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## Innovation Pathway

# Industries of the Future to Be Boosted

By Staff Reporters

Xi Jinping, general secretary of the Communist Party of China (CPC) Central Committee, has urged efforts to leverage the country's comparative advantages, pursue progress while maintaining stability, and promote continuous breakthroughs in the development of industries of the future.

Xi made the remarks while presiding over a group study session of the Political Bureau of the CPC Central Committee on January 30.

Experts responded to his remarks with various insights and suggestions.

Yu Haibin, an academican of the Chinese Academy of Engineering and director of the Institute of AI for Industries, Chinese Academy of Sciences (CAS), said efforts will be made to tackle the barriers in general AI frontier technology in major application scenarios in the manufacturing industry. At the same time, the "AI Plus" initiative will be advanced and strategic support for the development of industries of the future strengthened.

Wan Jinbo, a researcher at the Institutes of Science and Development, CAS, suggested guiding enterprises to closely cooperate with universities and research institutions, identify sci-tech challenges aligned with industrial needs, and undertake joint research on key core technologies.

They should also coordinatedly advance efficient commercialization and application of sci-tech achievements.

This was echoed by Yu Xiaohui, president of China Academy of Information and Communications Technology, who said it is key to incubating and cultivating original innovative industries of the future.

In regions where scientific, educational, talent and financial resources are abundant, the focus should be on developing cutting-edge technologies, integrating full-cycle resources of basic research, applied research and industrialization.

Yu also said industries of the future should be developed according to local conditions.

Hangzhou in east China is establishing innovation projects in disruptive technology in the low-altitude economy and humanoid robots sectors, systematically establishing its competitive advantages in industries of the future.

Guided by the city's goal to become the premier city for AI innovation and development, Hangzhou will accelerate the construction of a higher-level dynamic innovation hub, Lou Xiuhua, head of Hangzhou's municipal bureau of science and technology, said.

Zhang Yong, deputy director of Industry and Information Technology Department of Shaanxi, said the northwestern province will focus on establishing a support system of "platform + policy + fund," and a batch of innovation centers and pilot-scale platforms for industries of the future in nine industrial chains. *See page 2*



Several large ships are under construction in Taizhou city, Jiangsu province on February 2. Latest data from China's Ministry of Industry and Information Technology show that the country maintained a leading position in the global market share for shipbuilding for 16 consecutive years. (PHOTO: XINHUA)

## STI Frontier

# Electricity Generated from Carbon Dioxide

By WANG Xiaoxia, CHEN Yu & WU Yefan

The world's first commercial supercritical carbon dioxide (sCO<sub>2</sub>) power generator, Chaotan One, has recently begun commercial operation in Liupanshui, Guizhou province. The generator was developed by the Nuclear Power Institute of China (NPIC) of the China National Nuclear Corporation (CNNC), and its partners.

Compared with conventional waste-heat steam power generation technologies, Chaotan One offers over 85 percent higher generation efficiency and more than 50 percent higher net power output. Behind these achievements lies the 17-year dedication of the R&D team, who have successively solved a series of technical problems in design, manufacturing and integrated application.

**Micro-channels required**

sCO<sub>2</sub> is a fluid state of carbon diox-

ide where it is held at or above its critical temperature and critical pressure.

The power generation technology uses sCO<sub>2</sub> as the working medium for energy transfer and thermal power conversion, replacing water vapor in traditional power generation to achieve the conversion from thermal energy to electrical energy.

Compared with water vapor, sCO<sub>2</sub> has high density, low viscosity, and does not go through a gas-liquid transition. It can not only improve efficiency but also reduce the volume of equipment, Huang Yanping, CNNC chief scientist and the general designer of Chaotan One, told *Science and Technology Daily*.

Since the concept of sCO<sub>2</sub> power generation was proposed in 1948, development of the generator has eluded R&D teams. The missing link was the essential stage of establishing a microchannel heat

exchanger with finer channels and higher heat exchange efficiency, said Huang, who began the research on sCO<sub>2</sub> power generation in 2009, and decided to start from this key problem.

However, using traditional photochemical etching methods, it is extremely difficult to precisely process hundreds of one-millimeter-diameter grooves on stainless steel thin plates, said Liu Ruilong, one of the R&D team members.

The samples provided by the manufacturer didn't meet required standards, so Liu and his colleague Fei Junjie visited the etching factory to cooperate with experienced technicians and create an innovative solution for the required manufacturing process.

Eventually, after a few weeks, hundreds of micro-channels were evenly and precisely carved on the plate.

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# Rising Integration of Technology and Industry in 2025

By Staff Reporters

In 2025, the integration of technological and industrial innovation was no longer an abstract concept in policy documents, but a vibrant practice spreading across the country.

**Technological foundation**

The advancement of technology determines the depth of integration between technological innovation and industrial innovation. Over the past year, multiple breakthroughs have been made in key core technology R&D, providing a source of vitality and fundamental support for industrial upgrading.

Carbon fiber, dubbed "black gold," is an indispensable strategic material for high-end equipment in industries such as

aerospace. The Institute of Coal Chemistry, under the Chinese Academy of Sciences, and Shanxi Huayang Carbon Materials Technology Co., Ltd. have jointly built a production line in Datong, Shanxi, in north China, with an annual output of 200 tons of high-end T1000 carbon fiber.

It was put into operation last November. The products will be widely used in fields such as aerospace, rail transit, new energy and low-altitude economy, providing support for strategic emerging industries and future industry development.

Breakthroughs in quantum communication technology are promoting the industrial application of the technology in areas such as digital and intelligent office and cities.

In the field of biomanufacturing, material innovation company Bluepha uses waste bio-oils as carbon sources, mass production of PHA and opening up a trillion-RMB market for bio-based materials.

In new energy, the Experimental Advanced Superconducting Tokamak (EAST) has laid the foundation for nuclear fusion energy.

**Booming industries**

Industry serves as the carrier and amplifier of technological innovation. Over the past year, cutting-edge technologies represented by AI have empowered traditional industries such as manufacturing, and expanded the boundaries, scenarios and possibilities of the technology-industry integration. *See page 3*

## International Cooperation

# Chinese Experts Help Upskill Sierra Leone Farmers

Edited by WANG Xiaoxia

At Njala Farm, located in a village on the outskirts of Bo, the second largest city in Sierra Leone, patches of rice fields are inlaid on the mountain slopes shining like jade, a testament to the bumper harvest of high-quality rice.

The high-yield demonstration rice field is a cooperation project developed by the 14th China Agricultural Technical Expert Group to Sierra Leone, in West Africa.

Li Youliang, the team leader, said that experts began the field reclamation in October 2023. One year later, they reclaimed five hectares of land on the wasteland and planted two seasons of rice in 2024 and 2025.

It is not easy to reclaim wasteland in a mountainous country like Sierra Leone. The experts meticulously planned and designed the project based on the local conditions, dividing the whole field into 16 small plots, and dug a drainage ditch every six meters while sowing the seedlings.

Compared with local varieties, the Chinese rice varieties have higher resistance to diseases and pests, and the yield has risen from the one to three tons per hectare produced by local rice to nine tons per hectare.

In addition to cultivating high-quality rice varieties, Chinese experts also trained local farmers in practical farming techniques, for high-yield cultivation of rice and corn, hybrid breeding of rice, and operating agricultural machinery. A local farmer named Mike is now proficient in driving tractors and combine harvesters, while also capable of performing basic repairs.

Agriculture is one of the important cooperation areas between China and Sierra Leone. The Chinese agricultural experts have helped Sierra Leone establish six agricultural demonstration bases, presenting local farmers with modern agricultural methods to improve yields and promoting the application of advanced farming technologies.

# WEEKLY REVIEW

**China's 'Bolt' Robot Runs 10m/s**

Zhejiang University in east China has unveiled "Bolt," a full-size humanoid robot capable of running 10 meters per second, closing in on the speed of sprint legend Usain Bolt.

**A New Flexible Chip for Wearable Technology Unveiled**

Chinese researchers have unveiled a new flexible chip that could drive the next wave of innovation in wearable technology. The breakthrough, detailed in a study published in the journal *Nature*, aims to enable more efficient and powerful computing directly on the body — such as on skin or integrated into fabrics — reducing reliance on distant data centers.

**Jupiter Smaller, Flatter than Previously Believed**

An international team of researchers has measured Jupiter with unprecedented precision and found that the solar system's largest planet is smaller and more flattened than previously thought. The new study, published in *Nature Astronomy*, used data from NASA's Juno spacecraft.

**Artificial Organ Keeps Patient Alive for 48 Hours After Lungs Removal**

A groundbreaking case recently published in the journal *Med* reported the successful use of an external, artificial lung system to sustain a critically ill patient for 48 hours after the complete removal of both lungs. This won enough time for the patient to have lung transplants.



# Action Plan Sets 2030 Goal for Transport, Logistics

## Policy Express

By LIN Yuchen

China has unveiled a new action plan to accelerate the cultivation of leading transport and logistics enterprises by 2030.

It is designed to reduce logistics costs, improve quality and efficiency, and build an innovation-driven, internationally competitive logistics sector. It will mobilize joint efforts by the government and enterprises and strengthen coordination between central and local authorities to foster a group of cross-modal, integrated, and professional comprehensive logistics service providers.

The focus is on strengthening supply capabilities across industrial and supply chains and enhancing the resilience and efficiency of the logistics system so that by 2030, around 100 comprehensive logistics integrators are developed. They will include more than 10 enterprises with global reach and strong international competitiveness.

These firms are expected to play a pivotal role in improving logistics performance, lowering systemic costs, and reinforcing the safety and resilience of supply chains.

A priority is the improvement of transport and logistics service networks with faster development of a unified na-



Containers are piled together in Nanjing Port, Jiangsu province. (PHOTO: XINHUA)

tional transport market, greater cross-regional mobility of logistics resources, and optimized layouts of key corridors, hubs, and service nodes.

Urban distribution and rural logistics networks will be strengthened and enterprises encouraged to expand through alliances, mergers and acquisitions, and shared use of network resources.

The plan highlights promoting multimodal transport to enhance integrated logistics services. Enterprises are encouraged to form multimodal transport alliances, integrate resources across different transport modes, and advance mod-

els such as "single document" and "single container" services.

The goal is to shift from fragmented, station-to-station transport to integrated, door-to-door and end-to-end logistics solutions, while extending services into warehousing, distribution, and broader supply chain management.

Deepening the integration between logistics and industry is another focus. The plan supports closer collaboration between logistics firms and manufacturing, trade, and key cargo owners, encouraging joint infrastructure use, shared standards, information connectivity, and coordinated supply chain optimization.

Logistics enterprises will be encouraged to establish long-term strategic partnerships and pursue coordinated overseas expansion.

Digital and intelligent transformation features prominently in the plan. It will promote wider application of technologies such as big data, the Internet of Things, artificial intelligence, blockchain, and 5G.

Alongside, it will promote electronic waybills, intelligent capacity matching, route optimization, and online settlement.

Enterprises are encouraged to develop large-scale models tailored to logistics scenarios and to improve system connectivity with upstream and downstream partners.

To enhance security and resilience, enterprises are asked to strengthen risk monitoring, early warning, and emergency response mechanisms while improving coordination in emergency transport.

Financial, land-use, data, and insurance support measures are also outlined to ensure sufficient resources for logistics development.

Overall, the action plan signals a concerted push to build a modern, integrated, and resilient transport and logistics system capable of supporting high-quality industrial development and deeper participation in global supply chains.



# Government Mobile Apps Get Standardized

By LIN Yuchen

China has released a new set of regulations to strengthen the standardized management of government mobile Internet applications, aiming to improve governance efficiency.

Issued by the General Office of the State Council, the regulations came into force upon release. The document establishes comprehensive requirements covering the entire lifecycle of government apps, from planning and development to operation, maintenance and security mechanisms.

Government mobile apps, as defined by the measures, include apps, mini-programs, and quick apps developed or used by government agencies, mass organizations and public institutions to support internal work such as administration, management and training. County-level authorities and below

are, in principle, prohibited from independently developing such apps.

A core focus of the measures is addressing "fingertip formalism," a phenomenon in which digital tools are misused to shift administrative pressure downward through excessive reporting, repetitive data submission, forced check-ins, rankings or online performance metrics.

The new rules explicitly ban compulsory functions such as daily sign-ins, points-based rankings, and mandatory online time tracking, except in special cases such as security or emergency response. They also prohibit forcing downloads, assessing app usage rates, or turning apps into platforms for disguised inspections and routine performance evaluations.

To strengthen oversight, the measures establish a unified filing system. All government apps must complete filing

procedures before launch, clearly display their sponsoring entity and filing number, and undergo technical testing. Apps with major functional changes must reapply for filing, while those that are discontinued must be reported and deregistered in a timely manner. Existing government apps are required to complete filing within six months of the measures taking effect.

In addition, the document places strong emphasis on security and compliance.

Sponsors bear primary responsibility for app construction, use and security. All regions and departments will implement relevant laws and regulations concerning cybersecurity, data security, security protection of critical information infrastructure, personal information protection, cryptographic management, and management of mobile Internet application information services, as

well as protect data and personal information security in accordance with laws and regulations. Regular inspections and risk assessments are also required to ensure stable and secure performance.

Furthermore, the measures encourage greater integration and consolidation of government apps, promoting data sharing and intensive construction and eliminating low-usage, low-practicality or overlapping platforms. They will simultaneously encourage the use of government mobile applications to genuinely enhance grassroots governance and public service delivery.

According to officials from the Cyberspace Administration of China, the measures are designed to form a long-term mechanism to prevent formalism in digital governance, while enabling government mobile applications to better serve public needs with efficiency.

# Guideline Maps Path to Build Zero-carbon Factories

By LIN Yuchen

China has set its sights on building zero-carbon factories faster, in order to develop industrial green transformation and support the country's goals of carbon peaking and carbon neutrality.

To make this happen, a new guideline has been released defining a zero-carbon factory as an industrial facility that continuously reduces carbon dioxide emissions and gradually approaches near-zero emissions within the factory boundary, through the use of technolog-

ical innovation, structural adjustment and management optimization. The guideline was jointly released by five government departments, including the Ministry of Industry and Information Technology and the National Development and Reform Commission.

The initiative aims to guide industrial enterprises in piloting zero-carbon practices, and promote emission reduction and efficiency improvement across industries to foster the development of new-quality productive forces tailored to local conditions.

The guideline calls for the deep integration of green energy with modern manufacturing, technological innovation with industrial upgrading, and green transformation with intelligent manufacturing, all in order to drive fundamental changes in produc-

tion technologies and operational models.

A phased and differentiated approach will be adopted. From 2026, China plans to select a group of zero-carbon factories to play a demonstrative role. By 2027, a batch of zero-carbon factories are to be established in sectors such as automobiles, lithium batteries, photovoltaics, electronic appliances, light industry, machinery and computing facilities. This will form a preliminary industrial ecosystem covering energy supply, technology development, standards and financial support. By 2030, the initiative aims to expand to sectors including steel, non-ferrous metals, petrochemicals, building materials and textiles, exploring new decarbonization pathways for traditionally high energy consuming industries.

The guideline outlines six key implementation pathways, including establishing standardized carbon accounting systems, accelerating the green and low-carbon transformation of energy consumption structure, significantly improving energy utilization efficiency,

promoting product carbon footprint analysis to drive supply-chain-wide emission reductions, enhancing digital and intelligent capabilities to achieve smart carbon control, and using carbon offset mechanisms and information disclosure to achieve near-zero emissions.

Enterprises are encouraged to increase the use of renewable energy, apply advanced energy-saving equipment, and adopt digital technologies such as industrial Internet, big data, artificial intelligence and digital twins to enable precise monitoring and intelligent control of energy consumption and carbon emissions.

To ensure effective implementation, local industrial and information technology authorities are urged to strengthen coordination, improve standard systems, and promote market-oriented energy-saving and carbon-reduction services.

The guideline also highlights the importance of developing professionals proficient in both international carbon related regulations and carbon neutrality practices, while enhancing international exchanges and cooperation.



## Case Study

# Innovation Makes Sturgeon Farming Flourish on Land

By SUN Jin & WU Chunxin

At a sturgeon farm in Yidu, a city in central Hubei province, a new water-recycling system is transforming how fish are raised on land.

Developed by Hubei Qingjiang Sturgeon Valley Special Fisheries Co., Ltd. with support from China's national freshwater fish research team, the system cuts water use by 95 percent, increases output per unit area by more than five times, and ensures over 98 percent of the sturgeon survive transportation across distances longer than 5,000 kilometers.

This technology, known as advanced live sturgeon transport, was included in the first batch of advanced and applicable technologies for science and technology-based poverty alleviation under the Belt and Road Initiative recently released by the China Rural Technology Development Center of the Ministry of Agriculture and Rural Affairs.

It reflects how Yidu, a county-level city, is integrating scientific innovation with industrial development.

**Growing fish on land**

As environmental regulations restrict traditional net-cage aquaculture in rivers, moving sturgeon production onto land has become essential. Sturgeon Valley therefore adopted a recirculating aquaculture system that reuses and purifies water, making farming both sustainable and efficient.

or the first application of a new technology cycle.

Industrial projects led by high-level talents can receive up to 5 million RMB in funding. The city also allocates 3 million RMB each year to support key technological research by local companies.

At a 2025 meeting on business environment and innovation, Yidu distributed 9.55 million RMB in cash rewards and approved 110 million RMB in special loans for science and technology and talent development. These measures have significantly boosted local enterprises' capacity to innovate.

**Building an innovation ecosystem**

"Yidu's innovation model has shifted from isolated breakthroughs to a systematic approach," said Shen Xiyang, director of the Yidu Municipal Bureau of Science and Technology.

The government, industry, universities, and research institutions are now working together more effectively.

A key player is the Yidu Industrial Technology Research Institute, established in 2022 by Hubei University. It has organized more than 500 expert visits to local companies, finding 55 specific technical needs.

For example, Yidu Huayang Chemical Co., Ltd. was stuck at a critical stage in developing ultraviolet absorbers for over a year. Then Yidu Industrial Technology Research Institute brought in experts, who found a solution in less than two months.

Transporting large sturgeon, especially those raised for caviar, over long distances used to be a major challenge. Conventional methods often caused high mortality due to stress. The new approach manages every step of the process: capture, temporary holding, sedation, transport, and recovery.

In 2020, the system was tested when 12 tonnes of live sturgeon were shipped from Yidu to Kazakhstan. All the fish survived, setting a record for live sturgeon exports from Hubei.

In October 2025, Sturgeon Valley made its first live shipment to Vietnam, achieving a breakthrough in exports to that market.

**Government incentives**

Sturgeon Valley's progress is backed by strong local policies. Yidu offers rewards of up to 10 million RMB to enterprises that develop pioneering products, such as new equipment, advanced materials, specialized software,

Yidu has also built a demand-driven technology innovation platform in line with provincial strategy. So far, over 650 enterprises have joined the platform, posting innovation requests.

**Innovation across sectors**

Yidu's innovation efforts go beyond sturgeon farming. The city has nurtured three companies that are among Hubei's Top 100 High-Tech Enterprises and 27 emerging high-tech firms.

One of them, Yichang Dongyang Sunshine Bio-Pharmaceutical Co., Ltd., has been recognized as a "moose" enterprise, a provincial title for fast-growing, high-potential tech companies.

Today, Yidu is focused on turning individual innovations into coordinated industrial strengths. By channeling more scientific resources into real-world production, the city aims to drive high-quality economic growth and realize the vision that "the world looks to China for sturgeon, and China looks to Qingjiang."



Sturgeon Valley in Yidu, Hubei province. (PHOTO: XINHUA)

# Industries of the Future to Be Boosted

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The province will also advance industrial big data platforms to provide key data support for industries of the future like aerospace information and unmanned aerial vehicles.

Enterprises need to fully play their principal role in the development of industries of the future. According to Cao Zhongxiong, assistant president of China Development Institute in Shenzhen in south China, this means market forces and entrepreneurship will be more fully harnessed in the direction of

R&D, resource allocation and commercialization and application of sci-tech achievements.

In Shanghai, the brain-computer interface industry faces unprecedented opportunities.

An official from the city's municipal commission of science and technology said Shanghai will guide enterprises to continuously advance core technologies and refine product quality with a focus on clinical needs, making sure that cutting-edge science and technology truly benefits people's lives.

U.S. Exit from WHO Threatens Global Public Health



By LIANG Yilian & HU Dingkun

On January 22, the United States announced it had completed its withdrawal from the World Health Organization (WHO). The withdrawal, he warned, "makes the U.S. unsafe ... and makes the rest of the world unsafe, so it's not really the right decision."

The process began on January 20, 2025, when the U.S. president signed an executive order to exit the organization. Two days later, WHO received formal notice from the U.S. According to WHO regulations, a member state can finalize its withdrawal only one year after submitting such a request.

"Withdrawal from WHO is a loss for the United States, and it's also a loss for the rest of the world," WHO Director-General Tedros Adhanom Ghebreyesus said. "The withdrawal, he warned, makes the U.S. unsafe ... and makes the rest of the world unsafe, so it's not really the right decision."

The U.S. reportedly still owes 278 million USD in unpaid WHO dues. According to U.S. news organization STAT News, a U.S. State Department spokesperson stated that Washington does not intend to settle this debt. Hence the U.S. is leaving with both a financial shortfall and an unresolved obligation.

The withdrawal represents a clear retreat from international responsibility and poses a serious threat to global public health security. WHO serves as a cornerstone of global health governance. In 2023, the U.S. was one of its largest contributors, providing both assessed and voluntary funding. The abrupt and uncoordinated exit has created a major funding gap, forcing WHO to scale back staff



World Health Organization Director-General Tedros Adhanom Ghebreyesus speaks during a press briefing in Geneva, Switzerland. (PHOTO: XINHUA)

and critical health programs over the past year.

The budgetary constraints will likely reduce resources for low- and middle-income countries, which depend on WHO for funding and health guidance.

Judd Walson, chair of the Department of International Health at Johns Hopkins University, warned that "as countries experience worse health — more mortality and morbidity — economic conditions worsen as sick populations can't work, and the economic situation of already poor countries deteriorates further. Political instability follows, with mass migration, war and conflict, and now things start spilling over borders."

WHO also functions as a central platform for sharing infectious disease data and coordinating responses to global health emergencies. The U.S. has faced persistent public health challenges

in recent years, including repeated H5N1 avian influenza cross-species transmission events and a measles outbreak in 2025 that reached its highest level since 1992.

Leaving WHO weakens the U.S. role in global outbreak coordination and reduces other countries' ability to access timely and accurate disease data from within U.S. borders.

As Madhukar Pai, Canada research chair in Epidemiology and Global Health at the Montreal-based McGill University, noted, if a new outbreak emerges and the U.S. does not participate in coordinated global response efforts, neighboring countries such as Canada may be among the first to feel the impact.

The decision also carries serious consequences for U.S. national security. *Time* magazine reported that one of the first things that could change for U.S. scientists is their access to databases

that are important for monitoring infectious diseases like influenza, as well as emerging threats that could affect the health of Americans, such as COVID.

While many of these data sources are public, and U.S. scientists will continue to access them, they might not have as much insight into how the raw data were collected and processed, Walson said. That could be important for understanding how to interpret the information and for getting a head start on potentially dangerous outbreaks of new infectious diseases.

"By pulling out, we are not just losing our ability to provide data, but also to contribute to the dialogue and make sure we have a say in understanding why the flu vaccine is being composed in the way it is every year," said Dr. Jeanne Marrazzo, CEO of the Infectious Diseases Society of America (IDSA) and former director of the National Institute of Allergy and Infectious Diseases.

The move is widely seen as another anti-science action by the U.S. government.

On January 22, IDSA issued a statement condemning the withdrawal.

"The U.S. withdrawal from the World Health Organization is a short-sighted and misguided abandonment of our global health commitments. Global cooperation and communication are critical to keep our own citizens protected because germs do not respect borders," Ronald Nahass, president of IDSA, told ABC News.

The U.S. government should restore respect for scientific evidence and international responsibility by rejoining WHO as soon as possible — rather than positioning itself as a disruptor of global public health governance.

Data Flow Should Be Safe and Steady

Comment

By LIANG Yilian & ZHANG Mengran

Amid the omnipresent tide of the digital age, January 28 marked another Data Privacy Day. Data protection has gone far beyond static notions of "privacy protection," shifting instead toward a more dynamic focus: how to ensure the free and orderly flow of data within stringent security safeguards. Consequently, data is no longer just a technical concern; it has instead become a strategic choice shaping future development.

As the "fifth factor of production," after land, labor, capital and technology, data is as vital to human development as a foundation is to a building, or fuel is to an engine. From the perspective of national-level competition, data sovereignty represents a critical extension of state sovereignty in the digital era. Technological evolution relies on high-quality data

as the driving force behind rapid advancement of AI. The quality of data and ethical principles governing its use significantly influence the direction taken by an intelligent society.

The global landscape of data governance, however, is influenced by a proliferation of competing rules. This ramps up digital competition and regulatory rivalry between Europe and the United States, which highlights the urgency of establishing international rules that are secure, fair and orderly. In addition, barriers and divisions are impeding the legitimate global circulation of data as a factor of production, presenting a shared challenge for the international community to overcome obstacles and unblock channels.

During this historic process, China has been an active participant and a constructive contributor. It is committed to promoting a governance framework that balances security and development and coordinates order with circulation on multilateral international platforms, offering a mutually beneficial

"Chinese solution" to the formulation of global rules. The success of this process lies in China's own domestic practice and in-depth exploration of coordinating data security with data factor market reforms.

Recently, the national data work conference, held in December 2025, designated 2026 as the year of promoting the value of data resources, a significant decision. It was made on the back of the macroeconomy's urgent need for new sources of growth, marking a critical stage for testing and actioning the basic systems for data and major projects built during the 14th Five-Year Plan period (2021-2025). This reflects the inevitable conditions for developing new quality productive forces for high-quality data supply. While the market seeks a smooth flow of data, success means more than placing data on platforms; rather, it lies in ensuring that data creates value as it circulates.

The true essence of the "Chinese solution" means exploring an innovative path toward efficient and orderly

data flows. Through constant domestic innovation, market cultivation and technological safeguards — such as accelerating the development of a secure, open and unified national data market, building infrastructure for cross-border data flow services, and formulating industry-specific guidelines for cross-border data transfers — China is providing credible and workable examples for international rule-making. Participating in, and advancing international regulatory dialogue, shapes a growing consensus that ultimately influences domestic governance. This creates a virtuous cycle, where internal momentum and external engagement reinforce each other.

Eventually, these efforts seek to realize data's potential as a factor of production and empower all sectors of the economy. Only by ensuring the smooth flow of data and making effective use of its power, can we effectively manage the digital civilization — safeguarding the present while shaping a sustainable digital future.

Voice of the World

China's Sci-tech Innovation Leads the Way

By Staff Reporters

International institutions have recently published a series of reports to review global technological development in 2025. China's achievements in this field have been particularly notable, with many sci-tech research results recognized as major scientific breakthroughs.

In the field of basic research, several Chinese cities rank among the leaders globally in scientific research indices, and China's pool of top scientific research talent is growing. Meanwhile, in emerging technologies, China's breakthroughs in AI large model algorithms and applications, quantum technology and industrialization, and new energy have received significant attention.

According to the technology company Digital Science, China has over 30,000 AI researchers, which is three times the number of those in the U.S. Furthermore, China's number of AI postdoctoral fellows and doctoral students is nearly twice that of the total number of AI researchers in the U.S., giving it a unique advantage in long-term innovation.

In January 2026, Microsoft released a report stating that the popularity of DeepSeek in countries such as Russia, Belarus, Iran and in Africa has experienced "explosive" growth. In the field of advanced chips closely related to AI computing power, the financial research institution Bernstein Research predicts that in 2026, local enterprises such as Huawei will occupy 80 percent of the Chinese AI chip market, while NVIDIA's market share will drop to eight percent.

The U.S. journal *Eurasia Review* has reported that the most influential code is not being guarded in California, but is

being shared with the world from Hangzhou and Beijing.

According to statistics from institutions such as the Massachusetts Institute of Technology at the end of November 2025, the download volumes of Chinese open-source models like DeepSeek and Qwen have accounted for 17 percent of the global total, surpassing any similar models in the U.S.

*Nature* magazine stated that DeepSeek R1 is extremely close to the related top models in the U.S., and boasts much lower training costs than that of its competitors.

Apart from the algorithmic innovations, Chinese AI large models are also moving rapidly towards the application end. A report released by Stanford University in the fourth quarter of 2025 said: Since the beginning of 2025, the growth rate of derivative models based on Alibaba's Qwen and DeepSeek has exceeded that of any other base models.

According to a report by the World Economic Forum, a collaborative effort between various stakeholders, including government, industries, universities, research institutes and end-users, is promoting the widespread adoption of AI throughout China. This collaboration is driving the development of AI industry clusters and nurturing a vibrant AI ecosystem.

International observers believe that China's extremely high social acceptance of AI has provided fertile ground for its rapid experimentation and deployment in the fields of healthcare, education and poverty reduction. This "social consensus" is one of the core competitive advantages for the long-term development of AI in China.



Alibaba's Qwen3-Max-Thinking model. (PHOTO: VCG)

Hi-Tech

AI-driven Cultural Jewelry Celebrates Year of Horse

By LI Linxu

TTF AI, a leader in AI-driven jewelry creation, and the Shenzhen Art Museum jointly launched the 2026 Year of the Horse Spring AI Jewelry Design Exhibition in Shenzhen on January 28, marking the official commencement of their strategic cooperation partnership.

The exhibition showcases nearly 200 AI-generated design paintings on canvas and more than 60 pieces of jewelry items designed and fabricated by AI.

A highlight of the launch ceremony was the debut of a cultural and creative jewelry masterpiece — the "Zheng Wan Li" ("Galloping Thousands Miles") brooch.

In this work, AI transcends its role as a technical instrument, becoming a novel creative force actively engaged in its creative logic and formal derivation.

Inspired by the Tang Dynasty's "Zhaoling Liujun" ("Six Steeds of Zhao Mausoleum") stone reliefs, the brooch fuses the grandeur of ancient Chinese sculpture with contemporary jewelry design.

Its silhouette is defined by sharp,

angular lines sculpting a horse's head with precision, while its mane — rendered as blade-like ridges — pulses with dynamic tension, capturing the instant of a stallion in full gallop.

Beyond form, the piece embodies the unyielding spirit of the striving individual and resonates with the pulse of our current era: Each sharp edge becomes a metaphor for resilience, each line a testament to perseverance — transforming metal into a manifesto of courage.

In Chinese culture, the horse embodies the spirit of pioneering, ambition and long-distance journeying. The brooch is not merely the gallop of a steed, but a posture of persistent exploration, and a relentless pushing beyond boundaries.



◀The "Zheng Wan Li" brooch, an AI-driven cultural jewelry. (COURTESY PHOTO)

Rising Integration of Technology and Industry in 2025

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By December 2025, China had released over 1,500 industrial large models, covering 50 sectors and more than 700 scenarios. The application of large models in the production and manufacturing process has grown significantly, with cases increasing to 25.9 percent from 19.9 percent in the previous year.

This indicates that AI has been upgraded from an auxiliary tool to the "core engine" for the transformation and upgrading of traditional manufacturing.

In 2025, the low-altitude economy took a significant step from pilot exploration to large-scale implementation. Six cities became national pilots for electric vertical take-off and landing aircraft operations, expanding the application scenarios of low-altitude technology.

The output of industrial robots, new energy vehicles and integrated circuits increased by 28 percent, 25 percent and 11 percent respectively year on year.

**Institutional support**

Successful technology-industry integration cannot be achieved without

strong institutional support. The principal role of enterprises in sci-tech innovation has been reinforced and the role of state-owned and central enterprises strengthened.

From January to November 2025, the R&D investment of central enterprises reached 890 billion RMB, achieving over 120 landmark results.

In 2025, many deep-rooted obstacles to technological industrialization were gradually removed.

For instance, Nanjing Tech University gave 90 percent of the ownership of its job-related sci-tech achievements to

their developers, which greatly encouraged researchers, according to Jiang Min, the director of the university's institute of science.

Universities across the country are exploring innovative practices from multiple perspectives and implementing sci-tech achievements throughout entire industrial chains.

On May 14, seven authorities jointly issued a set of guidelines with 15 measures to promote financial services for sci-tech innovation, including those to boost venture investment, credit supply and insurance support.

# My Astrophysics Research 'Grew Up' Here

## Dialogue

By Staff Reporters

At Fudan University's Jiangwan Campus in Shanghai, Cosimo Bambi is often seen jogging around the physics building. He runs without headphones, keeps a steady pace, and sometimes waves to students. Some say he resembles Sheldon from the American sitcom *The Big Bang Theory*, not because of eccentric habits, but because of his sharp eyes and quiet focus. In reality, he is grounded and has spent the last 13 years helping build a research field that barely existed in China when he arrived.

In 2025, Bambi received the Chinese Government Friendship Award, the highest honor for foreign experts. He noted that many recipients are senior scholars who came to China after long careers abroad. "But my experience is a bit different; I 'grew up' here in China," he said.

### Starting from zero

Bambi earned his PhD in 2007 from the University of Ferrara in Italy under Alexander Dolgov, a leading figure in cosmology. He then worked as a post-doctoral researcher at Wayne State University in the United States, the University of Tokyo's Institute for the Physics and Mathematics of the Universe, and Ludwig Maximilian University in Munich.

During his time in Tokyo, he first considered moving to China. He learned from Chinese colleagues that the country was investing heavily in scientific research and offering real opportunities for young researchers. Knowing that Fudan is one of China's top universities, he decided to give it a try.

He joined Fudan as a full-time faculty member in late 2012. At the time, the physics department had strong programs in condensed matter physics but



Professor Cosimo Bambi. (PHOTO: Fudan University)

no active research in high-energy astrophysics, gravitation, or cosmology. Bambi stepped into that gap.

He introduced Fudan's first courses in astrophysics and cosmology for both undergraduate and graduate students. To support teaching, he wrote *Introduction to Particle Cosmology: The Standard Model of Cosmology and its Open Problems*, which became the only Chinese-language university textbook in particle cosmology in the country. Later, he published an updated *Introduction to General Relativity* that included modern topics such as gravitational waves and cosmological models, subjects rarely covered in Chinese academic materials at the time.

His research focuses on using X-ray observations to probe the extreme gravitational fields around black holes, a key testing ground for Einstein's theory of General Relativity. He and his team analyze data from China's Hard X-ray Modulation Telescope and provide theoretical frameworks for interpreting signals from

black hole systems. He says today's technology is advanced enough to treat the entire universe as a laboratory, something that was impossible in the past due to limited measurement precision.

### A global team in Shanghai

Under Bambi's guidance, undergraduates in his department regularly publish first-author papers in peer-reviewed journals, typically no fewer than six each year.

He finds Chinese students highly self-motivated and hardworking. Even when facing language barriers, they ask questions and take the initiative.

His core research group includes two postdocs and seven PhD students from the United States, India, Pakistan, Colombia, and Uzbekistan. He believes scientific progress requires collaboration, as different backgrounds bring different ways of thinking and help avoid blind spots.

As a mentor, he avoids micromanaging. He encourages students to find their own motivation, emphasizing that

what matters is not how they get results but that they choose to pursue them.

Outside the lab, Bambi enjoys running. He is often seen jogging around the campus. His office shelves display medals from marathons and university races. He once won Fudan's 10-kilometer faculty event. A sports bag and towel sit ready by the door. He says running clears his mind and sometimes sparks new ideas.

He also works to strengthen academic ties between China and Italy. In 2015, he co-founded the Association of Italian Scholars in China to promote cooperation in science and education. He has organized workshops and helped arrange exchanges between Fudan and overseas institutions.

In 2021, he obtained permanent residency in China. "I really enjoy life here," he said.

His academic record includes over 210 papers as first or corresponding author, more than 14,000 citations, 13 academic books, and one popular science book. He received the Shanghai Magnolia Memorial Award in 2018, the Magnolia Honor Award in 2022, and the Xu Guangqi Prize from the Italian Embassy in Beijing.

Bambi acknowledges that his field deals with questions that may not yield practical applications for decades. But he sees value in the pursuit itself. People naturally wonder where the universe came from and how it works, and that curiosity drives science forward.

He remains focused on training students, analyzing data, and testing theories. While he does not predict breakthroughs, he stays open to them. Tomorrow will surprise everyone, he says, and maybe some of those surprises will come from their little corner in Shanghai.

*This article was edited and translated based on the Chinese version by Fudan University.*

Reading China initiative at the London Book Fair is a recurrent exhibition, highlighting the country's development, economic growth, culture and the Chinese perspective.

At the Frankfurt Book Fair in Germany, the biggest in the world, China is a regular. Last year, the Beijing in Translation stand at the fair was a hit with adults, the original Chinese-style comic Gang Lan Jue drew in youngsters, and the Hong Kong Pavilion highlighted a modern field China reigns over: "Publishing 3.0+" and the integration of AI in publishing.

The Beijing International Book Fair and Shanghai International Children's Book Fair are among the major book fairs China hosts in two of its mega cities, supplemented by several more smaller ones.

According to the *China Publishers Special Report 2025*, China's digital reading market is growing. Audio books, e-books, web novel platforms, radio dramas, study courses on e-platforms and other innovations drove nearly 17 percent growth in 2024, with the revenue crossing 66 billion RMB.

charcoal for further use, keeping the area clean and tidy.

Bronze sieve: A "charcoal selection device," its body is covered with holes to sift out broken charcoal and impurities, ensuring the best charcoal burns more fully for better heating.

Experts believe that the logic behind this heating combination is similar to that of the wine vessels used by Shang Dynasty nobles. It takes into consideration the practical function of daily heating, while also demonstrating the owner's identity and status through the specifications of the complete set.

## Tech+Culture

# Digital Protection for Xi'an City Wall

By Staff Reporters

The Xi'an City Wall, initially built around 1,400 years ago in 582 AD during the Sui dynasty, now extends 13.74 kilometers, surrounding the ancient city of Xi'an in Shaanxi province, northwest China. As one of the oldest, largest and best-maintained ancient city fortifications in China, the wall has faced significant preservation and protection challenges. This is because its inner structure, primarily made of tamped earth, has eroded over time due to the elements.

However, AI has come to the rescue, solving this problem by creating a digital twin model of the wall with centimeter-level accuracy. This model utilizes over 3,000 monitoring points and more than 1,300 visual sensors placed along the entire wall. Along with additional data, restoration logs and visitor operation details, this system is currently overseen by a digital comprehensive management platform, or "super brain," which monitors slight indicators of structural stress to forecast possible risks.

"This platform, which makes full use of current facilities and resources,

was ultimately achieved with the help of experts, researchers and 14 laboratories specializing in wall preservation," said Zhao Bin, director of the Xi'an City Wall Digital Industry Innovation Center.

"Cultural heritage is not merely a relic to be exhibited; it must be brought to life using digital technology," he said. To effectively create the platform took a collaboration of digital technology with cultural heritage, resource integration, innovative ideas and experimentation.

According to Zhao, the digital platform has been significantly improved thanks to the alliance of experts and researchers from various disciplines. Not only does it play a vital role in overseeing the preservation of cultural heritage and offering early alerts, but it is also useful in managing cultural tourism, ensuring emergency safety and controlling floods.

Zhao said that the digital transformation of cultural heritage will transition from isolated innovations to a holistic system enhancement in the future. He believes that this Chinese solution could be adopted globally, enabling cultural heritage sites worldwide to benefit from China's digital technology.



The Yongning Gate of the city wall in Xi'an, the capital of Shaanxi province. (PHOTO: XINHUA)

## Electricity Generated from Carbon Dioxide

From page 1

### Vacuum diffusion welding

Microchannel processing was only the first step. The plates need to be stacked with the grooves facing each other, so that the flow channels could be formed. However, even the most experienced welders found it difficult to stack hundreds of plates precisely.

Huang carried out extensive research and turned his attention to vacuum diffusion welding technology. "Stack the plates one by one like pages of a book, apply vacuum, high temperature and high pressure, and the metal atoms will diffuse and bond tightly together," he explained.

However, China had no experience in this field, and countries who do, have included the technology in the commercial control list, with strict restrictions on its export. Huang was therefore determined to develop the technology with his team.

Over a period of 829 days, the team underwent 27 rounds of technical optimization and adjustment, along with 218 different welding parameters tested, leading to scrapped test samples filling half of the warehouse.

It was not until the early morning of a cold winter day in 2021 when the monitoring screen of the 49th process test suddenly showed a stable green curve that Liu repeatedly checked the flashing data and excitedly announced: "The welding was successful!"

### No leakage

The next challenge was to prevent

the leakage of sCO<sub>2</sub> through the gaps between the compressor and turbine motor, so as to reduce the energy loss of the unit.

At that time, there were already some successful cases abroad. Huang consulted foreign experts, who told him not to build units with a capacity of over 100 kilowatts. When they heard that Huang was going to build a megawatt unit, they saw it as mission impossible.

But Huang didn't give up and led the team to carefully analyze the materials and structures of multiple sealing techniques, and they finally decided to apply dry gas seals.

Although the dry gas sealing technology is stable, it cannot be directly adopted due to the high temperature and high pressure of the sCO<sub>2</sub> unit, said R&D team member Chen Yaoping.

The team went back to the drawing board, from static to dynamic, from low temperature to high temperature, and from low pressure to high pressure. In the laboratory, team members kept a close eye on the experimental status on the monitoring screen.

Huang's team eventually achieved success in the dry gas sealing for megawatt-level ultra-carbon turbines, which is a world first. Subsequently, the sCO<sub>2</sub> unit was verified in lab in 2019, the Chatan One project was inaugurated in 2023 and began commercial operation at the end of 2025.

## Traditional Eastern Wisdom

# Ancient Bronze Set Warms Homes in Winter

By BI Weizi

In modern life, people rely on heating or air conditioning to keep warm in the bitter cold of winter — but what did the ancients use?

During the Warring States period, people actually had a "three-piece set" for winter heating: a bronze charcoal brazier, a bronze shovel and a bronze sieve.

The bronze charcoal brazier is

quite different from modern stoves. With its shallow, flat-bottomed design, it resembles a "bronze frying pan" at first glance. The bottom is fitted with three short, animal-shaped legs, which support the main body of the brazier and keep it a safe distance from the ground to prevent the floor from being scorched.

The neck and belly of the brazier are adorned with exquisite red copper patterns, while symmetrical double-ring

handles balance both sides, each fitted with a carrying chain. These allow the brazier to be easily lifted and moved, providing "mobile heating."

But how exactly were these "three pieces" used?

Bronze charcoal brazier: The "heating core" of the trio, used for burning charcoal to provide heat.

Bronze shovel: A "charcoal ash collection tool," used to clean up the ash produced by the brazier and also to hold