Translation

The following Chinese government plan aims to improve China's tech ecosystem, chiefly through specific measures to make it easier to convert technological breakthroughs into commercial products or other practical applications. Most of the plan focuses on domestic innovation, but it also proposes new ways for China to exploit foreign technologies through tech transfer, talent recruitment, and so forth.

Title
Special Plan for the Technology Factor of Production Market in the 14th Five-Year Plan Period
"十四五"技术要素市场专项规划

Author
Chinese Ministry of Science and Technology (MOST; 科学技术部; 科技部)

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Special Plan for the Technology Factor of Production Market in the 14th Five-Year Plan Period

Accelerating the development of the technology factor of production (技术要素) market is an important part of perfecting the socialist market economic structure (社会主义市场经济体制), and has important significance for achieving high-level scientific and technological (S&T) self-reliance (自立自强), and for accelerating construction of the new development pattern that takes domestic great circulation as the mainstay and in which domestic and international dual circulation are mutually reinforcing (以国内大

循环为主体、国内国际双循环相互促进的新发展格局). This Plan has been formulated based on the requirements of *Opinions of the Chinese Communist Party (CCP) Central Committee and the State Council on Improving the Systems and Mechanisms for Market-Based Allocation of Factors of Production*, *Opinions of the CCP Central Committee and the State Council on Accelerating the Improvement of the Socialist Market Economic Structure in the New Era*, and *Opinions of the CCP Central Committee and the State Council on Accelerating the Construction of a Unified National Market*.

I. Situational Requirements

(i) Development foundation.

During the 13th Five-Year Plan period [2016-2020], China made great efforts to promote reform based on the market allocation of technology factors of production, and strengthened market mechanisms and demand orientation. The market allocation of innovation resources had significant results, mechanisms for converting S&T achievements into practical applications (科技成果转化) were continuously innovated, the technology factor of production market management and service system was increasingly perfected, technology trading grew increasingly active, the environment for technology factor of production market development was significantly optimized, and operational efficiency was continuously improved.

1. Important breakthroughs were made in the legal and policy system for the technology factor of production market, and its strategic position was highlighted. During the 13th Five-Year Plan period, the market allocation system for technology factors of production was gradually improved. The *Civil Code of the People's Republic of China* was promulgated, systematically improving the legal system for technology contracts, and comprehensively upgrading the basic legal norms for the market allocation of technology factors of production. The *Patent Law of the People's Republic of China* was revised to comprehensively strengthen the protection of intellectual property (IP) for technology factors of production and promote the conversion and application of technology factors of production. The Ministry of Science and Technology (MOST) formulated and issued *Several Opinions on the Development of the Technology Market*, which made comprehensive deployments for developing the technology factor of production market, improving technology transfer mechanisms, and promoting industrialization of S&T achievements. The property rights system conducive to the free flow of technology factors of production was improved, delegating the right to use, dispose of, and benefit from the S&T achievements of institutions of higher education ("universities"), and pilot projects were carried out to

give scientific researchers ownership or long-term use of job-related S&T achievements. The incentive system for the distribution of technology transaction proceeds was improved, significantly increasing the proportion of cash rewards and share rewards for scientific researchers. Preferential tax policies were implemented to promote technology trading, making technology transfers, technology development, and other technology contracts exempt from value-added tax (VAT), reducing or exempting corporate income tax, etc.

2. The scale of the technology factor of production market leaped to a new level, contributing to a new high level of economic growth. During the 13th Five-Year Plan period, the central position of S&T innovation in overall national development became more prominent, and policies on the conversion of S&T achievements into practical applications and on innovation and entrepreneurship were introduced intensively. The technology factor of production market was fully bursting with vitality and showed a good development trend. In 2020, a total of 549,400 technology contracts were registered nationwide with a transaction value of 2.83 trillion Chinese yuan Renminbi (RMB), 2.87 times the amount at the end of the 12th Five-Year Plan period [2011-2015], with average annual growth of 23.49%. The average value of individual technology contracts increased to RMB 5,142,700 from RMB 3,202,500 at the end of the 12th Five-Year Plan period, with average annual growth of nearly 10%. The value of technology contract transactions as a proportion of GDP increased steadily from 1.43% at the end of the 12th Five-Year Plan to 2.79%, and the contribution of the technology factor of production market to economic development continued to grow stronger. In the technology factor of production market, transactions by innovation entities were more active, and enterprises, as the main force in allocating innovation resources, continued to maintain their mainstay status in technology trading. In 2020, enterprises had a total output of 385,400 technologies, with a transaction value of RMB 2.58 trillion, which was 3.05 times that at the end of the 12th Five-Year Plan period, and accounted for 91.4% of technology transaction value nationwide. In 2020, output from universities amounted to 143,900 technologies, with a transaction value of RMB 167.28 billion, 1.91 times that at the end of the 12th Five-Year Plan.

3. The management and service systems for the technology factor of production market continued to be improved and the layout was progressively optimized. The management and service systems for the technology factor of production market developed rapidly during the 13th Five-Year Plan period. An improved four-level technology factor of production market management system at the national, provincial, city, and county levels was established. By the end of 2020, more than 1,000

technology factor of production market management institutions at all levels had been built nationwide, effectively promoting the free flow and efficient allocation of technology factors of production. Eleven national technology transfer regional centers, nine national demonstration zones for the transfer and conversion of S&T achievements into practical applications, 420 national technology transfer institutions, 45 international technology transfer centers, and 36 national technology transfer talent training bases had been built, and more than 10,000 technology brokers had been trained. Beijing, Tianjin, Chengdu, and other places added a technology manager specialty in their professional title evaluations, opening channels for the professional title promotion of technology transfer talents. Technology entrepreneurship incubators developed rapidly. More than 5,800 technology business incubators and 8,500 makerspaces were built nationwide, including more than 1,200 national-level incubators.

4. There was integrated development of technology factors of production and capital factors of production, and closer interaction between capital markets at multiple levels. During the 13th Five-Year Plan period, the diversified investment and financing system for the technology factor of production market developed rapidly, and the supply of funding and financial services became increasingly abundant and improved. The government ramped up financial support for the technology factor of production market, and the leverage and guiding role of government fiscal funding (财政资金) became increasingly significant. MOST and the Ministry of Finance set up the National Fund for Technology Transfer and Commercialization, and by the end of 2020, the Fund had set up 30 sub-funds with a total sub-fund scale of RMB 42.237 billion, and invested in 402 enterprises covering all high-tech fields and strategic emerging industries supported by the State, which further drove 20 provinces and cities to set up S&T achievement conversion guidance funds with a total scale of about RMB 140 billion. MOST, the Industrial and Commercial Bank of China (ICBC), China Construction Bank, the Bank of China, the Shanghai Stock Exchange, and the Shenzhen Stock Exchange jointly implemented a series of financial services, such as the "Ten-Hundred-Thousand-Ten Thousand" special initiative for S&T finance, "Science and Technology Entrepreneur Harbor," "Enterprise Innovation Score-Based Loans" and the "Torch - Star Sailing Science and Innovation Initiative" (火炬—星启航科创行动), to provide accurate and effective financial support for technology startups.

(ii) Opportunities and Challenges

The evolution of the new round of technological revolution and industrial transformation has accelerated, the digital economy has emerged strongly, and the

integration of technology factors of production and other kinds of factors of production has accelerated. The entry of China's economy into a new stage of high-quality development, the complete, accurate, and comprehensive implementation of the new concept of development (新发展理念), and the construction of the new pattern of development (新发展格局) have necessitated accelerating the development of a high-standard technology factor of production market.

1. Accelerating technology factor of production market development is an important part of accelerating the improvement of the socialist market economic structure. Improving the market allocation of technology factors of production is an inherent requirement of building a unified, open, competitive, and orderly market system, and is an important part of adhering to and improving the socialist market economic structure. Technology being an advanced factor of production (高级生产要素), the development and improvement of the technology factor of production market is bound to impose more and higher requirements for the construction of the existing market system, requiring a more sound and perfected property rights system, a fairer and more orderly market competition order, more active capital factor of production markets, and a more accommodating and prudent modern market supervision system. At the same time, the market allocation of technology factors of production necessarily requires solving issues of deeper institutional mechanisms and more effective overall coordination between government and markets, and between S&T and economic and social development.

2. Accelerating technology factor of production market development is an important institutional guarantee for achieving a high level of S&T self-reliance. Important institutional guarantees for unblocking the virtuous cycle of S&T, industry, and finance, and achieving a high level of S&T self-reliance include: Promoting the market-based reform of technology factors of production, building a high-standard technology factor of production market with abundant and high-quality supply, active transactions, convenient and efficient value discovery and realization, and smooth and effective market allocation; further breaking down the institutional and institutional barriers that hinder the efficient circulation of technology factors of production; and improving the efficiency of resource allocation for S&T innovation.

3. Accelerating technology factor of production market development urgently requires high-quality technology supply. China's economy has shifted from the stage of high-speed growth to the stage of high-quality development, and is in a critical period of transforming the mode of development (转变发展方式), optimizing the economic structure, and changing the drivers of growth. To achieve our carbon emission peak and

carbon neutrality goals, and to ensure the security and stability of production chains and supply chains, China's economic and social development and improvement of the people's livelihoods are more in need of S&T solutions than ever before, and it is necessary to accelerate the conversion of S&T achievements into real productive forces (生产力), thereby generating new momentum for high-quality economic development.

4. Accelerating technology factor of production market development requires further promoting the integration of technology with other factors of production such as capital. The role of capital in promoting the conversion of S&T achievements into practical applications is increasingly prominent, and smooth financing channels and a good financial environment are conducive to accelerating the virtuous cycle of S&T, finance, and industry. Talent is the basis of S&T development, and the interaction and integration of technology and talent factors of production is key to the construction of a high-standard market system. Data, as a new type of factor of production, will enable a restructuring of the technology factor of production market's organizational model and hasten the creation of new technology factor of production market business models. The integrated development of technology factors of production with other factors of production is conducive to enhancing a multiple-factor-of-production coordinated allocation effect and further promoting the quality improvement of technology factor of production market development.

Given the new circumstances and new requirements, the development of China's technology factor of production market faces the following problems: (1) The reform of the market allocation of technology factors of production lacks top-level design, (2) the interconnectivity of the national technology trading network needs to be improved, (3) mechanisms and systems for promoting the efficient flow of technology factors of production have not yet been fully established, including rights confirmation, pricing, and trading mechanisms, and credit and regulatory systems; (4) IP protection needs to be further strengthened; (5) the technology transfer system needs to be improved, and specialized service capabilities are not strong; (6) the coordinated allocation of technology and other factors of production such as capital needs to be more effective; and (7) the degree of internationalization of the technology factor of production market is insufficient, and the ability to gather together global technology factors of production needs to be improved.

II. Overall Requirements

(i) Guiding ideology.

Persist in taking Xi Jinping Thought on Socialism with Chinese Characteristics for

a New Era as the guide, fully implement the spirit of the 19th Party Congress and the various plenums of the 19th Central Committee, persist in the general work guideline of seeking progress while maintaining stability, persist in the main line of supply-side structural reform, completely, accurately, and comprehensively implement the new concept of development. Focus on breaking down institutional obstacles to the free flow of technology factors of production; expand the scope of market-based allocation of technology factors of production; promote the smooth flow of technology factors of production within a wider range; achieve clearly defined property rights, market-determined prices, autonomous and orderly flows, and efficient and equitable allocation; and lay a solid foundation for promoting high-quality economic development, modernizing national governance, and building an innovation-oriented country (创新型国家).

(ii) Basic principles.

1. Market determination and orderly flows. Give full play to the important role of the market in the pricing and trading of technology factors of production, clear circulation channels, and assure equal access to technology factors of production for different market entities. Fully mobilize the enthusiasm of various market participants, stimulate market competition, and promote the allocation of technology factors of production to achieve effectiveness maximization and efficiency optimization.

2. Improve systems and innovate regulation. Make better use of the role of government, improve the technology factor of production market system and operation system, refine government regulation and supervision, achieve the organic combination of loosening the reins (放活) and good management, improve supervision and service ability, improve the unity of policies and the consistency of rules, and guide the synergistic concentration of technology factors of production and other kinds of factors of production into advanced productive forces (先进生产力).

3. Problem-oriented approach, step-by-step progress. Take targeted measures to address such problems as the imperfect property rights system for S&T achievements, the failure to give full play to the market's role in allocating S&T innovation resources, and the continued existence of deep-rooted institutional barriers that obstruct the free flow of technology factors of production. Insist on starting from the actual situation, respect objective laws, and steadily promote reform of the institutions and mechanisms for market-based allocation.

(iii) Development objectives.

During the 14th Five-Year Plan period [2021-2025], the reform of market

allocation of technology factors of production will be deepened, a modernized market system and operation system for technology factors of production will be basically established, the market will play a decisive role in the allocation of resources for S&T innovation, the scale of technology trading will be continuously expanded, and a high-standard technology factor of production market will be basically built that is unified and open, with orderly competition, complete systems, and perfected governance. We will strive to achieve the following specific goals by 2025.

1. The technology factor of production market system will be basically complete. The top-level design of the technology factor of production market will be perfected, the property rights system for S&T achievements will be clear, market-based pricing and trading mechanisms will be sound, supervision will have comprehensive coverage, the management level will be significantly improved, the credit management and risk prevention and control mechanisms will be effective, supporting implementation policies will be solidly put into effect, and the systemic, holistic, and synergistic aspects of technology factor of production market system construction will be significantly enhanced.

2. The interconnectivity and interoperability of the technology factor of production trading network will be basically completed. Three national institutions for trading S&T achievement property and IP—China Technology Exchange (中国技术交易所), Shanghai Technology Exchange (上海技术交易所), and Shenzhen Stock Exchange—will be basically completed, and a number of regional and industrial technology trading institutions will be interconnected, forming a technology factor of production trading network that is multi-tiered and multifaceted, with distinctive features and a complete set of functions. The scale of the national technology trading market will continue to expand, with the value of technology contracts reaching RMB 5 trillion.

3. The technology factor of production market service system will be coordinated and efficient. The leading role of national technology transfer regional centers will become more and more evident, the ability of technology transfer institutions in terms of market-oriented and specialized services will be significantly improved, the technology transfer talent cadre will continue to grow, and the technology transfer service system will be further refined. The number of national demonstration zones for the transfer and conversion of S&T achievements will reach 20, the number of national technology transfer regional centers will reach 15, the number of national technology transfer institutions will reach 500, the number of international technology transfer centers will exceed 60, and the number of technology managers will exceed 30,000.

4. The effectiveness of market-based allocation of technology factors of

production will be greatly increased. The supply of high-quality S&T achievements for market demand will be increased significantly, and technology factors of production will achieve free flow and effective allocation, with deep integration with other factors of production such as capital, and the ability to support major national development strategies, promote industrial upgrading, and promote economic development will be markedly enhanced.

III. Key Tasks

(i) Improve the property rights system for S&T achievements.

1. Deepen the reform of S&T achievement usage rights, disposal rights, and benefit rights. Deepen pilot projects giving scientific researchers ownership or long-term use rights over job-related S&T achievements, explore management systems, workflows, decision-making mechanisms, and conversion models for enabling the conversion of S&T achievements into practical applications, establish a mechanism for tolerating mistakes and correcting errors in the conversion of job-related S&T achievements into practical applications, and distill exemplary experiences and initiatives and promote them in a timely manner. Improve mechanisms for sharing S&T achievement rights and interests, and implement property right incentives, so as to further mobilize the enthusiasm of all parties in the S&T achievement conversion process.

Column 1. Pilot projects giving scientific researchers rights to the ownership or long-term use of job-related S&T achievements

To explore the reform of the property rights system of S&T achievements, carry out pilot projects giving scientific researchers rights of ownership or long-term use of job-related S&T achievements, form a set of operable, replicable, and effective experiences, and promote them on a society-wide scale.

Establish empowerment (赋权) mechanisms for job-related S&T achievements. Encourage pilot work units to establish efficient and smooth management systems, workflows, and decision-making mechanisms to empower [employees as regards] job-related S&T achievements, establish a negative checklist (负面清单) for empowering [employees as regards] S&T achievements, and clarify the rights and obligations of all parties in regards to the conversion of job-related S&T achievements into practical applications.

Optimize the management and service systems of the whole process for converting S&T achievements into practical applications. Improve mechanisms for

distributing income from job-related S&T achievement conversion so that they fully reflect an orientation toward the value of knowledge (知识价值导向), and optimize the management system for the conversion of S&T achievements into practical applications, thereby smoothing the way for the transfer and conversion of S&T achievements.

Establish a due diligence exemption (尽职免责) mechanism for the conversion of S&T achievements into practical applications. Encourage pilot work units to improve the management process for the conversion of S&T achievements into practical applications, formulate norms and rules of due diligence, and eliminate the concerns of units and scientific researchers. For judgments on S&T achievement conversion activities, take whether they are in line with the spirit of the central authorities (中央精神) and the direction of reform and whether they are conducive to S&T achievement conversion as the qualitative standards, and implement prudent and inclusive regulation.

2. Expand the autonomy of universities in the management of S&T achievements. Promote the reform of research institutes, accelerate the establishment of modern research institute management systems, and promote the market-oriented and enterprise-oriented development of applied technology R&D-type research institutes. Explore the establishment of a management system for job-related S&T achievements of universities that is different from the existing system for state-owned assets, carry out a pilot reform on separate, direct management of job-related S&T achievements of universities, and promote a shift in the management of S&T achievements of universities from "administrative control of assets" to "market allocation of resources."

3. Strengthen the protection and application of intellectual property rights. Explore establishing a rapid response mechanism for IP infringement. Establish rules for IP protection in different areas of research, and compile and publish enterprise IP protection guidelines and country-specific IP protection guidelines. Strengthen the IP management of national S&T program projects, and, in the establishment and implementation of projects, strengthen the layout and quality management of S&T achievement IP from key projects.

(ii) Strengthen the supply of high-quality S&T achievements

1. Strengthen the mainstay status of enterprise innovation. Comprehensively boost the participation of enterprises in the study and formulation of national S&T innovation plans, S&T plans, innovation policies, and technical standards. Give full play to the "question writing" and "grading" roles of enterprises, and support leading S&T

enterprises in taking the lead to form innovation consortia. Encourage state-owned enterprises (SOEs) to lay out and construct sources of original technology, and enhance their sensitivity to demand, source supply, resource allocation, and conversion and application abilities for original technologies. Incorporate S&T achievement conversion performance as a core requirement in the innovation capacity evaluation system for SOEs. In the key special projects of the National Key R&D Program, earmark a certain amount of the budget to fund R&D activities of S&T-oriented small and medium-size enterprises. Encourage the licensing of government-funded S&T achievements that meet certain conditions to small and medium-size enterprises. To support enterprise innovation, further increase the opening up (开放) of innovation resources and application scenarios such as facility platforms, data, and technology verification environments.

2. Reform the project establishment and implementation methods of S&T program projects. Explore the construction of an innovation service system with integrated allocation of all factors such as projects, platforms, talents, and funds. Support enterprises in taking on more scientific research tasks, and stimulate enterprises to step up their R&D investment, so as to improve S&T innovation performance. Study the establishment of diversified investment mechanisms for the construction and operation of major S&T infrastructure. Optimize the new project management system, strengthening the demand-driven, goal-led, results-oriented aspects. Carry out pilot projects for the S&T program project manager system and "owner system" (“业主制”). Improve the acceptance mechanism for application-type projects, taking whether they solve key and core technology (关键核心技术) problems as the main inspection criterion. Carry out post-project evaluation of application-type S&T program projects on a pilot basis, taking the industrialization and application of S&T achievements or industry promotion circumstances as important references for the continued implementation and rolling support of S&T projects.

3. Vigorously develop all kinds of new R&D institutions. Focusing on national strategic requirements, support S&T enterprises in cooperating with universities to establish technology innovation centers, industrial innovation centers, industrial technology research institutes, pilot bases, and other new high-level R&D institutions that use deep integration of industry, academia, research institutes, and users (产学研用) and innovate new mechanisms for the market-oriented operation of R&D institutions. Refine support policies for new types of R&D institutions, improve the evaluation indicators for such R&D institutions, and guide them in developing in the direction of combining "R&D, conversion, incubation, services, industry, capital" and

other functions in one. Support universities and enterprises in eastern China in jointly building special industry technology R&D and conversion platforms with western China, to jointly launch technological breakthroughs in characteristic industries (特色产业). Through review and evaluation, guide the China National High-Tech Industrial Development Zones (国家高新区), National Demonstration Zones for the Transfer and Conversion of S&T Achievements (国家科技成果转移转化示范区), etc., to construct pilot engineering services platforms for S&T achievements.

4. Improve the S&T achievement evaluation mechanism. Carry out pilot S&T achievement evaluation reform, promote comprehensive implementation of the *Guiding Opinions on Improving the Mechanism for the Evaluation of Scientific and Technological Achievements*, explore differentiated evaluation mechanisms that conform to the characteristics of different types of S&T achievements, comprehensively and accurately evaluate the scientific, technical, economic, social, and cultural value of S&T achievements, form a simplified and practical evaluation system, norms, and processes for S&T achievements, and distill replicable and operational practices and promote them. Establish an evaluation orientation centered around the quality, performance, and contribution of S&T innovations, give full play to the orchestrating role of evaluation, stimulate the enthusiasm of S&T personnel, promote accelerated output of high-quality S&T achievements, and create a good innovation ecosystem.

Column 2. Pilot reform of S&T achievement evaluation

Carry out a pilot evaluation of S&T achievements, explore simplified and practical systems, norms, and processes, and promote them throughout society, and effectively establish an evaluation orientation centered around the quality, performance, and contribution of S&T innovations.

Establish a differentiated evaluation system for S&T achievements covering five dimensions of value. Select some pilot work units, refine differentiated evaluation criteria according to different types of achievements such as basic research, applied research, technology development, and industrialization, comprehensively evaluate the scientific, technical, economic, social, and cultural value of various S&T achievements, and form a diversified and differentiated evaluation mechanism consistent with the laws of science.

Develop market-based evaluation of S&T achievements. Establish a diversified approach to pricing market transactions of S&T achievements, and explore mechanisms for linking technology trading with the capital market. Strengthen the self-discipline and management of third-party S&T achievement evaluation

institutions, and improve the relevant management system, standards specification, and quality control system. Give full play to financial investment's role in S&T achievement evaluation, encourage financial institutions to establish relevant standards for the financial evaluation of S&T achievements, and develop asset evaluation methods suited to the characteristics of S&T achievements.

(iii) Build a high-standard technology exchange market.

1. Establish a nationwide unified and interconnected technology trading network. Support the China Technology Exchange, Shanghai Technology Exchange, and Shenzhen Stock Exchange in building national IP and S&T achievement property rights trading institutions to carry out IP transfer, licensing, and other operational services nationwide. Support national IP and S&T achievement property rights trading institutions in linking with various regional or industry technology trading institutions to unify rules, break down information "silos" and fragmented operations, and build a unified and interconnected nationwide technology trading market. Encourage technology trading institutions to work with asset evaluation, legal, auction, bidding, consulting, investment, and other types of professional service institutions in jointly establishing a comprehensive service system covering property rights definition, value assessment, circulation and trading, guarantees, and integrity supervision. Encourage the entry into trading of all kinds of S&T achievements, especially those financed by government fiscal funding.

Column 3. Construction of national IP and S&T achievement property rights trading institutions

Support the China Technology Exchange, Shanghai Technology Exchange, Shenzhen Stock Exchange and other institutions in building national IP and S&T achievement property rights trading institutions, and build a new generation of information infrastructure with advanced functions such as intelligent evaluation and analysis, accurate matching of supply and demand, statistical monitoring of transactions, and big data-based risk warning.

Support the China Technology Exchange in establishing a cross-regional mechanism for the joint release of information on S&T achievements and IP transactions. Explore paths for the industrialization and capitalization of technology factors of production, and carry out diversified financing services such as IP securitization. In conjunction with the Beijing Stock Exchange, study the construction of a mechanism for coordination between the technology trading market and the

capital market.

Support the Shanghai Technology Exchange in exploring a mechanism for registering technology rights and interests in the Yangtze River Delta region, expand the general scope of technology trading certificates and technology contract recognition and registration, and build a high-quality technology-capital matchmaking platform. Promote trading of the S&T achievements of universities, focusing on pilot projects on empowerment of S&T achievements and other reforms, and thereby enrich the application scenarios, supporting services, and products for technology factors of production.

Support the Shenzhen Stock Exchange in building an IP and S&T achievement property rights trading center, create a technology-capital matchmaking platform, strengthen IP financing services and property rights (equity) financing services for S&T achievements, and provide supporting services such as exhibiting and pushing relevant information on demand for transfers of equity derived in the process of IP and S&T achievement industrialization.

2. Improve the technology trading market management system. Revise technology contract recognition rules and the methods for managing S&T achievement registration, develop data standards for technology trading, and improve data quality and standardization. Optimize the national technology contract recognition and registration system, strengthen the management of technology contract recognition and registration, and form a national technology market monitoring, analysis, and evaluation system. Increase the ability to use big data and other means to provide early warning and identification of market operation risk, and improve technology trading risk prevention, control, and treatment mechanisms and integrity risk supervision mechanisms. Establish a social credit system for the technology trading market and a credit evaluation system for service providers, improve mechanisms for identifying breaches of trust, jointly disciplining breaches of trust, repairing credit, etc., and strengthen information sharing on scientific research integrity. In accordance with law, intensify the crackdown on breaches of trust so as to assure the rights and interests of the main parties to transactions and create a level playing field. Encourage local governments to formulate regulations and supporting policies on technology trading market administration.

3. Establish industry norms for the technology trading market. Fully utilize the leadership role played by national IP and S&T achievement property rights trading institutions in the nationwide unified technology trading market, jointly establish a

standardized mechanism and process for market-based trading of S&T achievements, and develop industry standards. Improve pricing mechanisms, such as agreement pricing, listing transactions, auctions, and asset evaluation, for diversified market trading of S&T achievements. Strengthen the ability of professional services such as information gathering, price discovery, supply-demand matching, etc., to achieve an organic balance of market discovery and risk control.

(iv) Raise the effectiveness of specialized services in the technology factor of production market.

1. Enhance the specialized service ability of technology transfer institutions. Improve the layout of national technology transfer regional centers, focusing on national regional strategies, and promote the construction of national technology transfer regional centers in the Yellow River Basin, Hainan Free Trade Port, and the Guangdong-Hong Kong-Macau Greater Bay Area. Encourage universities and S&T enterprises to set up technology transfer departments to carry out the transfer and conversion of S&T achievements. Carry out pilot projects on specialized national technology transfer institutions of universities, with universities establishing technology transfer institutions to serve the technology trading and achievement conversion of their own units, and give incentives to technology transfer institutions based on their technology transfer performance. Encourage local governments to focus on incubating a number of market-oriented specialized technology transfer institutions, gather high-end professionals, and enhance service capabilities and service levels. Strengthen the review and evaluation of national technology transfer institutions and international technology transfer centers, implement dynamic management, and establish an exit mechanism. Support technology transfer institutions in establishing industry associations or alliances, and enhancing their specialized service ability, to strengthen industry self-regulation and management.

Column 4. Construction of specialized technology transfer institutions
Carry out pilot construction of specialized national technology transfer institutions in universities. Pilot universities will establish technology transfer institutions to coordinate the management and conversion of S&T achievements, and provide integrated services within S&T achievement transfer and conversion activities, including policy and regulatory consultation, research on cutting-edge technology, evaluation of S&T achievements, market research and analysis, and negotiation of legal agreements. Establish a team of professional personnel, with no less than 70% of the personnel having received specialized education and training in technology

transfer. Improve the operating mechanisms of the institutions; for the whole technology transfer process, establish management standards and internal risk prevention and control systems, and establish a quality management system.

Optimize the layout of national technology transfer institution construction. Revise the *Administrative Measures for National Technology Transfer Demonstration Institutions*, improve the *Evaluation Indicator System for National Technology Transfer Demonstration Institutions*, establish a dynamic management mechanism, and follow up on review and evaluation in a timely manner, so that superior ones are rewarded and inferior ones are eliminated. Encourage makerspaces, investment institutions, and IP service institutions to expand technology transfer functions and enhance their technology transfer service ability.

2. Strengthen construction of the technology transfer talent team. Give full play to the role of technology managers in supply-demand matching, technology consulting, technology evaluation, and IP operations. Promote the inclusion of technology manager in the National Occupational Classification Code, so as to smooth the career development path. Support the occupational title evaluation of technology transfer personnel and improve evaluation standards for technology transfer and conversion occupational titles. Establish a credit evaluation mechanism for technology managers. Improve training mechanisms for technology transfer talents, promote professional academic credential education in technology transfer, and carry out society-oriented (社会化) training of technology managers. Strengthen the dynamic management of technology transfer talent training bases and establish mechanisms for performance assessment and for eliminating the inferior ones.

(v) Promote the integration of technology factors of production and other factors of production.

1. Promote the integration of technology and capital factors of production. Improve the regulatory system and development policies for venture capital. Adjust the National Fund for Technology Transfer and Commercialization sub-fund assessment indicator system to guide investment institutions to invest in earlier stages and smaller enterprises, so as to strengthen support for seed-stage and startup-stage S&T enterprises. Explore the "investment + incubation" model, and encourage innovation and entrepreneurship vehicles to set up angel investment funds. Explore the adoption of differentiated financial support approaches for the different stages of S&T achievements—proof of concept, pilot testing, and industrialization. Hold activities such as China Innovation Challenge, China Innovation and Entrepreneurship Competition,

TECH EXPRESS (科技成果直通车), and the Disruptive Technology Innovation Competition (颠覆性技术创新大赛) to provide platforms for linking technology with capital. Support financial institutions in setting up specialized branches for S&T finance, guide financial institutions to optimize their evaluation systems for S&T-based enterprises, and enrich the variety of financing service models such as investment-loan linkage, and increase financial support for achievement conversion and innovation and entrepreneurship talents. Encourage qualified local governments to carry out pilot projects on loan risk compensation for the conversion of S&T achievements into practical applications. Encourage innovation of S&T financial products, and promote capitalization of S&T achievements by adopting methods such as value of knowledge credit loans (知识价值信用贷款), pledge of expected income (预期收益质押), IP securitization, and S&T insurance.

Column 5. National Fund for Technology Transfer and Commercialization
Upgrade the National Fund for Technology Transfer and Commercialization. Revise the *Interim Measures for the Management of the Venture Capital Sub-Fund of the National Fund for Technology Transfer and Commercialization* to enhance the effectiveness of the venture capital sub-fund in supporting the conversion of S&T achievements into practical applications, strengthen the policy objectives, focus on supporting the conversion of S&T achievements of seed-stage and startup-stage S&T-based small and medium-size enterprises, and clarify the sub-fund's orientation as investing in early-stage and small enterprises and in hard S&T (硬科技). Improve the guidance and driving role of the Transfer and Commercialization Fund, and establish a number of new sub-funds to attract more social capital[1] and promote the diversification of capital investment. Encourage innovation and entrepreneurship vehicles to participate in the establishment of sub-funds, and explore new "incubation + investment" models, thereby promoting the conversion of S&T achievements into practical applications.

[1] Translator's note: The Chinese term 社会资本, translated literally as "social capital," and its synonyms "social funding" (社会资金), "social investment" (社会投资), and "social financing" (社会融资), refer to any source of funding outside of government budget outlays. These terms encompass investment by private individuals and private institutions. However, investment from state-funded entities such as state-owned enterprises (SOEs), including state-run banks, also falls under the umbrella of "social capital."

2. Support S&T personnel in implementing S&T achievement conversion through entrepreneurship. Support scientific researchers in universities who, in accordance with relevant national regulations, work part time or take a leave of absence from their jobs to innovate and start their own businesses. Explore the establishment of cross-regional, cross-ministerial, and cross-industry flow mechanisms for S&T talents, and improve "double employment door" (“双聘门”) or "revolving door" mechanisms for scientific researchers in universities and enterprises, so as to smooth the flow of talent between universities and enterprises. Enhance the professional service ability of entrepreneurial vehicles such as makerspaces and incubators, support cooperation between high-level research universities and local governments in carrying out pilot construction of future industrial S&T parks, etc., to provide whole-chain specialized services (sites, proof of concept, entrepreneurial training and counseling, investment and financing matchmaking, management consulting, etc.) to S&T personnel with S&T achievements for starting up S&T enterprises and implementing the conversion of S&T achievements into practical applications.

3. Improve the mechanisms for linking S&T program project achievement submission with regular roadshows. Improve the mechanism for registering and submitting national S&T program project achievements, encourage the submission and registration of achievements of S&T program projects funded by local government fiscal resources at all levels, and form a national S&T program project achievement database. Explore establishing a mechanism for linking regular information releases on national S&T program project achievements with roadshows, in order to promote the precise matching of S&T achievements with industry, finance, and other factors of production.

4. Implement demonstrations of S&T achievement conversion. Focusing on major national requirements, screen major S&T achievements and carry out organized demonstrations of S&T achievement conversion. Explore new modes of converting S&T achievements into practical applications, resolve the policy and institutional mechanism obstacles that constrain achievement conversion, and build application scenarios in key directions. Through demonstrations of the conversion of major S&T achievements into practical applications, support the security and stability of production chains and supply chains, and drive the development of new technologies and industries.

Column 6. Demonstration of major S&T achievement commercialization

During the 14th Five-Year Plan period, to address bottlenecks in supply chains and production chains in key regions, sort through technologies and form a technology supply list (技术供给清单) covering the whole production chain, precisely match technology demonstration, enterprise innovation, engineering construction, and scenario creation, promote demonstrations of the conversion of major S&T achievements into practical applications, and form "chain complementing and strengthening" technology clusters.

Through demonstrations of the conversion of major S&T achievements into practical applications, sort through the obstacles to S&T achievement conversion, and demonstrate formation mechanisms and models that run through the whole chain of S&T achievement conversion.

5. Deeply promote the construction of National Demonstration Zones for the Transfer and Conversion of S&T Achievements. Improve the monitoring and evaluation mechanisms and development report system of demonstration zones, promote the optimization and upgrading of existing demonstration zones, innovate mechanisms and carry out pilot trials of empowerment reform, market-based factor of production allocation reform, and S&T achievement evaluation reform, and build a pilot and demonstration zone for deepening reform of the S&T achievement conversion system and developing the technology factor of production market. In accordance with the S&T resource endowments and industrial advantages of each region, lay out a number of new, distinctive National Demonstration Zones for the Transfer and Conversion of S&T Achievements. Promote cooperation among demonstration zones to help solve the problem of unbalanced regional development.

Column 7. Construction of National Demonstration Zones for the Transfer and Conversion of S&T Achievements

Promote marketized allocation of technology factors of production. Establish and improve rules for technology transactions, service standards and norms, and the credit system for practitioners. Promote interoperability and mutual recognition of S&T innovation vouchers across regions. Actively explore the comprehensive use of post-project subsidies, guidance funds, risk compensation, S&T insurance, loan subsidies, and other ways to support the conversion of S&T achievements into

practical applications. Encourage demonstration zones to issue collective bonds for high-tech enterprises, support commercial banks in building S&T sub-branches and other special franchised institutions jointly with demonstration zones, and carry out market listing incubation activities for high-tech enterprises.

Carry out pilot trials of policies and systems. Implement the requirements of the *Guidelines for the Construction of National Demonstration Zones for the Transfer and Conversion of S&T Achievements*, improve the multi-agency coordination and linkage mechanisms of demonstration zones, clarify the main construction entities, and improve support for and assurance of personnel, funds, and policies. Encourage demonstration zones to improve their policy piloting mechanisms and expert consultation and guidance mechanisms, and establish a regular self-evaluation system. Encourage demonstration zones to establish a mechanism for linking with national and regional strategies, and promote exchanges and collaboration among demonstration zones.

(vi) Accelerate cross-border flows of technology factors of production.

1. Build an open technology factor of production market environment. Expand the opening up of S&T fields to the outside, strive to break down the barriers that constrain the cross-border flow of innovation factors of production, carry out pilot projects on facilitating the cross-border flow of innovation factors of production, and develop offshore innovation and entrepreneurship. Support Beijing in building a platform for hosting international innovation cooperation, support China (Shanghai) Pilot Free Trade Zone in building a global center for cross-border trade in technology, accelerate the application and demonstration of cross-border technology trading in the Guangdong-Hong Kong-Macau Greater Bay Area, and accelerate construction of the Hainan International Offshore Innovation and Entrepreneurship Demonstration Zone. Explore putting forward foreign scientists to lead government-supported S&T projects, and establish and improve the service system for foreign S&T talent. Boost the promotional role of Zhongguancun (ZGC) Forum and Pujiang Innovation Forum in converting S&T achievements into practical applications, protecting IP, and creating a first-class innovation ecosystem, etc., so they become national platforms for global S&T innovation exchange and cooperation.

2. Support enterprises in enhancing their ability to allocate technology factors of production globally. Vigorously develop trade in technology, promote diversified sources of technology imports, and expand technology exports. Enhance the open innovation ability of enterprises and encourage them to build various types of R&D

centers and innovation centers worldwide. Encourage enterprises to cooperate with teams of high-level S&T talents. Support industry-leading enterprises in taking the lead to form international industrial and standards organizations and actively participate in international rule-making.

3. Improve the international technology transfer collaboration network. Build global technology trading hubs in Beijing, Shanghai, and the Guangdong-Hong Kong-Macau Greater Bay Area, and support the development of National International S&T Cooperation Bases (国家国际科技合作基地). Encourage technology transfer institutions to enhance their service abilities by strengthening in-depth cooperation with foreign institutions for technology transfer, IP, market consulting, and other services. Build international technology transfer agencies, improve the international technology transfer and innovation cooperation network, and promote two-way technology transfer and business incubation.

IV. Assurance Measures

(i) Strengthen organization and leadership.

All local governments and departments must fully understand the importance of technology factor of production market construction work, and strengthen overall coordination. Strengthen the responsibilities of national, provincial, city, and county-level S&T management departments, take promoting reform of the market-based allocation of technology factors of production and promoting the transfer and conversion of S&T achievements as the main line, and improve the organization management and service system for technology factor of production market development. Give full play to the role of industry organizations in the technology factor of production market, and strengthen codes of conduct and industry self-regulation.

(ii) Establish a coordination mechanism.

Strengthen the policy collaboration and work coordination of departments for S&T, development and reform, government fiscal funding, finance, education, taxation, human resources, state-owned assets supervision, etc., and promote the effective connection and integrated development of technology factors of production with other factors of production, so as to promote the transfer and conversion of S&T achievements. Improve cross-sectoral and cross-regional linkage mechanisms to guide the efficient flow of technology factors of production between regions, and promote the interconnection of the national technology trading network.

(iii) Optimize the allocation of resources.

Give full play to the role of government guidance, and encourage local governments to ramp up support for the construction of technology trading markets, technology transfer service institutions, etc. Improve diversified, multi-channel, and sustainable investment mechanisms, and through risk compensation, post-project subsidies, guidance funds, and other ways, guide social capital to participate in the transfer and conversion of S&T achievements.

(iv) Do a good job of propaganda and guidance.

In a timely fashion, summarize experience regarding the reform of market-based allocation of technology factors of production, pilot projects giving researchers rights of ownership or long-term use of S&T achievements, the reform of S&T achievement evaluation, the construction of specialized national technology transfer institutions in universities, and other reform experiences, in order to actively publicize the of outstanding typical cases that emerge, promote advanced experiences and successful practices, and create a good atmosphere.

(v) Carry out monitoring and evaluation

Scientifically formulate annual work plans and promotion mechanisms, break down tasks well, and ensure that the targeted tasks are implemented properly. Establish mechanisms for plan monitoring, assessment, and dynamic adjustment, implement situation monitoring, and organize mid-term assessment and final summary assessment. Study and resolve problems in plan implementation, and make timely adjustments to planning objectives and tasks based on new circumstances, new changes, and new requirements.