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# Future Industrial development driven by University Science & Technology Park - Exploration and Practice of Building the Future Industrial Science Park for Biomedicine and Smart Mobility Based on the National University Science & Technology Park of Sun Yat-sen University

PLENERY 3 - INDUSTRIAL DEVELOPMENT DRIVEN BY INNOVATION SPACES

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**EXECUTIVE SUMMARY**

This paper briefly describes the advantageous conditions for cultivating future industries in Guangdong-Hong Kong-Macao Greater Bay Area (GBA), and focuses on introducing the constructive ideas and progress of the Future Industrial Science Park for biomedicine and future smart mobility which is jointly applied and constructed by Sun Yat-sen University and Sun Yat-sen University Science Park (SYSU Science Park), the Guangzhou Municipal Government and leading companies (for example Fortune Global 500 companies, such as the Guangzhou Automobile Group Co., Ltd. and Guangzhou Pharmaceutical Group Co., Ltd. etc.). It explores the path of university science parks in promoting future industrial developments, providing a reference for other AOIs to discuss.

Currently, there's no unified definition for "future industries". But there's a basic consensus on their main characteristics. Firstly, they are driven by scientific and technological innovation. Secondly, they are in the early industrial life - cycle stage, mostly embryonic. Thirdly, they feature strong uncertainty and externality. Fourthly, they play a key, supportive and leading role in economic and social transformation.

## BASIC SITUATION OF CULTIVATING AND DEVELOPING FUTURE INDUSTRIES IN THE GBA

### 1.1 Policy Background

Chinese President Xi Jinping attaches great importance to the development of future industries, emphasizing the need to quickly lay out future industries like the digital economy and life & health industry, vigorously boost scientific and technological innovation, and focus on strengthening new growth points to form new development drivers. The "14th Five-Year Plan (2021-25) for Economic and Social Development and Long-Range Objectives through the Year 2035" clearly proposes to plan future industries in advance, organizing and implementing future industry incubation and acceleration plans in cutting-edge technology and industrial transformation fields such as brain-like intelligence, quantum information, gene technology, future networks, deep sea, aerospace development, hydrogen energy and energy storage.

Guangdong Province prioritizes the development of future industry science parks as a key initiative to drive industrial growth in the GBA, support the GBA International Science and Technology Innovation Center, and advance the Guangzhou-Shenzhen-Hong Kong and Guangzhou-Zhuhai-Macao Innovation and Technology Corridors.

### 1.2 Scientific and Technological Innovation Foundation for Cultivating Future Industries in the GBA

The GBA is one of the regions with the highest degree of openness and the strongest economic vitality in China. It has established 2 national laboratories, 30 national key laboratories, and 430 provincial key laboratories[1], forming a tiered, diverse, and distinctive laboratory system and laying a solid foundation for innovation. In recent years, the regional R&D investment intensity has been continuously increased, the mechanism for transforming scientific and technological achievements has been gradually improved, the leading enterprises have played a vital role in industry technology innovation, and the demonstration effects of major platforms such as the GBA International Science and Technology Innovation Center have gradually emerged. The "Shenzhen-Hong Kong-Guangzhou" science and technology cluster has ranked second in the Global Innovation Index for five consecutive years[2].

The GBA is accelerating collaborative innovation. The Nansha branch of Guangzhou's National Supercomputing Center provides Hong Kong with computing power from "Tianhe-2" via a 100-megabit dedicated line, filling the gap of Hong Kong's lack of a top-level computing platform. Channels for funding Hong Kong and Macao's scientific research from the central government and Guangdong Province are already open. 25 key national R&D projects and over 130,000 sets of large-scale equipment are accessible to Hong Kong and Macao.

### 1.3 Advantages of Sun Yat-sen University in Future Industrial Cultivation

#### 1.3.1 Basic Conditions, Advantageous Disciplines and Interdisciplinary Construction

Sun Yat-sen University, founded by Dr. Sun Yat-sen, has a 100-year educational tradition. It is supervised by China's Ministry of Education and supported by the Ministry and Guangdong Province. The university is part of Project 211, Project 985, and the Double First-Class initiative. It has five campuses in Guangzhou, Zhuhai, and Shenzhen, and ten affiliated hospitals. It aims to be a world-class university and global learning center.

In recent years, the university has achieved significant basic research results, attracting high-level talent and strong support for scientific research. Key platforms like the National Supercomputing Center in Guangzhou have bolstered talent development, research, and innovation. Eleven disciplines are consistently listed in the "Double First-Class" initiative, and 21 disciplines rank in the top 1% globally

according to the March 2024 ESI rankings. The university has created a cross-research fund and interdisciplinary institutions, fostering frontier interdisciplinary growth, forming a comprehensive "arts, sciences, medicine, engineering, agriculture, and art" interdisciplinary framework.


*Image 1 – National Supercomputing center (Guangzhou)*

1.3.2 Remarkable Achievements in School Technology Achievements Transformation

The university has established a technology transfer system led by the Work Leading Group, managed by the Sun Yat-sen University Technology Transfer Center, supported by the library (National Intellectual Property Information Service Center) for intellectual property services, and assisted by institutions like the University Science Park and relevant departments. This system has created an effective incentive mechanism, resulting in 1.8 billion yuan in technology transfers over the past three years.

1.3.3 National University Science Park Serving for Regional Economic Development

SYSU Science Park was designated a national university science park in 2006 by the Ministry of Science and Technology and the Ministry of Education. As a national-level innovation platform, it focuses on technology transfer, industrializing research achievements, fostering innovative talent, and incubating tech-based enterprises, deeply integrated into the university's technology transfer and talent cultivation systems. It features the "Sun Yat-sen University Overseas Students Pioneer Park" and a full incubation chain of "nursery - incubator - accelerator." The park offers a comprehensive, multi-level service system, including basic, specialized, and tailored support for business incubation.

Since opening 20 years ago, SYSU Science Park has served over 1,200 start-ups, including 13 listed or "unicorn" companies, 132 high-tech firms, and 20 innovative enterprises, over 70% of our STPs are in information services, making it a hub for big data and IT companies. Currently, SYSU Science Park leverages Sun Yat-sen University's strengths in computer science, software engineering, and key platforms like the National Supercomputing Center in Guangzhou to drive tech innovation and startup incubation.

**UNIVERSITY SCIENCE PARKS PROMOTE THE DEVELOPMENT OF FUTURE INDUSTRIES - TAKING THE BIOMEDICAL AND SMART MOBILITY FUTURE INDUSTRIAL SCIENCE PARK AS AN EXAMPLE**

In 2021, the Ministry of Science and Technology and the Ministry of Education initiated pilot projects for future industry science parks, encouraging universities to collaborate with local governments and tech companies. Sun Yat-sen University, Guangzhou Municipal Government, and local firms successfully secured a spot in this initiative with their biomedical and smart mobility science park based on SYSU Science Park.

2.1 General Conception of Future Industrial Science Park Construction

2.1.1 Overall Thinking

With the main idea of "relying on new technologies, leading new demands, creating new driving forces, and expanding new spaces", the pilot construction of future industry science parks promotes the collaborative innovation of universities, local governments, and leading enterprises, improves the comprehensive industrial chain dominated by "disciplines + future industries"（which includes basic research, technological breakthroughs, industrial achievements, high-tech finance and talent cultivation ）, and strives to build a highland for cultivating future industries.

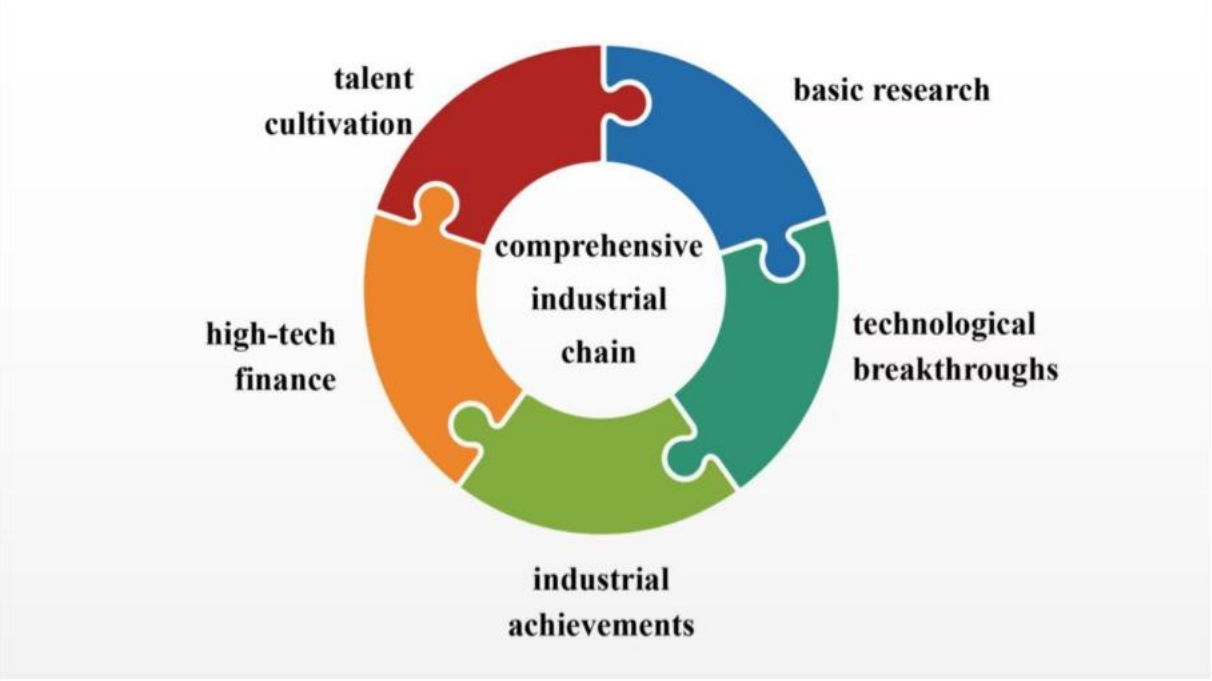


*Image 2 – Comprehensive industrial chain*

2.1.2 Overall Layout

With five campuses in the three cities of Guangzhou, Zhuhai and Shenzhen, combined with the industrial advantages of the GBA and the layout direction of future industries, focusing on the scientific and technological frontiers and major technological bottlenecks, with Guangzhou as the core start-up area, Shenzhen and Zhuhai as the expansion areas, and arranging in stages within other cities of the GBA, SYSU Science Park is gradually building a future industrial innovation incubation network, forming an "1 + 2 + N" overall layout.

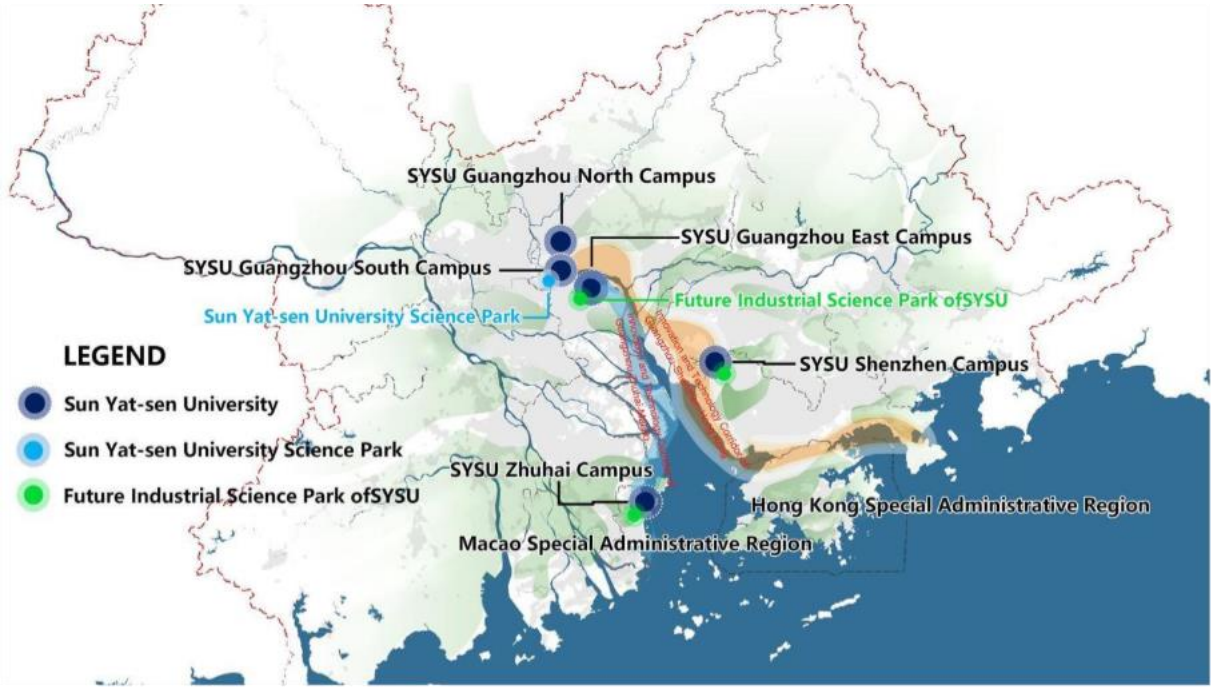


*Image 3 – Location of SYSU and Future Industrial Science Park*

"1" refers to Guangzhou city. It is planned to start the construction of the future industry science parks in the Innovation and Entrepreneurship Belt around universities. On Guangzhou International Bio Island, SYSU Science Park will collaborate with Guangzhou High-tech Development Zone and leading companies like Guangzhou Pharmaceutical Holdings to create a biomedical science park focused on gene diagnosis and treatment. In the Guangzhou Higher Education Mega Center, a smart mobility science park will be developed with Panyu District and leading companies, focusing on smart mobility and high-performance computing.

"2" refers to Shenzhen and Zhuhai cities. Driven by the Pearl River Delta, anchored by the Guangzhou-Shenzhen-Hong Kong and Guangzhou-Zhuhai-Macao innovation and technology corridors, relying on the advantageous disciplines of Sun Yat-sen University, fully linking the international cutting-edge technology innovation forces of Hong Kong University, Hong Kong University of Science and Technology, University of Macau and other universities, focusing on the key core technology fields of high-end medical devices and marine industries, SYSU Science Park will build future industry science parks to promote the integration of future industries into the economic and social development of Hong Kong and Macao special administrative regions.

"N" refers to other important node cities in the GBA. SYSU Science Park will continuously improve the multi-point radiation layout in the GBA.

2.2 Guangzhou Practice: Building a Smart Mobility Future Industrial Science Park

Sun Yat-sen University, leveraging its expertise in new-generation information technology, collaborates with Guangzhou's Panyu District Government and leading companies like Guangzhou Automobile Group Co., Ltd. （GAC Group）to establish the Smart Mobility Future Industrial Science Park. Supported by platforms such as the National IoT Chip and System Application Technology Lab and the Guangzhou National Supercomputing Center, the park focuses on key research areas like AI communication, advanced materials, core chips, avionics, flight control, and electric drive systems, aiming to advance core technologies and promote tech commercialization.

Founded in June 1997, GAC Group oversees over 20 prominent enterprises and R&D institutions, including Guangzhou Automobile Research Institute, GAC Motor, and GAC Aion New Energy. The group excels in automotive technology, innovation, and integrated capabilities.

The Smart Mobility Future Industrial Science Park will be in the Guangzhou Higher Education Mega Center, which is located at the geometric center of the GBA, as the "South China Intelligence Core" of the GBA and the core area of the Guangzhou Artificial Intelligence and Digital Economy Pilot Zone, adjacent to Guangzhou Automobile Research Institute. After 20 years of development, the Guangzhou Higher Education Mega Center has been built into a city of science and education with 12 universities, becoming the most concentrated area of scientific, educational, and innovative resources in South China. It is home to more than 1,400 doctoral supervisors, 67 academicians, and 72 recipients of the National Science Fund for Distinguished Young Scholars. The National Supercomputing Center in Guangzhou and 213 various scientific research platforms are also located here[3].

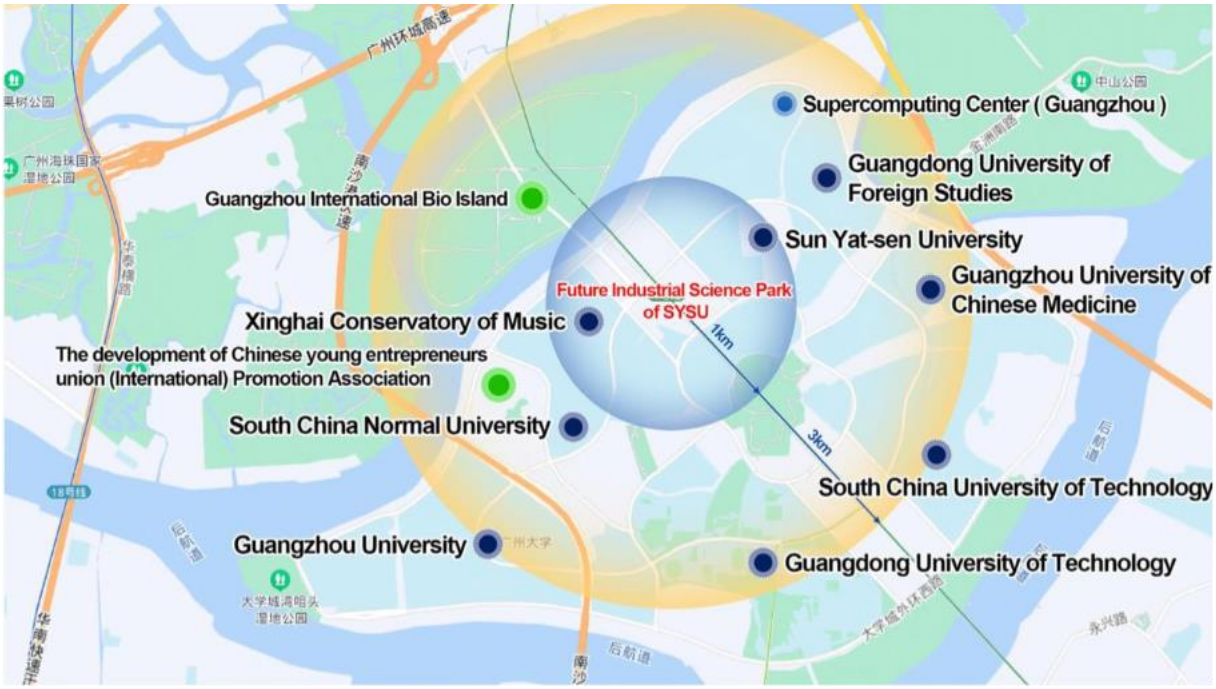


*Image 4 – Innovative resources of  Guangzhou Higher Education Mega Center*

2.2.1 Supercomputing Empowers Proof-of-Concept and "Advanced Incubation"

The National Supercomputing Center in Guangzhou is an important support platform for Sun Yat-sen University to carry out major scientific research and serve national and regional economic and social development in response to the needs of academic frontiers, national major strategic needs, and regional economic and social development. It has now built a series of supercomputing application platforms for future industries and fields such as astronomy, geophysics, atmospheric and marine environment, biomedical health, strategic engineering and advanced manufacturing, new energy and new materials, artificial intelligence and smart cities. It is one of the supercomputing centers with the widest application fields and the highest utilization rate in the world. In the ranking of the most influential supercomputing centers in global applications, it ranks among the top five in the world[4].

SYSU Science Park and the National Supercomputing Center in Guangzhou jointly build the Guangzhou Supercomputing and Artificial Intelligence Proof-of-Concept Center, exploring new models of future

industry incubation and "advanced incubation". Focusing on the proof-of-concept closed-loop of "basic research - technological innovation - engineering application - industrial development ", carrying out technical and commercial verification of future industry technology achievements, helping scientific research achievements to bridge the "valley of death", smoothing the technology transfer chain of future industries, and accelerating the creation of future industry application scenarios; promoting the integration of computing and intelligence, enterprise innovation, and achievement transformation, integrating multiple resources such as technology, entrepreneurship, talent, and finance, and providing all-round support for project incubation.

2.2.2 Construction of Service Platforms

Technology Innovation Service Center. The Future Smart Mobility Industry Science Park will establish an advanced computing and big data innovation platform, along with a smart transportation and AI joint laboratory. Leveraging Sun Yat-sen University's expertise, talent, and innovation teams, and supported by platforms like the Guangzhou National Supercomputing Center and the National Digital Home Engineering Technology Research Center, it will focus on high-performance computing, AI, big data, flying cars, and intelligent connected vehicles.

Intellectual Property Service Center. The Future Smart Mobility Industry Science Park will enhance its intellectual property services, collaborate closely with the university's Academy of Sciences to build a high-end team skilled in technology transfer, investment, and enterprise management, and support the development of standards across the entire process of "scientific research, testing, evaluation, development, and application" in cutting-edge technology fields.

Enterprise Incubation Service Center. The Future Smart Mobility Industry Science Park will provide a full-chain incubation services for enterprises and projects, set up a proof-of-concept center and acceleration area specifically to provide incubation services for projects at different stages.

High-level Talent Service Center. The Future Smart Mobility Industry Science Park will attract and pool talents and high-caliber personnel through more proactive, open, and effective talent policies. At the same time, through a more flexible employment mechanism, it will stimulate the innovation and entrepreneurship enthusiasm of high-level talents, to construct a set of innovative and entrepreneurial talent teams that support the development of future industries with high standards.

Sci-Tech Finance Service Center. The Future Smart Mobility Industry Science Park, supported by government funds, leading enterprises, and social capital, establishes a fund system covering proof-of-concept, seed-stage, angel, venture capital, and merger investments. This system aims to bridge the gap in transforming scientific achievements into technology, products, industries, and capital, addressing the financing needs of enterprises at every stage of their lifecycle.

Application Scenario Service Center. The Future Smart Mobility Industry Science Park establishes test fields for design, production, testing, and maintenance, driving future industry technologies through large-scale product applications. It integrates next-gen IT with manufacturing, accelerates industrial chain transformation, and explores new future manufacturing applications.

2.2.3 Construction Milestones

(1) 2024: Co-construction Agreement with Panyu District Government

In 2024, Sun Yat-sen University signed a co-construction agreement for the Future Industrial Science Park with the Panyu District Government. Panyu District will provide construction sites and operation funds to jointly build a national demonstration park of future industry science park.

(2) 2025: Future Smart Mobility Industry Science Park is scheduled to launch in H2

The Future Smart Mobility Industry Science Park is in the Computing Science and Big Data Industrial Park in Guangzhou Higher Education Mega Center, with a total construction area of about 19 hundred square meters. It is currently undergoing renovation and will officially open in the second half of 2025.

*Image 5 – Future Industrial Science Park for Smart Mobility*

(3) Supercomputing & AI Proof-of-Concept Center in Future Industrial Science Park: Bridging Lab to Market

In January 2025, the Supercomputing and AI Proof-of-Concept Center, jointly established by SYSU Science Park and SYSU's School of Computer Science (National Supercomputing Center in Guangzhou), has been recognized as the "Guangzhou Proof-of-Concept Center." Located in the Future Smart Mobility Industry Science Park, it will collaborate with the government, leading enterprises, and financial institutions to provide high-end tech services, innovation incubation, and sci-tech finance support. Focusing on early-stage "supercomputing" and "artificial intelligence" technologies, it will verify technical and market feasibility, facilitating the transition of lab achievements to the market. By January 2025, the center had secured agreements with project teams in fields such as intelligent driving algorithms, decision-making, group game methods, and AI theory and algorithm development.

**FUTURE OUTLOOK: TRENDS AND PROSPECTS**

By 2026, our Future Industrial Science Park, equipped with advanced mechanisms and efficient operations, aims to become a national model for future industry parks. Focusing on cutting-edge fields like biomedicine, smart mobility, and high-performance computing, it will establish a full-chain incubation platform spanning from startup nurseries to industrial parks, attract and nurture at least 15 top-tier talents and innovation teams in disruptive technologies, and incubate over 20 leading high-tech enterprises in specialized sectors.

By 2030, our Future Industrial Science Park aims to form 2 - 3 future industry clusters and build a "disciplines + future industries" innovation ecosystem, covering basic research, tech breakthroughs, industrialization, high - tech finance, and talent development. It will attract and nurture at least 40 top talents and innovation teams in disruptive technologies, solve core and bottleneck tech problems, and incubate over 10 leading enterprises like "single champions", "hidden champions", "future unicorns", "unicorns", and listed firms in specialized areas.

By 2035, based on the success of the Future Industrial Science Park pilot, we plan to set up 4 - 5 such parks in the GBA. These parks will be innovation platforms and resource networks for future industries, creating multiple billion - level industry clusters. As cooperation hubs for universities, local governments, and leading enterprises, they will leverage university knowledge, government resources, and corporate innovation to become industrial innovation and incubation centers, promoting university discipline integration, talent cultivation, and the growth of future industries and the new economy.

Looking to the future, as a national innovation platform that promotes the transformation and industrialization of achievements in an organized manner, university science parks will fully leverage their supporting role in serving the transfer of scientific and technological achievements from universities, cultivating innovative talents, and incubating technology-based enterprises. By integrating the strengths of universities and the market, they will become pioneering parks for the development of new quality productive forces and make greater contributions to the growth of future industries.