quantum Computing, Fudan University， Director of Nanofabrication Laboratory
09:00-09:10 Welcome Address	**ZHANG Renhe,** Vice President of Fudan University, Member of Chinese Academy of Sciences
09:10-11:30 Keynote Speech	**XIE Xincheng,** Deputy Director of National Natural Science Foundation of China, Professor of School of Physics, Peking University, Member of Chinese Academy of Sciences
	DU Jiangfeng, Professor and Vice President of University of Science and Technology of China, Member of Chinese Academy of Sciences
	XU Hongxing, Professor of School of Physics and Technology of Wuhan University, Deputy Dean of Wuhan University Institute for Advanced Study, Member of Chinese Academy of Sciences, Member of Academy of Sciences for Developing Countries
	JIA Jinfeng, Distinguished Professor of Shanghai Jiaotong University, Academic Leader of the Low-Dimensional Physics and Interface Engineering Laboratory of Shanghai Jiaotong University
11:30-11:40	**Break**
11:40-12:10	**Panel Discussion**

2020.10.23（Friday）	
13:30-17:15	**The 1st Global Health and Development Summit** **Scientific Innovation in Global Health Governance** **Organizer：** **Shanghai Center for Pujiang Innovation Forum** **People's Government of Fengxian District, Shanghai Municipal** **PATH** **Shanghai Center for Biomedicine Development** **Sponsor: Bill & Melinda Gates Foundation** **Strategic Partner: Chinese Academy of Sciences Shanghai Branch** **Nine Trees Future Art Center, Fengxian District**
Theme Interpretation	The COVID-19 pandemic has made global health system construction and governance a topic of global attention. In fighting the virus and crises, we are deeply aware of the solidarity of human destiny. The collaboration of many scientists across national boundaries has shown the value of science and technology in linking global health systems and achieving global governance, while holding out hope for victory over the pandemic. While the pandemic will eventually be the past, many global health challenges, including the health of vulnerable groups such as women and children, still require the cooperation of the global community of multidisciplinary science. This forum aims to bring together international organizations, government departments, scientific research institutions, enterprises and other parties in a dialogue to jointly explore how to establish a global health governance system based on scientific and technological cooperation, and how to promote the common health, safety and well-being of humankind with more effective scientific and technological support.
13:30-13:45 Welcome Address	**WU Yuanbin,** Director-General of Science And Technology For Social Development, MOST **LU Min,** General Engineer, Science and Technology Commission of Shanghai Municipality **ZHUANG Mudi,** Secretary of Shanghai's Fengxian District Party Committee
13:45-13:55 Opening Speech	**Steve Davis,** Senior China Strategy Advisor/ Interim Director for the China Country Office Chief Representative of Bill & Melinda Gates Foundation Beijing Office
Chair	**NIE Xiaowei,** Deputy Director of the Secretariat, the International Union of Scientific Organizations "One Belt, One Road" (ANSO)
13:55-15:15 Keynote Speech	**Lance Rodewald,** Senior Advisor to China CDC
	XUE Lan, Dean of Schwarzman Scholars, Tsinghua University, and Director of China Institute for Science and Technology Policy at Tsinghua University (The Role of Global Health in Global Governance)
	XU Jianrong, Country Director for China and Chief Representative of Shanghai Office of Project Hope Foundation (Material Maternal and Child Health and Global Health)
	David Kaslow, Vice President, CSO and Director of the Center for Vaccine Innovation and Access, PATH, and Chairman of WHO Advisory Committee on Vaccine Product Development (Vaccines and Global Health)
15:15-16:25 Excellent Project Demonstration and Presentation	**XU Fujie,** Deputy Director of Health Innovation and Cooperation for the China Country Office of Bill & Melinda Gates Foundation
	FENG Linglin, Family Planning Project (Shanghai Institute of Planned Parenthood Research)
	Andrew Wong, HPV Vaccine Development (Shanghai Zerun Biotechnology Co., Ltd.)
	WANG Xiuli, New Media Project of Peking University (Communication Project, Raise Awareness of Global Health)
16:25-17:15 Panel Discussion	**Chair: WANG Chen,** Chinese Academy of International Trade and Economic Cooperation
	Craig Anderson, Chief Representative of George Institute China (Chronic Diseases, Maternal and Child Health)
	LU Hongzhou, Secretary of the CPC Committee of Shanghai Public Health Clinical Center, and Co-director of WHO Collaborating Centre for Surveillance, Research and Training of Emerging Infectious Diseases
	LI Xiuling, General Manager, Shanghai Institute of Biological Products Co., Ltd. (Traditional Vaccine)
	NIE Xiaowei, Deputy Director of the Secretariat, the International Union of Scientific Organizations "One Belt, One Road" (ANSO)

2020.10.23（Friday）	
09:00-12:00	**The Regional & Urban Forum** **Making Joint Efforts to Create an Innovative Urban Agglomeration through Wisdom, Collaboration, and Sharing** **Organizer: Tongji University** **Guest Hall, 1F, Convention Center**
Theme Interpretation	As the world now has entered into an era of open innovation characterized by the global flow of innovation elements, urban agglomerations have become the concentration areas of high-level production factors worldwide. Some urban agglomerations with excellent geographical locations, sound industrial development and superior innovation environment are constantly pooling innovation resources and have become science and technology innovation centers with global influence, radiating and leading the development of extensive areas, and even globally. In recent years, the urban agglomerations in China such as Beijing-Tianjin-Hebei Region, Guangdong-Hong Kong-Macao Greater Bay Area and the Yangtze River Delta Region have been developing rapidly. With the rapid improvement of their strengths, the constant optimization of their structures, and the growing closeness in regional cooperation, it is particularly urgent to explore the mechanism of collaborative innovation and open cooperation in urban agglomerations. In this sub-forum with a focus on taking solid steps to promote higher-quality integrative development of the Yangtze River Delta region, we will discuss the means of further integrating innovation resources, facilitating collaborative innovation and optimizing innovation pattern so as to promote the formation of an innovative urban agglomeration, and the implementation of regional innovation and the “Belt and Road” Initiative.
Chair	**HUO Jiazhen,** Professor, Executive Associate Dean of the Chinese Institute of Science and Technology Management, Tongji University
09:00-11:30 Keynote Speech	**RUAN Qing,** Deputy Director of Shanghai Municipal Development & Reform Commission; Deputy Director of Yangtze River Delta Regional Cooperation Office; Dean of Shanghai Academy of Development Reform
	WU Zhiqiang, Professor and Vice President of Tongji University; Member of Chinese Academy of Engineering; Member of German Academy of Science and Engineering (acatech); Member of Royal Swedish Academy of Engineering Science; Honorary Fellow of American Institute of Architects (Hon. FAIA)
	Michele Geraci, former Undersecretary of State at the Italian Ministry of Economic Development, Senior Economist
	MA Xianping, Deputy Mayor of Xi’an City
	DONG Baotong, Director-General of Science & Technology Department of Yunnan Province
	Bruno Lanvin, Executive Director of INSEAD Global Indices
	Marco Kamiya, Senior Economist, Inter-regional adviser, Knowledge & Innovation Branch, UN-HABITAT
11:30-12:00	**Panel Discussion**

2020.10.23（Friday）	
13:30-16:30	**The Emerging Technology Forum** **Forum on Mathematics and Industrial Innovations** **Organizer：Shanghai Center for Applied Mathematics** **Shanghai Science Hall**
Theme Interpretation	Shanghai Center for Applied Mathematics, as one of the first 13 national centers for applied mathematics established by the Ministry of Science and Technology. The Center will integrate the interdisciplinary advantages of various universities and scientific research institutes in Shanghai, to establish an effective platform for the intersection and integration of applied mathematics and modern industrial development in the new era. Meanwhile, it will pool a batch of resources that can promote the development of applied mathematics and new and emerging industries, establish the mechanism for the exchanges between mathematicians and enterprises and industry leaders, and improve the capability of supporting the innovative development of Shanghai and China in a digital way. The Forum on Mathematics and Industrial Innovations, aims to discuss issues such as the integrated innovation of mathematics and industrial applications, to further strengthen the exchanges and match-making between the industrial community and the academic community. The Forum will introduce the development situations of applied mathematics in the major universities in Shanghai, including the research institutes, teams and topics related to applied mathematics. Meanwhile, mathematicians and entrepreneurs will have splendid dialogues on the role of mathematics in promoting the innovative development of enterprises during the Forum.
Chair	**LI Jun,** Director of Shanghai Center for Mathematical Sciences, Professor of School of Mathematical Science, Fudan University, and Co-Director of Shanghai Center for Applied Mathematics
13:30-13:45 Welcome Address	**ZHOU Wenneng,** Deputy Director of Department of Basic Research, MOST **JI Xiaoye,** Inspector of Science and Technology Commission of Shanghai Municipality
13:45-15:00	**JIN Shi,** Dean of the Institute of Natural Sciences, Shanghai Jiao Tong University, Co-Director of Shanghai Center for Applied Mathematics, and Director of the Key Laboratory of Scientific and Engineering Computing, Ministry of Education
	LIN Wei, Professor of School of Mathematical Sciences, Fudan University, Director of the Basic Theory and Key Technology Laboratory of Intelligent and Complex Systems, Vice Dean of the Institute of Science and Technology for Brain-inspired Intelligence, and Director of the Center for Computational Systems Biology
	LV Changhong, Professor of East China Normal University, Doctoral Supervisor, Council Member of Operations Research Society of China, Council Member of Shanghai Society for Industrial and Applied Mathematics, and Council Member of Operations Research Society of Shanghai
15:00-15:20	**Break**
15:20-16:30 Panel Discussion	**Chair：JIN Shi,** Dean of the Institute of Natural Sciences, Shanghai Jiao Tong University, Co-Director of Shanghai Center for Applied Mathematics, and Director of the Key Laboratory of Scientific and Engineering Computing, Ministry of Education
	CHENG Jin, Professor of School of Mathematical Sciences, Fudan University, and Dean of School of Mathematics, Shanghai University of Finance and Economics
	FENG Jinzhang, General Manager of ACAE
	LV Changhong, Professor of East China Normal University, Doctoral Supervisor, Council Member of Operations Research Society of China, Council Member of Shanghai Society for Industrial and Applied Mathematics, and Council Member of Operations Research Society of Shanghai
	XU Li, Co-founder and CEO of SenseTime Group
	XUAN Xiaohua, Chairman of www.UniDT.com
	YU Kai, Co-founder and Chief Scientist of AIspeech
16:30-17:15	**Posters Show**

2020.10.23（Friday）	
14:00-18:00	**International Symposium for Leading Research Institutions** **Innovation and Development of Photonics Research Institutes** **Organizers：Chinese Academy of Sciences Shanghai Branch; Zhangjiang Laboratory** **Guest Hall, 1F, Convention Center**
Theme Interpretation	National-level laboratories and top scientific research institutions are the important strategic scientific research force in the national innovation systems of various countries and shoulder the important mission of conducting major frontier researches, serving national strategic goals, and facilitating the transfer of high and new technologies. The conference will center on "Innovation and Development of Photonics Research Institutes", and invite photonics research institutes and top integrated scientific research institutions from all over the world to exchange and share their experience and practices in management mechanism, management and construction of large scientific devices, construction of scientific research and user services, etc., and have in-depth discussions about how leading international research institutions can better develop strategic plans to facilitate their sustainable development, to conduct the industry-university-research cooperation to facilitate the transfer and commercialization of scientific and technological achievements, and to promote interdisciplinary development to support facility users for significant achievements, etc.
Chair	**ZHAO Zhentang,** Deputy director of Zhangjiang Laboratory, vice president of Shanghai Advanced Research Institute, Chinese Academy of Sciences, Academician of Chinese Academy of Engineering
14:00-17:20	**Keynote Speech**
14:10-14:40	**WANG Jianyu,** Director of CAS Shanghai Branch, Academician of CAS
14:40-15:10	**GAO Wen,** director of Peng Cheng Laboratory, Academician of Chinese Academy of Engineering
15:00-15:25	**LI Ruxin,** Director of Zhangjiang Laboratory, President of Shanghai Advanced Research Institute - CAS; Academician of CAS
15:25-15:40	**Break**
15:40-16:05	**Helmut Dosch,** Vice president, Helmholtz Association of German Research Centres; Chairman, the Board of Directors for the German Electron Synchrotron (DESY)
16:05-16:30	**Tetsuya Ishikawa,** Director of RIKEN SPring-8 Center (RSC)
16:30-16:55	**YANG Hui,** Executive Director of GUSU Lab
17:20-18:00	**Panel Discussion**

October 23, 2020 (Friday)	
14:30-17:20	**The "Belt and Road" Seminar** **Mutual Trust and Interaction in Science and Technology Innovation** **Organizer: Chinese Academy of Science and Technology for Development** **Yulan Hall, 2F, Convention Center**
Theme Interpretation	Mutual trust is the basic prerequisite for cooperation, and interaction is the only way to cooperation. Focusing on the construction of the "Innovation Journey" and building an innovation community requires full mutual trust and strong support of the countries along "the Belt and Road" in terms of science and technology innovation. In recent years, under the call of the Chinese Government, the countries along "the Belt and Road" have jointly promoted the opening of science and technology, extensively gathered resources of innovative elements, and jointly shared the innovation achievements by various means including strengthening the talent exchanges, expanding the opening of national science and technology plans and projects, and jointly building "the Belt and Road" science and technology parks and technology transfer platforms, to continuously enhance the mutual trust in innovation. An important task for the building of "the Belt and Road" innovation community is to face the future to promote the integration of science and technology innovation elements and jointly respond to the new challenges faced by international science and technology innovation. We will continue to uphold the principles and concepts of "Wide Consultation, Common Development and Mutual Sharing", build consensus on science and technology innovation, construct platforms for innovation, enhance mutual trust and exchanges, and continue to deepen the cooperation on science and technology innovation under "the Belt and Road". This sub-forum focuses on the key areas and key issues in the science and technology innovation cooperation among countries along "the Belt and Road", exchanges views on "the Belt and Road" science and technology policies and institutional innovation measures of various countries, builds the "Belt and Road" Science and Technology Innovation Policies Think Tank Network, and substantially deepens cooperation and exchanges on science and technology innovation, committed to contributing technological innovation to "the Belt and Road" for building a well-established "Belt and Road" innovation community and promoting the development of the new round of economic globalization.
Chair	**HU Zhijian,** President of Chinese Academy of Science and Technology for Development
14:30-16:30 Keynote Speech	**Branislav Djordjevic,** Director of Institute of International Politics and Economics, Serbia
	Manzoor Hussain Soomro, Chairman of ECOSF, Pakistan
	WANG Yiwei, College of International Relationship, Renmin University of China
	Edna Pasher, Dean of Smart City Research Institute, Israel
	CHEN Baoming, Deputy Director of Talent Exchange Center, Ministry of Science and Technology of the People's Republic of China
	CHANG Jiang, Vice President of Northwest University
	LIU Hong, Dean of Nanyang Graduate School of Public Administration, Nanyang Technological University, Singapore
	WANG Wen, Chongyang Research Institute, Renmin University of China
	WANG Delu, Director of Greatwall Strategy Consultants
	Kitipong Promwong, Director of the Office of Thailand Science and Education Leading Group
	YAN Lijin, Chairman of China Silk Road Group
	TANG Zhimin, Director of Center for China-ASEAN Studies, Panyapiwat Institute of Management
16:30-16:50	**Panel Discussion**
16:50-17:00	**Break**
17:00-17:15	**Ceremony of The Belt and Road Science and Technology Innovation Think Tank Network**
	Chair: LIU Dongmei, Vice President of Chinese Academy of Science and Technology for Development
17:15-17:20	**Conclusion Speech**

2020.10.27（Tuesday）	
19:30-21:30	**Young Elite Scientist Summit** **Seeing Scientific Research Through The Eyes of Young Scholars** **Organizer：Science/AAAS** **Online**
Theme Interpretation	Amid the COVID-19 pandemic, scientists can't get into their labs right now to do their research. Data is being lost as well as a large amount of money. Facing the global public health challenges, what can researchers do? Has the pandemic changed the outlook for young researchers?
Chair	**Sean Sanders,** Director and Senior Editor for Custom Publishing for the journal Science, Program Director for Outreach, Science/AAAS
19:30-21:00 Panel Discussion	**CHEN Zibo,** winner of the 2019 Science Young Scientist Awards, California Institute of Technology, Cell and Molecular Biology
	CHEN Shuo, winner of the 2019 Science Neurode regulation Awards，New York University，Neurosurgery
	Matt Savoca, Winner of the 2018 Science Young Scientist Award，Hopkins Marine Station, Stanford University
	Shruti Naik, winner of the 2018 Prize in Regenerative Medicine and Cell Therapy，NY University Langone Health
	BAI Rui, Outstanding Young Author Representative of Science, Postdoctoral Fellow, Westlake University
21:00-21:30 Sharing	**Science Careers** **Jackie Oberst,** Assistant Editor for Custom Publishing at Science/AAAS

2020.10.28（Wednesday）	
09:00-10:00	**Open Ceremony of INNO-MATCH EXPO** **Shanghai Exhibition Center**
Chair	**CHEN Mingbo,** Deputy Secretary-General of Shanghai Municipal People's Government
09:00-09:10 **Welcome Address**	**DUAN Junhu,** Deputy Director of Torch High Technology Industry Development Center, Ministry of Science and Technology
09:10-09:20	**Ceremony**
09:20-10:00	**Visit**
09:45-12:15	**The First World Tech-transfer Manager Summit** **Organizer：National Eastern Tech-Transfer Center** **Shanghai Exhibition Center**
Theme Interpretation	Transformation of S&T achievements marks the "last mile" of the industrialization and commercialization of S&T achievements where technology-transfer professionals play a vital role in this process. In recent years, all parts of the country have been launching tech-transfer related policies, with a focus on optimizing the cultivation of tech-transfer talents. Commercialization of S&T achievements has become one of the important measures to build China a major S&T power. Under the background of the new era, the first World Tech-transfer Manager Summit will be held to discuss the hot topics among technology managers and tech-transfer industry, focusing on the development achievements and future trends of Chinese technology managers, aiming to provide technology mangers with a broader platform for communication and display. Domestic and foreign technology managers and experts as well as tech-transfer service institutions will gather together to have an in-depth discussion on the development status, bottlenecks and solutions to jointly promote industrial upgrading and draw the blueprint in the collision of wisdoms and ideas.
09:45-10:00 **Welcome Address**	**CHEN Yujian,** Head of Minhang District, Shanghai Municipal **LU Min,** General Engineer, Science and Technology Commission of Shanghai Municipality
10:00-10:15	**Ceremony**
10:15-10:35	**Andy Sierakowski,** Co-chairman of International Technology Transfer Network
10:35-11:10 **Panel Discussion**	**Theme: How to Guide Domestic Science-and-technology Enterprises to Enter Chinese Market**
	Dr. Felix Moesner, Science Consul & CEO of Swissnex, China
	Taake Manning, Counselor for Scientific and Technological Affairs, Royal Netherlands Embassy
	Bart Boschmans, Economic Representative& Commercial Consul, Flanders Investment&Trade, The Kingdom of Belgium
	Martin Rune Hoxer, Executive Director of Innovation Centre, The Consulate General of the Kingdom of Denmark in Shanghai
	Stephen Brennan, Science& Technology Innovation Consul, British Consulate General in Shanghai
	Dr. Vincent YANG, VP, Shanghai University Asset Management Corporation
11:10-11:25	**Ceremony**

11:25-11:45	**Gil Granot-Mayer,** Former CEO, Yeda Institute
11:45-12:20 Panel Discussion	**Theme: Open Innovation in Large Enterprises**
	SHEN Yun, Assistant to President and Joint Chief Growth Officer (CGO), Fosun
	HU Yi, General Manager, Wesocool, Baowu
	MA Xi, Head of Access Innovation, Roche Pharmaceuticals
	ZHU Jinghua, CEO of Publicis Media China
	Claude-Sebastien Lerbourg, Saint-Gobain Foreign Investment Manager-Asia
12:20-12:35	**Russ Shaw,** London Tech Ambassador and Chairman of Global Tech Advocates
13:30-16:20	**The first World Summit of technical managers（China Special）**
13:30-13:50 Welcomed Address	**ZHOU Jing,** Party Branch Secretary and Deputy Director of Shanghai Technical market Management Office **TAO Yuanxing,** Chairman of China Technology Market Association
13:50-15:30 Keynote Speech	**CHEN Baiqiang,** Deputy Director, Technology Transfer Center, Beijing Institute of Technology (BIT)
	GUO Shugui, President of China Technology Exchange
	SHI Gefu, General Manger of Beijing Peihongwangzhi Technology Co., Ltd., Founder of Science Hero
	WANG Wen, Vice president of Xi'an Jiaotong University Science and Technology and Education Development Research Institute
	YU Xiaojing, Director of Shanghai Xuhui Ceyuan Health Intelligent Technology Achievement Transformation Development Center

2020.10.28（Wednesday）	
09:30-11:30	**The Entrepreneur Forum** **Mutual Integration Co-Creation, Technology Boosts The Integrated Development Of The Yangtze River Delta** **Organizer：Shanghai Technology Innovation Center** **Shanghai Exhibition Center**
Theme Interpretation	Sticking to the overall layout of high-quality integrated development in the Yangtze River Delta, introducing the dynamic parameters of development and predicting the uncertain variables, activating the regional innovation stock, and injecting the innovation increment of development demand, it is the key to promote the synergy effect of the elements of innovation resources and enhance the advantages of innovation, domestic leading power and international competitiveness. Therefore, a thorough understanding, accurate grasp and initiative to adapt to the current trend of scientific and technological innovation is the fundamental requirement for achieving high-quality development in the new era. As the theme of this year's Entrepreneurs' forum, "Mutual Integration Co-Creation, Technology Boosts The Integrated Development Of The Yangtze River Delta" , the three dimensions of society, Economy and Development will be explored to explore the driving force of science and technology innovation in driving integration of the Yangtze River Delta to take the lead in high-quality development, discussion on the Endogenous Law of innovation and entrepreneurship. Under the background of the integrated construction of the Yangtze River Delta, how to gather majestic strength in this hot land? Promote the orderly and flexible flow of innovation factors between regions? How to continuously integrate and deepen industrial innovation in various cities to achieve complementary and integrated high-quality development? This forum will also take this opportunity and combine current hotspots to conduct in-depth discussions on the perspectives of all parties.
09:30-09:45 Welcome Address	**DUAN Junhu,** Deputy Director of Torch High Technology Industry Development Center, Ministry of Science and Techology
	LU Min, General Engineer, Science and Technology Commission of Shanghai Municipality
09:45-10:00	**CHEN Qing,** Chief of the Department of Incubator Management Torch High Technology Industry Development Center, Ministry of Science and Technology
10:00-10:10 TED I	**LIU Wei,** Dean of the Research Institute, CSG Smart Science & Technology Co., Ltd.
10:10-10:20	**Release of Shanghai Scientific and Technological Entrepreneurship Trend Study Report (2016-2019)**
10:20-10:30 TED II	**JIN Xia,** Cofounder and Chairman of Hsmap
10:30-10:40 TED III	**ZHOU Tao,** Business department manager, Shanghai Branch, China Construction Bank
10:40-11: 05 Talk Show	**Where are the opportunities for science and technology innovation in the post-pandemic era?** **ZHOU Dongliang,** General Manager of Jiangsu Swood Zhihui Venture Services Co., Ltd **ZUO Wei,** Senior Director of Marketing, Beida Pharmaceutical Co., Ltd **WEI Yiyu,** Chairman of Hefei National University Science and Technology Park **XIE Jihua,** General Manager of Shanghai Yangpu Technology Entrepreneurship Center Co., Ltd **RUAN Wenjun,** Manage Partner of Dongke Equity Investment Fund Co., Ltd
11:05-11:15 Ceremony	**Release: Proposal for Joint Incubation of Sci-tech Enterprises in the Yangtze River Delta**
11:15-11:30 Ceremony	**Awarding Ceremony of 2020 Startup in Shanghai**

2020.10.29（Thursday）	
14:00-17:00	**The Science & Technology Finance Forum** **Technology, Finance and Sustainable Development** **Shanghai Exhibition Center**
Theme Interpretation	Science and technology has not only promoted the development of productivity, but also brought about changes in production relations. In addition to the upgrading and reconstruction of financial industry chain, and the creation of new industry opportunities, technological advance can also help the financial industry to use new technological means to serve a wider range of users at a lower cost and in a more efficient and fair way, realizing the synergy between short- and long-term benefits, and promoting the accomplishment of sustainable economic growth goals. The Science & Technology Finance Forum of 2020 Pujiang Innovation Forum will draw on the wisdoms and opinions of experts from a professional perspective to jointly interpret the sustainable growth brought about by technology and finance in the new era of technology
Chair	**HUANG Wei,** Host Presenter of YICAI
14:00-14:20 Welcome Address	**ZHANG Jun,** Deputy District Director of Jing'an District, Shanghai
	CHEN Sijie, General Manager of YICAI
14:20-14:40 Release	**Release of The Annual Report on the Eco-system of Science and Technology Finance in China 2020**
14:40-15:05 Keynote Speech	**XIAO Feng,** Vice Chairman of China Wanxiang Shareholding Co., Ltd.
	LIAN Ping, Chairman of China Chief Economist Forum
	WANG Sunan, President of Shanghai Branch of Shanghai Pudong Development Bank
16:05-17:00 Panel Discussion	**Chair: LIN Chunjie,** Vice President of YICAI Research Institute
	LIU Bin, Director of Shanghai Academy of Free Trade Area, Pudong Academy of Reform and Department and Office of Financial Research
	XU Qing, Head of Financial Sustainable Development Program of UNDP in China
	LU Yong, General Manager of Shanghai Data Exchange Corp., Director of Shanghai Data Innovation Center

2020.10.29（Thursday）	
09:00-17:00	**Green Technology Bank Summit Forum - Innovation-driven Green Development: Accelerating the Construction of a Market-oriented Green Technology Innovation System** **W Shanghai - The Bund**
09:00-11:20	**Opening ceremony and plenary session** **Great Room, 2nd Floor**
09:00-09:30 Welcome Address	**Chair: XIE Wenlan,** Deputy Director of Shanghai Science and Technology Commission, Secretary General of the Steering Committee of the Green Technology Bank
	CHEN Mingbo, Deputy Secretary-General of Shanghai Municipal People's Government
	H.E KittiSettha Pandita Cham Prasidh, Senior Minister of Minister of Industry, Science, Technology & Innovation, Kingdom of Cambodia (remote)
	XU Jun, Deputy director of department of social development
09:30-09:40	**Signing ceremony**
09:40-09:50 Awards	**Excellent Cases of Green Technology Applications in Yangtze River Delta**
	Presenter: WANG Zhen, Director of Administration Center of Green Technology Bank
09:50-10:10	**Break**
10:10-11:20 Keynote Speech	**Chair: WANG Zhen,** Director of Administration Center of Green Technology Bank
	Minelik Alemu Getahun, Assistant Director General, World Intellectual Property Organization, Advisor Committee of theGreen Technology Bank Academy
	ZHOU Hanmin, Vice Chairman of Shanghai Committee of CPPCC and Vice Chairman of the International Finance Forum
	MA Jun, Director, Chairman of China Green Finance Committee of China Society for Finance and Banking
	ZHANG Rongqing, Head of the National Green Development Fund
	ZHU Junhao, General Manager of Green Technology Bank (Shanghai) Science and Technology Development Co., Ltd.
13:30-17:00	**Thematic session 1: Regional Cooperation for Green Technology** **STAGE2, 1st Floor**
13:30-17:00	**Thematic session 2: Best green technology practices in Yangtze River Delta region** **GREAT ROOM FOYER, 2nd Floor**
13:30-17:00	**Thematic session 3: A Green, Healthy and Smart North Bund** **Great Room, 2nd Floor**

2020.10.29（Thursday）	
14:00-16:40	**The Emerging Technology Forum** **New Opportunities for IoT Development and New Drivers for the Digital Economy** **Organizer: Shanghai Academy of Science & Technology, Zhangjiang Group** **Aloft Shanghai Zhangjiang Haike**
Theme Interpretation	New science and technology lead the future, and new economy empowers development. With the guidance of the high-quality economic development, the "new capital construction", represented by 5G base stations, big data centers, AI, and the Industrial Internet, has become the hotspot, and will become an important growth point of new economy. The Forum proposes to cooperate with the representatives of the outstanding companies and scientific research institutes in the industrial community and the academic community to improve the deep integration of the Industry Internet and the real economy, and facilitate the digital transformation and upgrading of the society and economy, with focuses on the emerging IT technologies in information and network fields, and the new business modes, new applications and new services derived from the technologies.
Chair	**CAO Amin,** Vice president of Shanghai Academy of Science & Technology **ZHANG Aiping,** Full Time Director of Zhangjiang Group
14:00-14:20 Welcome Address	**WANG Yu,** Deputy Secretary of the CPC Committee of the Science and Technology Commission of Shanghai Municipality **QIN Wenbo,** Vice president of Shanghai Academy of Science & Technology **YUAN Tao,** Chairman of Zhangjiang Group
14:20-14:30	**Signing Ceremony and Achievement Release**
14:30-17:00 Keynote Speech	**FENG Songlin,** Former Dean of Shanghai Advanced Research Institute, Chinese Academy of Sciences
	SONG Zhiqun, Chief Scientist of China Electronics Technology Group Corporation, and Chief Engineer of CETC Network & Communications Co., Ltd.
	HUANG Xiusong, Director, Technical Center, Shanghai International Port (Group) Co., Ltd
	Break
	CAO Ming, Vice President of Wireless Network Line, Huawei
	ZHENG Lei, Vice President, Shanghai QUETCL Wireless Solution
	Gunnar Grün, Deputy Director of Fraunhofer IBP
	Przemyslaw Komarnicki, Head of Energy Systems and Infrastructures of Fraunhofer IFF

2020.10.29（Thursday）	
13:30-17:00	**The Emerging Technology Forum** **The Fourth Paradigm: Scientific Data on Cloud** **Organizer:** **Shanghai Science and Technology Innovation Resource Center** **The Administrative Center of Shanghai R&D Public Service Platforms** **Jin Jiang Grand Hall, Jin Jiang Hotel**
Theme Interpretation	In the era of S&T 4.0, scientific data has become important basic strategic resources for the S&T innovation and economic and social development of a nation. The opening and sharing of scientific data has become a national strategy. Also, the natural properties of cloud computing to the integration of resources provide a most appropriate platform for the gathering and exchange of scientific data. Many developed countries in Europe and America have taken cloud computing as a national scientific infrastructure to facilitate the sharing and reuse of scientific data, and satisfy the scientific research needs of scientists when conducting data-intensive researches. The Forum will discuss how to facilitate the sharing and exchange of scientific information, improve innovation capability and creativity, and enhance the efficiency of scientific research through cloud computing.
Chair	**ZHU Yue,** Deputy Director of the Administrative Center of Shanghai R&D Public Service Platforms
13:30-13:40 Welcome Address	**SU Jing,** Director of National Science&Technology Infrastructure
	FU Guoqing, Vice Chairman of Science and Technology Commission of Shanghai Municipality
13:40-14:00	**Ceremony**
14:00-14:40	**Philippe Sansonnetti,** Member of the French Academy of Sciences, Foreign Member of the US National Academy of Sciences, Member of the Deutsche Akademie Der Natursforscher Leopoldina, Member of the Sweedish Academy of Biotechnology, Fellowship of the Royal Society, Principal Investigators, The Center for Microbes, Development and Health, Institut Pasteur of Shanghai Chinese Academy of Sciences
14:40-15:20	**JIN Li,** Academician of Chinese Academy of Science, Executive Vice President in Fudan University, Principal of Shanghai Medical College of Fudan University
15:20-15:30	**Break**
15:30-16:10	**ZHAO Guoping,** Molecular Microbiologist, Academician of Chinese Academy of Sciences, Principal Investigators, Biomedical Big Data Center, Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences
16:10-16:50	**HUANG Yunsong,** QingCloud CEO, and Eclipse Committer
16:50-17:00	**Q&A**

2020.10.29（Thursday）	
14:00-16:50	**The Emerging Technology Forum** **Innovation and Development Summit of Carbon Fiber Composite Industry** **Collaborative Innovation and Interactive Development** **Organizer: Jinshan District People's Government, Shanghai** **Conference Center of Jinshan District People's Government**
Theme Interpretation	Carbon Fiber Composite is the key material supporting the innovative development of aerospace, rail transit, new energy vehicles, wind power equipment and other strategic emerging industries. The conference will bring together top experts and industry leaders in carbon fiber materials to discuss about how to vigorously integrate resources, conduct cooperative R&D, innovate systems and mechanisms, and utilize the core elements such as technologies, talents and capital to provide important support for building an ecosphere of the carbon fiber composite industry chain for the Yangtze River Delta rooted in Shanghai.
Chair	**HE Dongbin,** Deputy Head of Jinshan District, Shanghai
14:00-14:15 Welcome Address	**LIU Jian,** Head of Jinshan District, Shanghai **WANG Ye,** Vice Chairman of Science and Technology Commission of Shanghai Municipality
14:15-14:45	**Ceremony**
14:45-14:55	**Break**
14:55-16:25 Keynote Speech	**Chair: YU Jianyong,** Academician of Chinese Academy of Engineering; Deputy Secretary of the CPC Committee and President, Donghua University
	HUANG Xiangyu, Deputy General Manager of Sinopec Shanghai Petrochemical Co., Ltd
	YI Xiaosu, University of Nottingham Ningbo China
	LIN Gang, General Manager of ATA Carbon Fiber Tech. Guangzhou Co., Ltd.; Deputy Secretary-General and Vice Chairman of Special Committee on Wind Power, Chinese Society for Composite Materials

Agenda of 2020 Pujiang Innovation forum & Inno-Match Expo

Shanghai • Shanghai Exhibition Center (1000 Yan'an Zhong in Jin's District)

Meeting Agenda		
28 Oct. 2020（Wednesday）		
09:00-10:00	**Inno-Match Expo Opening Ceremony**	Central Hall 1F Center Stage
09:45-16:20	**The 1st World Technical Manager Summit(sub-forum for PIF)**	Central Hall 1F Center Stage
09:30-11:30	**Entrepreneurship Forum(sub-forum for PIF)**	East Square M1
09:30-11:30	**Blockchain Digital Technology Forum**	East Wing M3
13:30-17:00	**Modern Technology Factor Market's Innovation and Development Forum**	East Square M1
09:30-11:30	**President's Roundtable Forum of the Global Conference on Technology Transfer**	East Wing M3
13:00-17:00	**Wesocool Innovation & Entrepreneurship Forum**	East Square M2
13:00-17:00	**The 1st Purchase of Innovative Products for The Minor Enterprises**	2FTech-New Exhibition Area
19:00-21:00	**Opening Reception and 2020 Hurun Shanghai Technology Transfer Agency Announcement**	East Square M1
29 Oct. 2020（Thursday）		
09:20-16:15	Emerge Tech Conference	Central Hall 1F Center Stage
12:30-17:15	EMERGE Tech Conference -workshop	West Wing M4
13:00-16:00	Science and Technology Finance Forum (sub-forum for PIF)	East Square M1
10:00-17:00	Sci-tech Achievements Express	East Square M2
13:00-17:00	The 3rd NETC's Sub-center Cooperation Conference	East Wing M3
09:00-16:00	The 1st Purchase of Innovative Products for The Minor enterprises	2FTech-New Exhibition Area
09:00-17:00	2020 Yangtze River Delta City Groups "Young Talents Innovation Forum" "Scientific Innovation Momentum" Commercialization of Scientific and Technology Achievements ZHANGJIANG SUMMIT	Live broadcast

30 Oct. 2020（Friday）		
09:30-17:00	**The Third Yangtze River Delta International Innovation Challenge**	East Square M1
09:00-11:30	**“Regional TTO” Technology Transformation Platform Unveiling Ceremony**	Central Hall 1F Center Stage
09:00-11:00	**Shanxi Province Project Roadshow Activities**	East Square M2
09:00-11:30	**Yunnan Liquid Metal Industry Scientific and Technological Innovation Achievements Conference**	West Wing M4
13:00-14:00	**Rong’s Intellectual Property Products Conference**	West Wing M4
09:00-16:00	**The 1st Purchase of Innovative Products for The Minor enterprises**	2FTech-New Exhibition Area
Shows		
28th-30th Oct.	**INNO-MATCH EXPO**	Shanghai Exhibition Center

2020.8.31（Monday）	
19:30-21:30	**The Future (Science) Forum** **Innovation, co-governance and collaboration in climate change research** **Organizer: Springer Nature** **Supporter: Polar Research Institute of China, Ministry of Natural Resources** **Online**
Theme Interpretation	Nobody knows how the COVID-19 pandemic emerged at the start of 2020 will play out. And it is too early to tell its impacts on our planet. Interestingly, carbon emissions have temporarily dropped as a result of the outbreak. Will it be a turning point in the quest to rein in global warming? As countries are pulling together to defeat the pandemic, will their efforts lead to a new era of cooperation to prevent climate disasters? Or rather, the temporary drop in carbon emissions is little more than a blip, and countries might turn to cheap fossil fuels under the pressure brought by economic downturns, potentially leading to a soar in carbon emissions and more rapid global warming? Climate change topics are not new to us. From melting glaciers in the Antarctic and sea-ice loss in the Arctic, to higher average temperatures over the summer months in polar zones and a series of heat waves or heavy rainfall every summer breaks … Human activities are altering the atmosphere and the climate, which are, in turn, affecting human beings and animals, as represented in large numbers of dead seabirds found in Alaska, for instance, coral bleaching off the coast of Australia, or reduced production in crops, and even a surge in beer prices. The climate action is among the United Nation's Sustainable Development Goals (SDGs), and scientific innovations equip us with effective tools to assess climate change impacts and combat this global challenge. Is Earth really getting warmer? How can we project Earth's climate, say, in the next fifty years? What impacts could different types of economic development or policies bring? How to develop green energy technologies that could help reduce carbon emissions and air pollution? How are international trade flows related to carbon emissions and the flow of air pollutants? Climate change studies draw on the methodology and findings from multiple disciplines, including geoscience, biology, ecology, chemistry, physics, and even computer science, sociology and engineering. We hope that by bringing experts in the field to share the latest development, we can have a better understanding of the climate change landscape, and how it affects us. It is also expected that through collaboration and co-governance, we can find a solution to this global issue.
Chair	**JIANG Xujia,** Senior Editor, Nature
19:30-19:35	**Welcome Address**
19:35-19:55	**Myles Allen,** Professor of University of Oxford
19:55-20:15	**Denise Mauzerall,** Professor of Princeton University
20:15-20:35	**GUAN Dabo,** Senior Member of University of Cambridge, Distinguished Professor at Tsinghua University
20:35-20:50	**HE Jianfeng,** Senior Researcher of Polar Research Institute of China

20:50-21:00 Panel Discussion 1	**Impact Of Climate Change On Polar Environment And Ecosystem** **HE Jianfeng,** Senior Researcher of Polar Research Institute of China **ZHANG Jiansong,** Chief and Senior Reporter of Xinhua News Agency Shanghai Bureau
21:00-21:30 Panel Discussion 2	**Climate Change: Crises, Challenges And Solutions** **JIANG Xujia,** Senior Editor, Nature **Myles Allen,** Professor, University of Oxford **Denise Mauzerall,** Professor of Princeton University **Dabo Guan,** Senior Member of University of Cambridge, Distinguished Professor at Tsinghua University

扫一扫加关注 获取更多惊喜

WWW.PUJIANGFORUM.ORG

主　　办：中华人民共和国科学技术部　上海市人民政府
Hosts：Ministry of Science and Technology of People's Republic of China　Shanghai Municipal People's Government

承　　办：上海市科学技术委员会　中国科学技术发展战略研究院　同济大学
Organizers：Science and Technology Commission of Shanghai Municipality　Chinese Academy of Sciences and Technology for Development　Tongji University

上海市张江科学城建设管理办公室　科技日报社　上海广播电视台
Shanghai Municipal Office for Zhangjiang Science City Development and Management　Science and Technology Daily　Shanghai Media Group

中国科学院上海分院
Chinese Academy of Sciences Shanghai Branch