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# CAST Newsletter

## Special Issue on the 4th World Science and Technology Development Forum

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## **20th CPC National Congress in Focus**

### **Technology as a powerful tool to improve people's livelihood and well-being**

The report to the 20th National Congress of the Communist Party of China (CPC) emphasized the importance of regarding “science and technology as our primary productive force,” “keeping innovation at the heart of China’s modernization drive,” and “ensuring that the gains of modernization benefit all people fairly,” which provided directions and guidelines for the China Association for Science and Technology (CAST) to accelerate work on innovation-driven development.

Zhang Yuzhuo, Executive Vice President of CAST, opined that never before in history has science and technology exerted such

a profound impact on people’s happiness and well-being. To advance China’s economic and social development and people’s livelihood, China needs more scientific and technological solutions than ever before. Boosting the primary productive force of science and technology is essential.

### **China must develop self-reliance and strength in advanced technology**

Zhang Yuzhuo said that, with the rapid pace of technological developments, one of the most defining features of our times is the start of a new round of technological revolution and industrial transformation. Scientific and technological innovations can unlock forces that fundamentally change production, lifestyles, and philosophies. This will not only shape the form and content of human civilization, but

also inject new impetus for the development of human civilization.

### **China has benefited from technology dividends**

Zhang Yuzhuo focused on how Chinese science and technology workers have, in recent years, reaffirmed their commitment to serving the Chinese people. Their efforts in tackling key technology challenges have paid big dividends. In the field of medicine and health, China has successfully developed and deployed a range of home-made advanced medical technologies such as magnetic resonance imaging, color Doppler ultrasonography, and computerized tomography (CT) scanning to cut people’s medical expenses. In the environmental sector, guided by President Xi’s vision of lucid waters and lush mountains as invaluable assets, China has developed clean and efficient combustion

technology and ultra-low emission technology for the iron and steel industry. As a result, the country has recorded more days of blue skies. China has developed new agricultural technologies that significantly increase its food security and has achieved good harvests in grain production for 18 years in a row. China has made key breakthroughs in manufacturing C919 passenger jets, new energy vehicles, maglev trains that run at 600 km/h, and widespread application of 5G technology.

### CAST' s firm mission to advance science and technology

Zhang Yuzhuo outlined CAST's construction of "Innovation China," a platform to connect all national societies, local science and technology associations, and leading Chinese experts and accelerate integrated application of science and technology. CAST has also built "Smart

China," a think-tank that provides consulting services on key technology and industry issues. So far, the platform has published over 600 strategic reports that have a bearing on people's livelihood.

(Sources: *Guangming Daily*, <https://www.chinanews.com.cn/>)

### Cover Story

## 4th World Science and Technology Development Forum opens in Chengdu



Opening ceremony of the 4th World Science and Technology Development Forum  
Photo credit: Official website of CAST

On November 27, 2022, the 4th World Science and Technology Development Forum opened in Chengdu under the theme "Openness, Trust and Cooperation." The forum was attended by more than 300 top experts and scholars, representatives of international organizations, and entrepreneurs from more than 20 countries and regions including 7 Nobel laureates and more than 60 Chinese and international academicians. Together, they discussed technological inno-

vation and sustainable development in fields of basic science, climate change, the digital economy, and green innovation, and proposed technological solutions to meet the challenges of the times. Sharmila Nair-Bedouel, Assistant Director-General for Natural Sciences of UNESCO attended the forum and commended the role China played on the adoption of UNESCO Recommendation on Open Science last year. She urged participants to carry out pragmatic cooperation in the spirit of openness, trust, and cooperation and promote basic research.

One of the most discussed topics at the forum was digital technology and digital economy. Participants shared a wide range of use cases for digital technologies. Chengdu Yurui Innovation Technology Co. Ltd., for example, showed attendees how to use Surg-Smart, an AI-empowered device they developed,

to digitize and standardize surgical operations and bring down the cost of medical treatment.

The metaverse was also another hot topic at the forum. Dan Shechtman, the Nobel laureate in chemistry, Joseph Sifakis, winner of the A.M. Turing Award in computer science, and Chu Junhao, a member of the Chinese Academy of Sciences (CAS), shared views on virtual reality technologies used in metaverse, their applications, and prospects.

The World Science and Technology Development Forum was jointly hosted by CAST, the Chinese Academy of Sciences (CAS), and the Chinese Academy of Engineering (CAE). It pools global wisdom to promote non-governmental scientific and cultural exchange. It aims to serve as a high-end platform to promote open cooperation, transformation, and development of the global

science and technology governance system and aid building a global community of shared future. Since 2019, the forum has developed a tradition of publishing the Top 10 Scientific Issues of the Year in Human Social Development.

(Source: Xinhua News Agency)

### **Open cooperation is the natural requirement of science**

Wan Gang, President of CAST, attended the opening ceremony of the 4th World Science and Technology Development Forum and delivered a speech. He suggested that open cooperation is the natural requirement for science, the inherent demand for development, and the inevitable requirement to meet global challenges. China's science and technology community has always acted as an advocate of global open cooperation, a partic-

ipant in science and technology governance, and a contributor to innovative development. China has used and will continue to use science and technology in shaping the future, drive development with innovation, and build consensus through dialogue and cooperation, he said.



CAST President Wan Gang addressing the opening ceremony  
Photo credit: Official website of the 4th World Science and Technology Development Forum

Wan Gang stressed that since its inception, the forum has always been working towards an ecosystem featuring shared growth through discussion and collaboration. He urged participants to stay true to their aspirations, continue to do what is right, seek innovation, respect science, and never waver in pursuit of truth. He called on all science and technology workers to use basic science and cutting-edge technology to cultivate new momentum for innovation. He urged them to focus on the big picture, cross disciplinary boundaries, and be inclusive in research. He also called on attendees to push for

mechanism innovation, accelerate technology transfer and knowledge sharing, and promote the development of modern industries. They must recognize the importance of integrating natural and social sciences and stand ready to embrace new changes in research methods, ethics, and governance norms. They must uphold principles of equality, mutual respect, mutual benefits, and win-win cooperation and use a global perspective to practice open science without the constraints of national borders. He stressed overcoming regional barriers and discrimination to strengthen exchange for knowledge building and technological innovations. He said scientists must build consensus based on enhanced understanding and mutual trust, continue to promote exchange and mutual learning between different civilizations through high-level open cooperation, and promote implementation of the 2030

Agenda for Sustainable Development.

(Sources: Official website of CAST, <https://sichuan.scol.com.cn/>)

## Event Highlights

### Top 10 Scientific Issues of the Year in Human Social Development in 2022



Top 10 Scientific Issues of the Year in Human Social Development in 2022 unveiled at the forum  
Photo credit: *Chengdu Daily*

On November 28, 2022, the 4th World Science and Technology Development Forum announced the Top 10 Scientific Issues of the Year in Human Social Development in 2022 at the closing ceremony.

The list reflected global wisdom, consensus to use collaboration to tackle key problems, and commitment to openness, trust, and cooperation. Selection committee members came from more than 10 countries and regions including China, the United States, the United Kingdom, Canada, and Singapore. The issues focus on the 2030 Agenda for Sustainable Development that includes 17 Sustainable Development

Goals (SDGs) and fall into the three categories of climate, urban management, and manufacturing.

#### Issues in the field of climate:

1. How can the earth's climate be stabilized by developing the green economy?

2. What is the best way to effectively respond to global extreme weather events?

3. What mechanism could help achieve carbon emission targets and ensure socioeconomic development?

#### Issues in the field of urban management:

1. What is the best way to build a green and efficient recycling system to treat urban waste?

2. What is the best way to build a high-speed, multi-dimensional, interconnected, and smart city suitable for mankind?

3. What would optimize urban planning and func-

tion to reduce resource consumption?

### Issued in the field manufacturing:

1.As a core technology of the Fourth Industrial Revolution, how should intelligent manufacturing promote the transformation, upgrading, and innovative development of global manufacturing?

2.What is the best way to understand common basic science issues such as photosynthesis and high-precision green manufacturing?

3.What is the best way for companies to transition from resource-intensive, high-carbon manufacturing to decentralized, low-carbon manufacturing?

4. How can atomic precision surface processing be achieved in the post-Moore era of chip manufacturing?

**The forum also published a list of the Top 10 Emerging Technologies of the Year in Chemistry**

### in 2022:

·Sodium-ion batteries as a readily available and inexpensive alternative to lithium-ion batteries

·Nanozymes, a type of nanomaterials with unique physicochemical properties

·Aerogels, a type of lightweight material used in thermal insulation

·Thin-film fluorescent sensors used in tunable, versatile, and small detector devices

·A big nanoparticle database containing annotated nanostructures suited for modeling research

·Fiber Batteries offering new energy storage solutions for wearable devices

·Liquid solar fuel as a strategic source of renewable-energy-based fuel

·Flexible organic light-emitting diode displays

·Spherical nucleic acid

(SNA) vaccines offering new possibilities in the field of gene and drug delivery

·VR-assisted interactive modeling that applies computational chemistry in the metaverse ecosystem

“These emerging technologies in chemistry demonstrate how different chemical technologies can play a role in improving human well-being, promoting industrial development, addressing climate change, and promoting health,” said Javier García-Martínez, President of the International Union of Pure and Applied Chemistry (IUPAC). “They also highlight the importance of using chemical science and technology to respond to global challenges.”

In response to the United Nations International Year of Basic Sciences for Sustainable Development 2022 (IYBSSD 2022), the forum also published the Basic

Science for Sustainable Development Initiative and a Discipline Development Report, calling on the global science and technology communities to concentrate on basic science research, deepen practical cooperation, promote science popularization for sustainable development, and jointly use basic science to achieve the UN SDGs.

(Sources: <http://www.people.com.cn/>, *Guangming Daily*)

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### *Dialogue with Experts*

## **High-level dialogue on what technology can do to meet common global challenges**

A high-level dialogue was held at the opening ceremony of the 4th World Science and Technology Development Forum to explore how technology can address the world's common challenges.

Themed “Action-oriented approaches – Sci-tech innovation for global challenges,” the dialogue was moderated by Li Yanrong, President of the Sichuan Association for Science and Technology, President of Sichuan University, and a member of the Chinese Academy of Engineering (CAE).

Fuji Ren, a professor at Tokushima University and a member of the Engineering Academy of Japan (EAJ), talked about the need to increase the intensity of technological innovation and adopt more scientific and technological solutions. “As we get less dividends from purely data-driven artificial intelligence, we need to explore harnessing more advanced smart technologies such as ‘affective computing’ to better collaborate with technologies. Only when we can deploy artificial intelligence in smart city management and senior care will we be able to truly trust and embrace

robots.”

“We need to apply new technologies such as artificial intelligence in the development of the industrial economy,” said Tang Lixin, Vice President of Northeastern University and a member of the Chinese Academy of Engineering (CAE). Since economic development is underpinned by industrial activities, he argued that “we need to use artificial intelligence to allocate energy and logistics resources, develop more manufacturing clusters, and make them more intelligent.”

Richard Horton, Editor-in-Chief of *The Lancet*, applauded the positive impact of technology in the field of medicine. He called for changes in how people view human health to accompany progress in science and technology.

“Obviously, we all agree that scientific and technological progress has responded positively to global challenges,”

commented Li Yanrong at the end of the dialogue. Scientific and technological progress requires concerted efforts from all communities. He called on people to create more conditions conducive to scientific and technological innovation.

(Source: <https://sichuan.scol.com.cn/>)

## Nobel laureates discuss technology and development



Christopher Pissarides delivering a keynote speech  
Photo credit: Official website of the 4th World Science and Technology Development Forum

Christopher Pissarides, the Nobel laureate in economics, kicked off the forum's opening ceremony with a speech entitled "Science and Technology Cooperation and Global Sustainable Development." He described different use cases for science and technology in vivid detail and stressed the need for international scientific and technological cooperation.

"Unlike in the past, we now have more choices in how to apply science and technology," he said. "We

have invested heavily in technology research and development and used these innovations to improve our well-being." He is now seeking to determine how much user satisfaction improves with new technologies. He predicted that in the future, more new technologies will be used to help people achieve their goals, but efficiency is merely one of the many emerging changes. The ultimate goal of technology is to spur societal development.

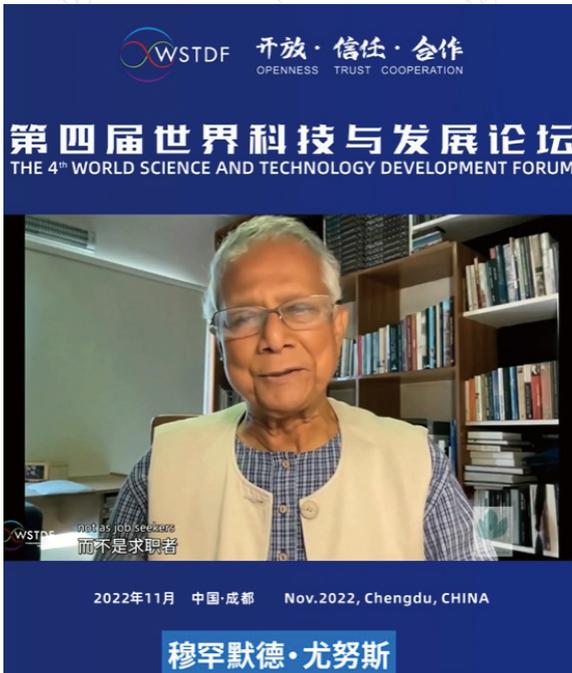
In his keynote speech, Muhammad Yunus, Bangladeshi economist and winner of the 2006 Nobel Peace Prize, stressed that technology alone will never completely eradicate poverty. He suggested that great reform efforts are also needed within the existing economic system.

Muhammad Yunus drew a simple analogy to illustrate the point. Without the right type of soil, a

potted plant can never grow tall. Similarly, deprived of the space and opportunities for development, poor people will remain poor and powerless to change their conditions.

“Science and technology benefits mankind, but it can also cause poverty,” he said. “If machines perform better than humans, humans will no longer work in production.” He argued that science and technology is a “double-edged sword.” People must view it cautiously and never allow science and technology to take away their social activities and creativity.

(Source: <http://www.people.com.cn/>)



Muhammad Yunus delivering a keynote speech  
Photo credit: Official website of the 4th World Science and Technology Development Forum

## Events in Focus

### Special exhibitions to raise public awareness on sustainable development and digital intelligence

Two exhibitions featuring diverse use cases for digital technology, the 2022 World Digital Economy Forum Use Case Exhibition and the Sustainable Development Digital Innovation Use Case Exhibition, were held on the sidelines of the 4th World Science and Technology Development Forum.



The 2022 World Digital Economy Forum Use Case Exhibition  
Photo credit: <https://www.thepaper.cn/>

Themed “Green Earth, Digital Pulse”, the 2022 World Digital Economy Forum Use Case Exhibition used artificial intelligence to deliver a comprehensive under-

standing of sustainable development and digital intelligence to visitors. The centerpiece of the exhibition was an earth-shaped cloud data platform utilizing the latest resource, environmental, biological, and ecological technologies to provide a detailed assessment of China's status in sustainable development. By scanning the device with their mobile phones, visitors were taken through an interactive presentation on the United Nations Sustainable Development Goals (UN SDGs) using AR technology.

At the entrance of the 2022 World Digital Economy Forum Use Case Exhibition, a bright 1:1 scale replica of a Formula E race car attracted considerable attention. The car, aiming to raise awareness about plastic pollution, was built with 100 kilograms of single-use plastic waste collected by primary school students in Glasgow and took more than 700 hours to complete by hand.

(Source: <https://www.thepaper.cn/>)



Formula E race car exhibited at the entrance  
Photo credit: <https://www.thepaper.cn/>

## New biomaterial device allows babies born with congenital heart disease to live a normal life

The Biomaterials Science and Engineering Frontiers Forum was one of the 16 sub-forums held at the 4th World Science and Technology Development Forum. Themed “Biomaterials: Open Cooperation and Common Development for the Benefit of Human Health,” the sub-forum aimed to strengthen exchange of cutting-edge research in biomaterials and advance development of biomaterial science and technology.

Professor Wang Yunbing, Director of the National Engineering Research Center for Biomaterials of China, Dean of the College of Biomedical Engineering of Sichuan University, and Vice President of the Chinese Society for Biomaterials, delivered a keynote presentation titled “Development

of Innovative Biomaterials and Devices for the Treatment of Cardiovascular Diseases.” He discussed new research progress his team has made in the treatment of congenital heart disease, coronary heart disease, heart valve disease, heart failure, and the latest development of associated medical devices.



Professor Wang Yunbin making a presentation at a sub-forum  
Photo credit: Official website of the 4th World Science and Technology Development Forum

Professor Wang’s team has successfully developed a fully degradable transcatheter ventricular septal defect occluder for minimally invasive treatment of congenital heart disease. Using in-situ myocardial tissue engineering technology, it is the world’s first device of its kind approved for clinical use and gives babies born with congenital heart disease a chance to live a normal life.

(Source: <https://sichuan.scol.com.cn/>)

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CAST is the largest non-governmental organization of scientific and technological professionals in the world. Through its 211 member societies and local branches all over the country, CAST maintains close ties with millions of Chinese scientists, engineers, and other professionals working in fields of science and technology.

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