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State Council issued

Notice of the New Generation Artificial Intelligence Development Plan

Guofa [2017] No. 35

The people's governments of all provinces, autonomous regions and municipalities directly under the Central Government, ministries and commissions of the State Council, and their respective agencies:

The "New Generation Artificial Intelligence Development Plan" is now printed to you, please implement it carefully.

State Council
July 8, 2017

(This item is released publicly)

A New Generation of Artificial Intelligence Development Planning

The rapid development of artificial intelligence will profoundly change the life of human society and change the world. In order to seize the major strategic opportunities for the development of artificial intelligence, build the first-mover advantage of China's artificial intelligence development, accelerate the construction of innovative countries and the world's scientific and technological powers, and formulate this plan in accordance with the requirements of the Party Central Committee and the State Council.

1. The Strategic Situation

The development of artificial intelligence has entered a new stage. After more than 60 years of evolution, especially driven by new theories and new technologies such as mobile Internet, big data, supercomputing, sensor network, brain science, and strong demand for economic and social development, artificial intelligence has accelerated development, showing deep learning, New features such as cross-border integration, human-machine

collaboration, open intelligence, and autonomous control. Big data-driven knowledge learning, cross-media collaborative processing, human-computer collaborative enhancement intelligence, group integration intelligence, and autonomous intelligent systems have become the focus of artificial intelligence development. Brain-like intelligence inspired by brain science research results is ready to go, chip hardwareization. The trend of platformization is more obvious, and the development of artificial intelligence has entered a new stage. At present, the overall advancement of a new generation of artificial intelligence related discipline development, theoretical modeling, technological innovation, software and hardware upgrades, etc., is triggering a chain breakthrough, and promoting economic and social fields from digital, network to intelligent acceleration.

Artificial intelligence has become a new focus of international competition. Artificial intelligence is a strategic technology that leads the future. The world's major developed countries regard the development of artificial intelligence as a major strategy to enhance national competitiveness and safeguard national security. They have stepped up the introduction of planning and policies, and strengthened the deployment around core technologies, top talents, and standards. Trying to take the lead in the new round of international technology competition. At present, China's national security and international competition situation is more complicated. It is necessary to look at the whole world, put the development of artificial intelligence at the national strategic level, systematically plan, and actively plan, firmly grasp the strategic initiative of international competition in the new stage of artificial intelligence development, and create new competitive advantages. Open up new space for development and effectively protect national security.

Artificial intelligence has become the new engine of economic development. As the core driving force of the new round of industrial transformation, artificial intelligence will further release the enormous energy of previous scientific and technological revolutions and industrial transformation savings, and create new powerful engines to reconstruct various links of production, distribution, exchange, consumption and other economic activities. From the macro to the micro-intelligent new demands, new technologies, new products, new industries, new formats, and new models have been spurred, leading to major changes in economic structure, profound changes in human production lifestyles and thinking patterns, and an overall leap in social productivity. . China's economic development has entered a new normal, and it is very difficult to deepen the supply-side structural reform task. It is necessary to accelerate the in-depth application of artificial intelligence, cultivate and strengthen the artificial intelligence industry, and inject new kinetic energy into China's economic development.

Artificial intelligence brings new opportunities for social construction. China is in the final stage of building a well-off society in an all-round way. The challenges of population aging, resource and environmental constraints are still severe. Artificial intelligence is widely used in education, medical care, pension, environmental protection, urban operation, and judicial services, which will greatly improve the public. The level of service precision is comprehensive to improve the quality of people's lives. Artificial intelligence technology can accurately

perceive, predict, and warn the major situation of infrastructure and social security operations, timely grasp group cognition and psychological changes, and make active decision-making responses, which will significantly improve the ability and level of social governance, and effectively prevent social stability. The role of substitution.

The uncertainty of the development of artificial intelligence brings new challenges. Artificial intelligence is a subversive technology that affects a wide range of issues. It may bring about changes in employment structure, impact on laws and social ethics, infringement of personal privacy, and challenges to international relations. It will have far-reaching implications for government management, economic security, social stability, and even global governance. influences. While vigorously developing artificial intelligence, we must attach great importance to the security risks that may arise, strengthen forward-looking prevention and constraint guidance, minimize risks, and ensure the safe, reliable, and controllable development of artificial intelligence.

China has a good foundation for the development of artificial intelligence. The state has deployed key special projects for national key R&D projects such as smart manufacturing, and issued and implemented the "Internet +" artificial intelligence three-year action implementation plan, and proposed a series of measures from the aspects of technology research and development, application promotion and industrial development. After years of continuous accumulation, China has made important progress in the field of artificial intelligence. The number of international scientific papers published and the number of invention patents has ranked second in the world, and key core technologies in some fields have achieved important breakthroughs. The world's leading voice recognition and visual recognition technologies, adaptive self-learning, intuitive perception, comprehensive reasoning, hybrid intelligence and group intelligence have the ability to leapfrog development, Chinese information processing, intelligent monitoring, biometrics, industrial robots, service robots, Unmanned driving has gradually entered practical applications, artificial intelligence innovation and entrepreneurship have become increasingly active, and a number of leading backbone enterprises have accelerated their growth and gained wide attention and recognition in the international arena. The accelerating accumulation of technical capabilities combined with massive data resources, huge application requirements, and open market environment has formed a unique advantage in the development of artificial intelligence in China.

At the same time, we must also clearly see that there is still a gap between the overall development level of artificial intelligence in China and developed countries, lacking major original results, in basic theories, core algorithms and key equipment, high-end chips, major products and systems, basic materials, There is a big gap in components, software and interfaces; scientific research institutions and enterprises have not yet formed an internationally influential ecosystem and industrial chain, lacking systematic advanced research and development layout; artificial intelligence cutting-edge talents are far from meeting demand; adapting to artificial intelligence development The infrastructure, policies and regulations, and standards system need to be improved.

In the face of new situations and new demands, we must actively seek change, firmly grasp the major historical opportunities for the development of artificial intelligence, closely follow the development, judge the general trend, actively plan, grasp the direction, seize the opportunities, and lead the world's artificial intelligence to develop new trends, services Economic and social development and support for national security have led to an overall leap in national competitiveness and leapfrog development.

2. The Overall Requirements

(1) Guiding ideology.

Fully implement the spirit of the Party's 18th and 18th Central, 4th, 5th and 6th Plenary Sessions, thoroughly study and implement the spirit of General Secretary Xi Jinping's series of important speeches and the new ideas, new ideas and strategies for governing the country, in accordance with the "five "One-piece" overall layout and "four comprehensive" strategic layout, conscientiously implement the decision-making and deployment of the Party Central Committee and the State Council, and implement the innovation-driven development strategy in an in-depth manner to accelerate the integration of artificial intelligence and economic, social and national defense as the main line to enhance the new generation of artificial intelligence. Science and technology innovation capabilities are the main direction, developing an intelligent economy, building an intelligent society, safeguarding national security, and building an ecosystem of knowledge groups, technology groups, industrial groups, and the mutual support of talents, institutions, and cultures, and anticipating risk challenges and promoting humanity. Sustainable development as the center of intelligence, comprehensively enhance social productivity, comprehensive national strength and national competitiveness, and provide for the acceleration of building an innovative country and a world of science and technology, achieving the goal of "two hundred years" and the Chinese nation's great rejuvenation of the Chinese dream Strong support.

(2) Basic principles.

Technology leadership. Grasp the development trend of artificial intelligence in the world, highlight the forward-looking nature of R&D deployment, explore layout and long-term support in key frontier areas, strive to achieve transformational and disruptive breakthroughs in theory, methods, tools, systems, etc., and comprehensively enhance the original innovation capability of artificial intelligence. Accelerate the construction of first-mover advantage and achieve high-end leading development.

System layout. According to the different characteristics of basic research, technology research and development, industrial development and industrial application, develop a targeted system development strategy. Give full play to the advantages of the socialist system to concentrate on major issues, promote the overall layout of projects, bases, and talents. The major projects that have been deployed are organically linked to the new tasks. There is an urgent need for continuous development with long-term development, innovation capacity building, institutional mechanism reform, and policy environment. Create synergy.

Market leading. Follow the market rules, adhere to the application orientation, highlight the main role of enterprises in the choice of technology routes and industry product standards, accelerate the commercial application of artificial intelligence technology results, and form a competitive advantage. Grasping the government and market division of labor, and giving full play to the important role of the government in planning guidance, policy support, security prevention, market supervision, environmental creation, and ethical regulations.

Open source is open. Advocate the concept of open source sharing, and promote the sharing of innovation among industry, education and research. Follow the law of coordinated development of economic construction and national defense construction, promote the two-way transformation and application of military and civilian scientific and technological achievements, and jointly build and share military and civilian innovation resources, and form a new pattern of deep integration of military and civilian development with all factors, multiple fields and high efficiency. Actively participate in the global R&D and governance of artificial intelligence, and optimize the allocation of innovative resources on a global scale.

(3) Strategic objectives.

Take three steps:

The first step is to synchronize the overall technology and application of artificial intelligence with the world advanced level by 2020. The artificial intelligence industry has become a new important economic growth point. The application of artificial intelligence technology has become a new way to improve people's livelihood, and it has strongly supported the entry into the ranks of innovative countries. The goal of building a well-off society in an all-round way.

-- A new generation of artificial intelligence theory and technology has made important progress. Key technologies such as big data intelligence, cross-media intelligence, group intelligence, hybrid enhanced intelligence, and autonomous intelligent systems have made important progress, and artificial intelligence model methods, core devices, high-end equipment and basic software have achieved landmark results.

—The competitiveness of artificial intelligence industry has entered the international first phalanx. The artificial intelligence technical standards, service systems and industrial ecological chain were initially established, and some of the world's leading artificial intelligence backbone enterprises were cultivated. The artificial intelligence core industry scale exceeded 150 billion yuan, driving the related industries to exceed 1 trillion yuan.

—The artificial intelligence development environment was further optimized, and innovative applications were launched in key areas. A group of high-level talent teams and innovation teams were gathered, and artificial intelligence ethics and policies and regulations in some areas were initially established.

In the second step, by 2025, the basic theory of artificial intelligence has achieved a major breakthrough, and some technologies and applications have reached the world's leading level. Artificial intelligence has become the main driving force for China's industrial

upgrading and economic transformation, and the construction of intelligent society has made positive progress.

—The new generation of artificial intelligence theory and technology system was initially established, and artificial intelligence with independent learning ability made breakthroughs, and achieved leading research results in various fields.

-- The artificial intelligence industry has entered the high end of the global value chain. A new generation of artificial intelligence has been widely used in the fields of intelligent manufacturing, intelligent medical care, smart city, intelligent agriculture, and national defense construction. The scale of the artificial intelligence core industry exceeds 400 billion yuan, driving the related industries to exceed 5 trillion yuan.

—Initially establish artificial intelligence laws and regulations, ethical norms and policy systems to form artificial intelligence security assessment and management capabilities.

In the third step, by 2030, the theory, technology and application of artificial intelligence have reached the world's leading level, becoming the world's major artificial intelligence innovation center. The intelligent economy and intelligent society have achieved remarkable results, laying an important foundation for being among the forefront of innovative countries and economic power.

—Form a relatively mature new generation of artificial intelligence theory and technology system. It has made major breakthroughs in the fields of brain-like intelligence, autonomous intelligence, hybrid intelligence and group intelligence, and has an important influence in the field of international artificial intelligence research, occupying the commanding heights of artificial intelligence technology.

—The competitiveness of artificial intelligence industry has reached the international leading level. The breadth of application of artificial intelligence in production, life, social governance, and national defense construction has greatly expanded, forming a complete industrial chain and high-end industrial cluster covering core technologies, key systems, support platforms and intelligent applications. The scale of artificial intelligence core industry exceeds 1 One trillion yuan has driven the relevant industries to exceed 10 trillion yuan.

— Forming a group of the world's leading artificial intelligence technology innovation and talent training base, and building a more complete artificial intelligence laws and regulations, ethical norms and policy systems.

(4) Overall deployment.

The development of artificial intelligence is a complex system project that has a bearing on the overall situation. It should be laid out in accordance with the principle of “building a system, grasping dual attributes, adhering to the Trinity, and strengthening the four major supports” to form a strategic path for the healthy and sustainable development of artificial intelligence.

Construct an open collaborative artificial intelligence technology innovation system. Aiming at key and difficult problems such as weak theoretical foundation and major product and system shortage, we will establish a new generation of artificial intelligence basic theory and key common technology system, lay out major scientific and technological

innovation bases, strengthen the artificial intelligence high-end talent team, and promote the synergy interaction between innovation subjects. Form artificial intelligence to continuously innovate.

Grasp the characteristics of the highly integrated artificial intelligence technology attributes and social attributes. It is necessary to increase the research and development and application of artificial intelligence to maximize the potential of artificial intelligence; to pre-judge the challenges of artificial intelligence, coordinate industrial policies, innovation policies and social policies, achieve coordination between incentive development and rational regulation, and maximize risk prevention. .

Adhere to the "three-in-one" advancement of artificial intelligence research and development, product application and industrial cultivation. Adapt to the characteristics and trends of artificial intelligence development, strengthen the deep integration of innovation chain and industry chain, the interactive evolution of technology supply and market demand, promote domain application and industrial upgrading with technological breakthroughs, and promote technology and system optimization through application demonstration. At the same time of promoting technology application and industrial development on a large scale, we will strengthen the R&D layout and research for medium and long-term, realize rolling development and continuous improvement, ensure theoretically ahead, technically occupy the commanding heights, and apply security and control.

Full support for science and technology, economic development, social development and national security. Breaking through the artificial intelligence technology to promote the country's ability to innovate in an all-round way, leading the process of building a world of science and technology and strengthening the country; by expanding the smart industry and cultivating the smart economy, creating a new growth cycle for China's economic prosperity in the next decade or even decades; The society promotes the improvement of people's livelihood and the development of people-centered development ideas; it uses artificial intelligence to enhance national defense strength and safeguard and safeguard national security.

3. The Key Tasks

Based on the overall development of the country, we will accurately grasp the development trend of global artificial intelligence, identify breakthroughs and main directions, comprehensively enhance the basic capabilities of science and technology innovation, comprehensively expand the depth of application in key areas, and comprehensively improve the level of economic and social development and national defense application intelligence.

(1) Constructing an open collaborative artificial intelligence technology innovation system.

Focusing on increasing the supply of artificial intelligence innovation, strengthening the deployment from frontier basic theories, key common technologies, basic platforms, talent teams, etc., promoting open source sharing, systematically improving the ability of

continuous innovation, ensuring that China's artificial intelligence technology ranks among the world's forefront, for the world The development of artificial intelligence makes more contributions.

1. Establish a new generation of artificial intelligence basic theory system.

Focusing on the important frontier issues of artificial intelligence, taking into account current needs and long-term development, focusing on breaking the bottleneck of artificial intelligence application basic theory, advanced layout may lead to basic research on artificial intelligence paradigm change, promote cross-disciplinary integration, and continue to develop and deepen artificial intelligence. The application provides a strong scientific reserve.

Break through the bottleneck of applied basic theory. Aiming at the application of clear-cut targets, it is expected to lead the basic theoretical direction of artificial intelligence technology upgrade, and strengthen basic theoretical research such as big data intelligence, cross-media perception computing, human-machine hybrid intelligence, group intelligence, independent coordination and decision-making. The big data intelligence theory focuses on the difficult problems such as unsupervised learning and comprehensive deep reasoning, and establishes a data-driven, natural language understanding as the core cognitive computing model, forming the ability from big data to knowledge, from knowledge to decision-making. The theory of cross-media perception computing breaks through the theoretical methods of low-cost low-energy intelligent perception, complex scene active perception, natural environment auditory and speech perception, multimedia autonomous learning, etc., to achieve superhuman perception and high dynamic, high-dimensional, multi-mode distributed large scene perception. . The theory of mixed-enhanced intelligence breaks through the theory of situational understanding and decision-making learning, intuitionistic reasoning and causality model, memory and knowledge evolution of human-computer synergy, and realizes the hybrid enhanced intelligence that learns and thinks close to or exceeds the level of human intelligence. The theory of swarm intelligence breaks through the theory and method of organization, emergence and learning of group intelligence, and establishes an extensible and computable group intelligence incentive algorithm and model to form an Internet-based swarm intelligence theory system. The theory of autonomous intelligent control and optimization decision-making breaks through the theories of collaborative sensing and interaction, autonomous collaborative control and optimization decision-making, knowledge-driven ternary cooperation and interoperability of autonomous unmanned systems, forming the innovation of independent intelligent unmanned systems. Theoretical architecture.

Basic research on the frontier of layout. In view of the direction that may lead to the transformation of artificial intelligence paradigm, forward-looking layout of advanced machine learning, brain-like intelligent computing, quantum intelligent computing and other cross-domain basic theoretical research. The advanced machine learning theory focuses on the theoretical methods such as adaptive learning and self-learning to realize artificial intelligence with high interpretability and strong generalization ability. The brain-like intelligent computing theory breaks through the brain-like information coding, processing,

memory, learning and reasoning theory, forms the brain-like complex system and brain-like control and other theories and methods, and establishes a new model and brain-inspired brain-scale intelligent computing. Cognitive computing model. The quantum intelligent computing theory focuses on the quantum-accelerated machine learning method, and establishes a hybrid model of high-performance computing and quantum algorithm to form an efficient and precise autonomous quantum artificial intelligence system architecture.

Conduct interdisciplinary exploratory research. Promote the integration of artificial intelligence and related disciplines such as neuroscience, cognitive science, quantum science, psychology, mathematics, economics, and sociology, strengthen the research of mathematical basic theory that leads the development of artificial intelligence algorithms and models, and attach importance to artificial intelligence laws. The study of basic theoretical issues of ethics supports exploratory research with strong originality and non-consensus, encourages scientists to explore freely, dares to overcome the scientific problems of artificial intelligence frontiers, proposes more original theories, and makes more original discoveries.

Box 1 Basic Theory

1. Big data intelligence theory. Research on new methods of artificial intelligence combining data-driven and knowledge-guided, cognitive computing theory and methods with natural language understanding and image graphics as the core, comprehensive deep reasoning and creative artificial intelligence theory and methods, and basic theory of intelligent decision-making under incomplete information And framework, data-driven general artificial intelligence mathematical models and theories.

2. Cross-media perception computing theory. Researching perceptual acquisition beyond human visual ability, active visual perception and computation for the real world, auditory perception and computation of natural acoustic scenes, speech perception and computation in natural interactive environments, human-like perception and computation for asynchronous sequences, media-oriented Autonomous learning of intelligent perception, urban full-scale intelligent perception inference engine.

3. Hybrid enhanced intelligence theory. Research on "human-in-the-loop" hybrid enhancement intelligence, human-computer intelligent symbiosis behavior enhancement and brain-computer coordination, machine intuitionistic reasoning and causal model, associative memory model and knowledge evolution method, complex data and task hybrid enhanced intelligent learning method, cloud Robot collaborative computing methods, situational understanding in real-world environments, and human-machine group collaboration.

4. Group intelligence theory. Research group intelligent structure theory and organization method, group intelligence incentive mechanism and emergence mechanism, group intelligent learning theory and method, group intelligence general computing paradigm and model.

5. Autonomous collaborative control and optimization decision theory. Research on collaborative sensing and interaction for autonomous unmanned systems, collaborative control and optimization decision-making for autonomous unmanned systems, knowledge-driven theory of ternary synergy and interoperability.

6. Advanced machine learning theory. Study the basic theories of statistical learning, uncertainty reasoning and decision making, distributed learning and interaction, privacy protection learning, small sample learning, deep reinforcement learning, unsupervised learning, semi-supervised learning, active learning and other learning theories and efficient models.

7. Brain-like intelligent computing theory. Research brain-perception, brain-like learning, brain-like memory mechanisms and computational fusion, brain-like complex systems, brain-like control and other theories and methods.

8. Quantum intelligent computing theory. Exploring the quantum model and internal mechanism of brain cognition, researching efficient quantum intelligent models and algorithms, high-performance high-bit quantum artificial intelligence processors, and real-time quantum artificial intelligence systems that can exchange information with the external environment.

2. Establish a new generation of artificial intelligence key common technology system.

Focusing on the urgent need to improve the international competitiveness of China's artificial intelligence, the development and deployment of a new generation of artificial intelligence key common technology should be based on algorithms, based on data and hardware, to enhance perception recognition, knowledge computing, cognitive reasoning, motion execution, The human-computer interaction capability is the focus, and an open, compatible, stable and mature technology system is formed.

Knowledge computing engine and knowledge service technology. Focus on breakthrough knowledge processing, deep search and visual interaction core technology to achieve automatic acquisition of knowledge continuous increment, with concept recognition, entity discovery, attribute prediction, knowledge evolution modeling and relationship mining capabilities, forming a multi-billion entity scale Multi-source, multidisciplinary and multi-data type cross-media knowledge maps.

Cross-media analysis and reasoning techniques. Focus on breaking through cross-media unified representation, relevance understanding and knowledge mining, knowledge mapping construction and learning, knowledge evolution and reasoning, intelligent description and generation technologies, and realize cross-media knowledge representation, analysis, mining, reasoning, evolution and utilization, and construct analytical reasoning engine.

The key technology of group intelligence. Focus on breakthroughs in Internet-based mass collaboration, large-scale collaborative knowledge resource management and open sharing, and establish a group intelligence knowledge representation framework to achieve knowledge acquisition based on group intelligence perception and group intelligence integration and enhancement in an open dynamic environment. Perception, synergy and evolution of millions of large-scale groups covering the whole country.

Hybrid enhanced intelligent new architecture and new technologies. Focus on breakthroughs in human-machine collaboration perception and execution integration model, intelligent sensor advancement of new sensor components, general hybrid computing architecture and other core technologies, build a self-adapted environment hybrid enhanced intelligent system, human-machine group hybrid enhanced intelligent system and support surroundings.

Intelligent technology for autonomous unmanned systems. Focus on breaking through the common unmanned system computing architecture, complex dynamic scene perception and understanding, real-time precise positioning, adaptive intelligent navigation for complex environments, and other technologies, drone autonomous control and intelligent technologies such as auto-driving in cars, ships and rail transit. Core technologies such as service robots and special robots support unmanned system applications and industrial development.

Virtual reality intelligent modeling technology. Focus on breaking the virtual object intelligent behavior modeling technology, improve the sociality, diversity and interactive fidelity of intelligent object behavior in virtual reality, and realize the organic combination and efficient interaction between virtual reality, augmented reality and other artificial intelligence.

Intelligent computing chips and systems. Focus on breakthrough energy-efficient, reconfigurable brain-like computing chips and brain-like vision sensor technology with computational imaging capabilities, develop high-performance brain-like neural network architecture and hardware systems with independent learning capabilities, and realize multimedia-aware information understanding and intelligent growth. A brain-like intelligent system with common sense reasoning ability.

Natural language processing technology. It focuses on the core technologies of grammatical logic, character concept representation and deep semantic analysis of natural language, promotes effective communication and free interaction between humans and machines, and realizes natural language intelligent understanding and automatic generation in multi-style, multi-language and multi-domain.

Box 2 key common technology

1. Knowledge computing engine and knowledge service technology. Research knowledge computing and visual interaction engines, research innovative design, digital creativity and business services such as business intelligence with visual media as the core, and carry out knowledge discovery of large-scale biological data.

2. Cross-media analysis and reasoning techniques. Research cross-media unified representation, association understanding and knowledge mining, knowledge map construction and learning, knowledge evolution and reasoning, intelligent description and generation, and develop cross-media analysis inference engine and verification system.

3. The key technology of group intelligence. Conduct key technologies such as active perception and discovery of group intelligence, knowledge acquisition and generation, collaboration and sharing, assessment and evolution, human-machine integration and enhancement, self-sustainment and security interaction, build a service architecture of group intelligence space, and study mobile groups. Intelligent collaborative decision making and control technology.

4. Hybrid enhancement of new intelligent architecture and new technologies. Research hybrid intelligent core technology, cognitive computing framework, new hybrid computing architecture, human-machine interaction, online intelligent learning technology, parallel management and control of hybrid enhanced intelligent framework.

5. Intelligent technology for autonomous unmanned systems. Research on autonomous control of drones and intelligent technologies such as auto, ship and rail transit automatic driving, service robots, space robots, marine robots, polar robot technology, unmanned workshops / smart factory intelligent technology, high-end intelligent control technology and autonomous unmanned operation system. Research on robotic and robotic arm autonomous control technologies based on computer vision for positioning, navigation and recognition in complex environments.

6. Virtual reality intelligent modeling technology. Study the mathematical expression and modeling methods of intelligent behavior of virtual objects, natural, continuous and in-depth interaction between virtual objects and virtual environments and users, and techniques and methodologies for intelligent object modeling.

7. Intelligent computing chips and systems. Research and development of neural network processors and energy-efficient, reconfigurable brain-like computing chips, new sensing chips and systems, intelligent computing architectures and systems, and artificial intelligence operating systems. Research hybrid computing architectures suitable for artificial intelligence.

8. Natural language processing technology. Research on short text computing and analysis techniques, cross-language text mining technology and semantic understanding technology for machine cognitive intelligence, and human-machine dialogue system for multimedia information understanding.

3. Coordinate the layout of artificial intelligence innovation platform.

Construct a layout artificial intelligence innovation platform to strengthen the basic support for the development and application of artificial intelligence. The artificial intelligence open source software and hardware infrastructure platform focuses on building a unified computing framework platform that supports artificial intelligence paradigms such as knowledge reasoning, probability statistics, and deep learning, and forms an ecological chain that promotes synergy between artificial intelligence software, hardware, and intelligent clouds. The group intelligence service platform focuses on building knowledge resources management and open sharing tools based on large-scale Internet collaboration, and forms a group intelligence platform and service environment for innovation in production, education and research. The hybrid enhanced intelligent support platform focuses on building heterogeneous real-time computing engines and new computing clusters that support large-scale training, providing a serviced, systematic platform and solution for complex intelligent computing. The autonomous unmanned system support platform focuses on building a support system for artificial intelligence core technologies such as environment awareness, autonomous collaborative control, and intelligent decision making in a complex environment of autonomous unmanned systems, forming an open, modular, and reconfigurable autonomous unmanned system. Development and testing environment. The artificial intelligence basic data and security detection platform focuses on building a public data resource library, a standard test data set, and a cloud service platform for artificial intelligence, and forms a method, technology, specification and tool set for artificial intelligence algorithm and platform security test evaluation. Promote open source openness for all types of common software and technology platforms. All kinds of platforms should promote the sharing of military and civilian sharing in accordance with the requirements of the deep integration of military and civilians and related regulations.

Column 3 basic support platform

1. Artificial intelligence open source software and hardware infrastructure platform. Establish a big data artificial intelligence open source software infrastructure platform, an artificial intelligence cloud service platform that cooperates with the terminal and the cloud, a new multi-intelligent sensor device and integration platform, a new product design platform based on artificial intelligence hardware, and a big data intelligent service platform in the future network. Wait.

2. Group intelligent service platform. Established Qunzhi Zhongchuang computing support platform, technology creation service system, Qunzhi software development and verification automation system, Qunzhi software learning and innovation system, open environment group decision system, group intelligence sharing economic service system.

3. Hybrid enhanced intelligent support platform. Establish an artificial intelligence supercomputing center, a large-scale super-intelligent computing support environment, an online intelligent education platform, a “human-in-the-loop” driving brain, an intelligent platform for industrial development complexity analysis and risk assessment, an intelligent support platform for supporting nuclear power security operations, and people. Machine sharing technology research and development and testing platform.

4. Autonomous unmanned system support platform. Establish a common core technical support platform for autonomous unmanned systems, autonomous control of drones, and automatic driving support platforms for automobiles, ships and rail transit, service robots, space robots, marine robots, polar robot support platforms, smart factories and intelligent control equipment technical support Platform, etc.

5. Artificial intelligence basic data and security detection platform. Construct a public data resource library, standard test data set and cloud service platform for artificial intelligence, establish artificial intelligence algorithm and platform security test model and evaluation model, and develop artificial intelligence algorithm and platform security assessment tool set.

4. Accelerate the cultivation of high-end talents that gather artificial intelligence.

Taking the construction of high-end talent team as the top priority of artificial intelligence development, persisting in the combination of training and introduction, perfecting the artificial intelligence education system, strengthening the talent reserve and echelon construction, especially accelerating the introduction of the world's top talents and young talents, forming China's artificial intelligence Talent highland.

Cultivate high-level artificial intelligence innovative talents and teams. Support and cultivate the leading talents of artificial intelligence with development potential, and strengthen the cultivation of professional and technical personnel in basic research, applied research, operation and maintenance of artificial intelligence. Pay attention to the cultivation of compound talents, focus on cultivating vertical composite talents that integrate artificial intelligence theory, methods, technologies, products and applications, as well as horizontal composite talents who master "artificial intelligence +" economic, social, management, standards, and law. Through the major R&D tasks and the construction of the base platform, the high-end talents of artificial intelligence will be gathered, and a number of high-level innovation teams will be formed in several key areas of artificial intelligence. Encourage and guide domestic innovative talents and teams to strengthen cooperation and interaction with the world's top artificial intelligence research institutions.

Increase the introduction of high-end artificial intelligence talents. Open up special channels and implement special policies to achieve the accurate introduction of high-end talents of artificial intelligence. Focus on the introduction of international top scientists such as neurocognition, machine learning, autonomous driving, intelligent robots and high-level innovation teams. Encourage the flexible introduction of artificial intelligence talents through project cooperation and technical consultation. We will make overall use of existing talent programs such as the “Thousand Talents Program” to strengthen the introduction of outstanding talents in the field of artificial intelligence, especially outstanding young talents. Improve the relevant policies for enterprise human capital cost accounting, and encourage enterprises and scientific research institutions to introduce artificial intelligence talents.

Building an artificial intelligence discipline. Improve the discipline layout in the field of artificial intelligence, set up artificial intelligence majors, promote the construction of first-level disciplines in the field of artificial intelligence, establish artificial intelligence colleges in pilot schools as soon as possible, and increase the number of doctoral and master's degree enrollment in the direction of artificial intelligence. Encourage colleges and universities to broaden the content of artificial intelligence professional education on the basis of the original, form a new model of "artificial intelligence + X" composite professional training, attach importance to artificial intelligence and mathematics, computer science, physics, biology, psychology, sociology, law and other disciplines. The cross-integration of professional education. Strengthen cooperation between industry, university and research institutes, and encourage universities, research institutes and enterprises to cooperate in the construction of artificial intelligence disciplines.

(2) Cultivate a high-end and efficient intelligent economy.

Accelerate the cultivation of artificial intelligence industry with major tie-making actions, promote the deep integration of artificial intelligence and various industrial fields, and form an intelligent economic form of data-driven, human-machine synergy, cross-border integration, and sharing. Data and knowledge have become the first elements of economic growth. Human-machine synergy has become the mainstream production and service mode. Cross-border integration has become an important economic model. Co-creation and sharing have become the basic characteristics of economic ecology. Personalized demand and customization have become a new trend of consumption, and productivity has increased dramatically. Enhance and lead the industry to the high end of the value chain, effectively support the development of the real economy, and comprehensively improve the quality and efficiency of economic development.

1. Vigorously develop artificial intelligence emerging industries.

Accelerate the transformation and application of key technologies of artificial intelligence, promote technology integration and business model innovation, promote smart product innovation in key areas, actively cultivate new forms of artificial intelligence, lay high-end industrial chain, and build an artificial intelligence industrial cluster with international competitiveness.

Intelligent hardware and software. Develop key infrastructure software such as operating system, database, middleware, and development tools for artificial intelligence, break through core hardware such as graphics processor, and study intelligent system solutions such as image recognition, speech recognition, machine translation, intelligent interaction, knowledge processing, and control decision-making. The program fosters and strengthens the basic software and hardware industry for artificial intelligence applications.

smart robot. Conquer the core components and special sensors of intelligent robots, and improve the hardware interface standards, software interface protocol standards and safe use standards of intelligent robots. Develop intelligent industrial robots and intelligent service robots to achieve large-scale applications and enter the international market. Develop and

promote special intelligent robots such as space robots, marine robots, and polar robots. Establish intelligent robot standard systems and safety rules.

Smart delivery vehicle. Develop self-driving cars and rail transit systems, strengthen technology integration and support for vehicle sensing, autopilot, vehicle networking, and Internet of Things, develop traffic intelligent sensing systems, and form China's autonomous autopilot platform technology system and product assembly capabilities, and explore automatic Driving car sharing mode. Develop consumer and commercial UAVs and unmanned vessels, establish specialized service systems for test identification, testing, and competition, and improve airspace and water area management measures.

Virtual reality and augmented reality. Break through key technologies such as high-performance software modeling, content capture generation, augmented reality and human-computer interaction, integrated environment and tools, and develop virtual display devices, optical devices, high-performance true 3D displays, development engines and other products to build virtual reality and enhance Realistic technology, products, service standards and evaluation systems promote the integration of key industries.

Intelligent Terminal. Accelerate the development of smart terminal core technologies and products, develop mobile smart terminal products and devices such as smart phones and in-vehicle smart terminals, and encourage the development of wearable terminal products such as smart watches, smart headphones, smart glasses, and expand product forms and application services.

IoT infrastructure. Develop high-sensitivity, high-reliability intelligent sensor devices and chips that support the next-generation IoT, and overcome key technologies such as IoT core technologies and low-power processors such as radio frequency identification and close-range machine communication.

2. Accelerate the promotion of industrial intelligent upgrading.

Promote the integration of artificial intelligence and various industries, and carry out pilot demonstrations of artificial intelligence applications in key industries and fields such as manufacturing, agriculture, logistics, finance, commerce, and home, promote the scale application of artificial intelligence, and comprehensively improve the level of intelligent development of industry.

Intelligent manufacturing. Focusing on the major needs of manufacturing powers, we will promote the integration of key technologies and equipment, core supporting software, industrial Internet and other systems for smart manufacturing, research and development of smart products and smart connected products, intelligent manufacturing enabling tools and systems, intelligent manufacturing cloud service platforms, and promotion of process intelligent manufacturing. New manufacturing models such as discrete intelligent manufacturing, networked collaborative manufacturing, remote diagnosis and operation and maintenance services, establish an intelligent manufacturing standard system, and promote the intelligentization of manufacturing life cycle activities.

Intelligent agriculture. Develop agricultural intelligent sensing and control systems, intelligent agricultural equipment, and agricultural machinery field operations. Establish and

improve the intelligent agricultural information remote sensing monitoring network integrating the sky and the ground. Establish a typical agricultural big data intelligent decision analysis system, and carry out integrated application demonstrations such as intelligent farms, intelligent plant factories, intelligent pastures, intelligent fish farms, intelligent orchards, agricultural products processing intelligent workshops, and agricultural products green intelligent supply chains.

Intelligent logistics. Strengthen the development, promotion and application of intelligent logistics equipment such as intelligent loading and unloading, sorting and packaging, processing and distribution, and build a deep-sensing intelligent storage system to improve the level and efficiency of warehousing operations management. Improve the intelligent information public information platform and command system, product quality certification and traceability system, intelligent distribution scheduling system.

Smart finance. Establish a financial big data system to improve financial multimedia data processing and understanding capabilities. Innovate smart financial products and services and develop new financial formats. Encourage the financial industry to apply smart customer service, intelligent monitoring and other technologies and equipment. Establish a financial risk intelligent early warning and prevention and control system.

Smart business. Encourage new technologies such as cross-media analysis and reasoning, knowledge computing engines and knowledge services to be applied in the business field, and promote new business services and decision-making systems based on artificial intelligence. Building a cross-media big data platform covering geographic location, online media and urban basic data to support enterprises in smart business. Encourage customized business intelligence decision-making services around individual needs and business management.

Smart home. Strengthen the integration of artificial intelligence technology and home building systems to enhance the intelligent level of construction equipment and household products. Develop and develop home interconnection protocols and interface standards for different application scenarios, and enhance the perception and connectivity of home appliances such as home appliances and durable goods. Support smart home enterprise innovative service model and provide interconnection and sharing solutions.

3. Vigorously develop smart enterprises.

Promote the intelligent upgrade of enterprises on a large scale. Support and guide enterprises to apply artificial intelligence new technologies in core business aspects such as design, production, management, logistics and marketing, build a new type of enterprise organizational structure and operation mode, form a business model of manufacturing and service, financial intelligence integration, and develop personalized customization Expand the supply of smart products. Encourage large-scale Internet enterprises to build cloud manufacturing platforms and service platforms, provide key industrial software and model libraries for manufacturing enterprises online, carry out manufacturing capability outsourcing services, and promote the intelligent development of small and medium-sized enterprises.

Promote the application of smart factories. Strengthen the application demonstration of key technologies and system methods of smart factories, focus on promoting production line reconstruction and dynamic intelligent scheduling, production equipment intelligent object and cloud data collection, multi-dimensional human-machine cooperation and interoperability technologies, encourage and guide enterprises to build factories Large data systems, networked distributed production facilities, etc., to achieve production equipment network, production data visualization, production process transparency, production site unmanned, improve the level of plant operation management intelligence.

Accelerate the cultivation of leading enterprises in the artificial intelligence industry. Accelerate the creation of global leading enterprises and brands of artificial intelligence in the fields of drone, voice recognition and image recognition. Accelerate the cultivation of a number of leading companies in emerging fields such as smart robots, smart cars, wearable devices, and virtual reality. Support artificial intelligence enterprises to strengthen patent layout, take the lead or participate in the development of international standards. Promote domestic advantageous enterprises, industry organizations, scientific research institutions, universities and other joint ventures to form China's artificial intelligence industry technology innovation alliance. Support leading enterprises to build open source hardware factories and open source software platforms, form an innovative ecology that gathers various resources, and promote the development of small and micro enterprises in artificial intelligence and applications in various fields. Support various organizations and platforms to provide professional services to artificial intelligence enterprises.

4. Create an artificial intelligence innovation highland.

Combining the basics and advantages of each region, the relevant industrial layouts are organized according to the field of artificial intelligence application. Encourage localities around the artificial intelligence industry chain and innovation chain to gather high-end elements, high-end enterprises, high-end talents, and create artificial intelligence industry clusters and innovative highlands.

Pilot demonstration of artificial intelligence innovation application. In areas with good artificial intelligence and great development potential, organize national artificial intelligence innovation experiments, explore major reforms in system and mechanism, policies and regulations, and personnel cultivation, and promote the transformation of artificial intelligence results, major product integration innovation and demonstration applications. To form a copyable and scalable experience, and to lead the development of intelligent economy and intelligent society.

Construction of the National Artificial Intelligence Industrial Park. Relying on the innovation carriers such as the National Independent Innovation Demonstration Zone and the National High-tech Industrial Development Zone, we will strengthen the optimal allocation and combination of science and technology, talents, finance, policies and other factors, and accelerate the cultivation and construction of artificial intelligence industry innovation clusters.

Building a national artificial intelligence collective base. Relying on the areas where universities and research institutes engaged in artificial intelligence research are concentrated, set up new types of entrepreneurial service institutions such as specialized innovation platforms in artificial intelligence fields, and build a number of low-cost, convenient, all-factor, open-type artificial intelligence space creation, perfect Incubation service system, promote the transfer and transformation of artificial intelligence technology, and support artificial intelligence innovation and entrepreneurship.

(3) Building a safe and convenient intelligent society.

Focusing on the goal of improving people's living standards and quality, we will speed up the application of artificial intelligence and form an intelligent environment that is ubiquitous and ubiquitous. The level of intelligence in the whole society has been greatly enhanced. More and more simple, repetitive and dangerous tasks are completed by artificial intelligence, individual creativity is greatly exerted, and more high-quality and high-comfort jobs are formed. Accurate intelligent services are more diverse and diverse. Maximize the enjoyment of high-quality services and convenient living; the level of intelligentization of social governance has been greatly enhanced, and social operations have become safer and more efficient.

1. Develop convenient and efficient intelligent services.

Focusing on the urgent needs of people's livelihood such as education, medical care, and old-age care, we will accelerate the application of artificial intelligence innovation and provide personalized, diversified and high-quality services to the public.

Intelligent education. We will use smart technology to accelerate the reform of the talent training model and teaching methods, and build a new education system that includes intelligent learning and interactive learning. Carry out the construction of intelligent campus and promote the application of artificial intelligence in the whole process of teaching, management and resource construction. Develop a three-dimensional integrated teaching field and an online learning education platform based on big data intelligence. Develop intelligent education assistants to build an intelligent, fast and comprehensive education analysis system. Establish a learner-centered education environment, provide accurate educational services, and customize daily education and lifelong education.

Smart medical care. Promote the application of new methods of artificial intelligence treatment and establish a fast and accurate intelligent medical system. Explore the construction of smart hospitals, develop robots and intelligent assistants for human-machine collaboration, develop flexible wearable, biocompatible physiological monitoring systems, and develop human-computer collaborative clinical intelligent treatment programs to achieve intelligent image recognition, pathological typing and intelligent multidisciplinary consultation. Based on artificial intelligence, large-scale genome recognition, proteomics, metabolomics research and new drug research and development are carried out to promote the intelligentization of medical supervision. Strengthen epidemiological intelligence monitoring and prevention.

Smart health and retirement. Strengthen group intelligence health management, break through key technologies such as health big data analysis and Internet of Things, develop health management wearable devices and home intelligence health detection and monitoring equipment, and promote health management from point monitoring to continuous monitoring, from short process management to long Process management transformation. Build smart old-age communities and institutions to build a safe and convenient intelligent pension infrastructure system. Strengthen the intelligence of the elderly products and the aging of smart products, develop smart home care equipment such as audio-visual aids and physical aids, and expand the activity space for the elderly. Develop mobile social and service platforms for the elderly, emotional accompanying assistants, and improve the quality of life of the elderly.

2. Promote the intelligentization of social governance.

Focusing on the hot and difficult issues of social management such as administrative management, judicial management, urban management, and environmental protection, we promote the application of artificial intelligence technology and promote the modernization of social governance.

Smart government. Develop an artificial intelligence platform suitable for government service and decision-making, develop a decision-making engine for open environment, and promote its application in major strategic decisions such as complex social problem research, policy evaluation, risk warning, and emergency response. Strengthen the integration of government information resources and accurate prediction of public needs, and open the channels of interaction between the government and the public.

Wisdom court. To build a smart court data platform that integrates trial, personnel, data application, judicial disclosure and dynamic monitoring, and promote the application of artificial intelligence in evidence collection, case analysis, legal document reading and analysis, and realize the intelligentization of court trial system and trial ability. .

Smart City. Build urban intelligent infrastructure, develop intelligent buildings, promote the intelligent transformation and upgrading of municipal infrastructure such as underground pipe corridors; build urban big data platform, build a multi-heterogeneous data fusion urban operation management system, and realize urban infrastructure and urban green space Comprehensive perception of important ecological elements such as wetlands and deep understanding of the operation of complex urban systems; research and development of community public service information systems, promotion of community service systems and residents' intelligent home systems; promotion of urban planning, construction, management, and operation of life The cycle is intelligent.

smart transportation. Study and establish a technical system for automatic driving and road coordination of operating vehicles. Develop multi-dimensional traffic information integrated big data application platform in complex scenarios, realize intelligent traffic guidance and comprehensive operation coordination command, and build intelligent traffic monitoring, management and service systems covering the ground, track, low altitude and sea.

Smart and environmentally friendly. Establish an intelligent monitoring big data platform system covering the environmental fields such as the atmosphere, water and soil, and build an intelligent environmental monitoring network and service platform integrating land and sea, integrating the world and the world, and coordinating and sharing information. R&D resource energy consumption, environmental pollutant emission intelligent prediction model method and early warning program. Strengthen the construction of intelligent prevention and control systems for environmental protection and environmental emergencies in major strategic regions such as the Beijing-Tianjin-Hebei region and the Yangtze River Economic Belt.

3. Use artificial intelligence to improve public safety and security capabilities.

Promote the deep application of artificial intelligence in the field of public safety, and promote the construction of a public safety intelligent monitoring and early warning and control system. Focusing on the urgent needs of comprehensive social governance, new crime detection, and anti-terrorism, we have developed intelligent security and police products that integrate multiple detection and sensing technologies, video image information analysis and recognition technologies, and biometrics technology to establish an intelligent monitoring platform. Strengthen the intelligent transformation and upgrading of security equipment in key public areas, and support qualified communities or cities to carry out demonstrations of public security areas based on artificial intelligence. Strengthen the protection of artificial intelligence for food safety, and establish an intelligent food safety early warning system around food classification, early warning level, food safety hazards and assessment. Strengthen the effective monitoring of natural disasters by artificial intelligence, and build an intelligent monitoring, early warning and comprehensive response platform for major natural disasters such as earthquake disasters, geological disasters, meteorological disasters, floods and droughts and marine disasters.

4. Promote social interaction and share mutual trust.

Give full play to the role of artificial intelligence technology in enhancing social interaction and promoting credible communication. Strengthen the research and development of the next generation of social networks, accelerate the promotion and application of technologies such as augmented reality and virtual reality, promote the synergy of virtual environment and physical environment, and meet the real-time information needs of personal perception, analysis, judgment and decision-making, and realize work, study, life and entertainment. Smooth switching in different scenarios. In order to improve the needs of interpersonal communication barriers, we develop intelligent assistant products with emotional interaction functions that can accurately understand people's needs, and achieve a virtuous cycle of emotional communication and demand satisfaction. Promote the integration of blockchain technology and artificial intelligence, establish a new social credit system, and minimize the cost and risk of interpersonal communication.

(4) Strengthening the integration of military and civilian in the field of artificial intelligence.

We will thoroughly implement the military-civilian integration development strategy and promote the formation of a full-element, multi-field, and high-efficiency artificial intelligence military-civilian integration pattern. Guided by the shared sharing of military and civilians, we will deploy a new generation of artificial intelligence basic theory and key common technology research and development, and establish a normalized communication and coordination mechanism for research institutes, universities, enterprises and military units. Promote the two-way transformation of artificial intelligence technology between the military and the civilian, strengthen the new generation of artificial intelligence technology to support the command decision, military deduction, national defense equipment, etc., and guide the transformation of artificial intelligence technology achievements in the national defense field to the civilian field. Encourage the superior scientific research forces to participate in the major scientific and technological innovation tasks of artificial intelligence in the national defense field, and promote the rapid embedding of various artificial intelligence technologies into the field of national defense innovation. Strengthen the construction of the general standard system for military and civilian artificial intelligence technology, and promote the overall layout and open sharing of the science and technology innovation platform base.

(5) Constructing a ubiquitous and efficient intelligent infrastructure system.

Vigorously promote the construction of intelligent information infrastructure, upgrade the level of intelligence of traditional infrastructure, and form an infrastructure system that meets the needs of intelligent economy, intelligent society and national defense construction. Accelerate the promotion of digital and networked information infrastructure with information transmission as the core, and transform into an intelligent information infrastructure that integrates sensing, transmission, storage, computing and processing. Optimize and upgrade the network infrastructure, research and develop the fifth-generation mobile communication (5G) system, improve the Internet of Things infrastructure, accelerate the construction of the integrated information network, and improve the transmission capability of low latency and high throughput. Coordinate the use of big data infrastructure, strengthen data security and privacy protection, and provide massive data support for artificial intelligence research and development and wide application. Build high-performance computing infrastructure and improve the service support capabilities of supercomputing centers for artificial intelligence applications. The construction of a distributed and efficient energy Internet will form a new energy network that supports coordinated and complementary multi-energy, timely and effective access, promotes intelligent energy storage facilities and intelligent power facilities, and realizes real-time matching and intelligent response of energy supply and demand information.

Box 4 Intelligent Infrastructure

1. Network infrastructure. Accelerate the development and application of 5G enhanced technology for real-time collaborative artificial intelligence, build a high-precision navigation and positioning network for space-based collaborative artificial intelligence, strengthen the core technology research and key facilities construction of intelligent sensing Internet of Things, and develop an intelligent industrial Internet. Research

on intelligent network security architecture, such as car networking. Accelerate the construction of an integrated information network for heaven and earth, and promote the full integration of the space-based information network, the future Internet, and the mobile communication network.

2. Big data infrastructure. Relying on public infrastructure such as national data sharing and exchange platform and data open platform, we will build a database of big data basic information in the fields of government governance, public services, industrial development, technology research and development, and support the implementation of national governance big data applications. Integrate all kinds of data platforms and data center resources in the society to form an integrated service capability covering the whole country, reasonable layout and smooth links.

3. High-performance computing infrastructure. Continue to strengthen the construction of supercomputing infrastructure, distributed computing infrastructure and cloud computing centers to build a sustainable high-performance computing application ecosystem. Advance the next generation of supercomputer development applications.

(6) Prospective layout of a new generation of artificial intelligence major science and technology projects.

Aiming at the urgent needs and weak links in the development of artificial intelligence in China, a new generation of artificial intelligence major science and technology projects was set up. Strengthen the overall overall planning, clarify the task boundary and research and development priorities, and form a “1+N” artificial intelligence project group with the new generation of artificial intelligence major science and technology projects as the core and the existing R&D layout as the support.

“1” refers to a new generation of artificial intelligence major technology projects, focusing on the forward-looking layout of basic theories and key common technologies, including theories of big data intelligence, cross-media perception computing, hybrid enhanced intelligence, group intelligence, autonomous collaborative control and decision making. Research knowledge computing engine and knowledge service technology, cross-media analysis and reasoning technology, group intelligence key technology, hybrid enhanced intelligent new architecture and new technology, independent unmanned control technology, etc., open source sharing artificial intelligence basic theory and common technology. Continue to carry out the prediction and research of artificial intelligence development, and strengthen the comprehensive impact of artificial intelligence on economic and social development and countermeasure research.

“N” refers to the artificial intelligence R&D project deployed in the relevant national planning plan. The focus is to strengthen the connection with the new generation of artificial intelligence major science and technology projects, and jointly promote the theoretical research, technological breakthroughs and product development and application of artificial intelligence. Strengthen the connection with major national science and technology projects, and support the development of artificial intelligence software and hardware in the national science and technology major projects such as “core high-based” (core electronic devices, high-end general-purpose chips, basic software) and integrated circuit equipment. Strengthen the mutual support with other "scientific and technological innovations 2030 - major projects", accelerate the research of brain science and brain-like

computing, quantum information and quantum computing, intelligent manufacturing and robotics, big data, etc., and provide support for major technological breakthroughs in artificial intelligence. The national key R&D program continued to promote key special projects such as high-performance computing, and increased support for R&D and application of artificial intelligence-related technologies; the National Natural Science Foundation of China strengthened support for cross-disciplinary research and free exploration in the field of artificial intelligence. Strengthen the application demonstration of artificial intelligence technology in major projects such as deep sea space stations, health protection and other key national R&D plans such as smart cities and smart agricultural machinery and equipment. The basic theories of artificial intelligence and the research results of common technologies supported by other types of science and technology programs should be openly shared.

Innovate a new generation of artificial intelligence major science and technology projects to organize the implementation model, adhere to the principle of focusing on major issues and key breakthroughs, give full play to the role of market mechanisms, and mobilize the efforts of departments, localities, enterprises and society to promote implementation. Clear management responsibilities, conduct regular evaluations, strengthen dynamic adjustments, and improve management efficiency.

4. Resource Allocation

Make full use of existing funds, bases and other stock resources, coordinate the allocation of international and domestic innovation resources, give play to the guiding role of fiscal input, policy incentives and market allocation resources, incite enterprises and society to increase investment, and form financial funds and finance. A new pattern of support from both capital and social capital.

(1) Establish financial guidance and market-led financial support mechanisms.

Coordinate the government and market multi-channel capital investment, increase financial fund support, revitalize existing resources, and provide support for artificial intelligence based frontier research, key common technology research, results transfer and transformation, base platform construction, and innovative application demonstration. Use existing government investment funds to support qualified artificial intelligence projects, and encourage leading enterprises and industrial innovation alliances to lead the establishment of market-oriented artificial intelligence development funds. Use social investment, venture capital, venture capital funds and capital market financing to guide social capital to support the development of artificial intelligence. Actively use the government and social capital cooperation models to guide social capital to participate in the implementation of major artificial intelligence projects and the transformation and application of scientific and technological achievements.

(2) Optimizing the layout and building an artificial intelligence innovation base.

In accordance with the layout and framework of national-level science and technology innovation bases, we will promote the construction of several leading international innovation bases in the field of artificial intelligence. Guide existing national key laboratories

related to artificial intelligence, national key laboratories of enterprises, national engineering laboratories and other bases, and focus on the frontier direction of a new generation of artificial intelligence. In accordance with the prescribed procedures, the company will be the mainstay, industry, university and research institutes to establish relevant technologies and industrial innovation bases in the field of artificial intelligence, and give play to the leading role of technological innovation in leading enterprises. Develop professional space for innovation in the field of artificial intelligence, and promote the accurate connection of the latest technological achievements and resources and services. Give full play to the role of various innovation bases to gather innovative resources such as talents and funds, and break through the frontier theory of artificial intelligence and key common technologies to carry out application demonstration.

(3) Coordinating international and domestic innovation resources.

Support domestic artificial intelligence enterprises and international artificial intelligence leading universities, research institutes and teams. Encourage domestic artificial intelligence enterprises to “go global” to provide convenience and services for powerful artificial intelligence enterprises to conduct overseas mergers and acquisitions, equity investment, venture capital investment and establishment of overseas R&D centers. Foreign artificial intelligence enterprises and scientific research institutions are encouraged to set up R&D centers in China. Relying on the “One Belt, One Road” strategy, we will promote the construction of artificial intelligence international science and technology cooperation bases and joint research centers to accelerate the promotion and application of artificial intelligence technology in countries along the “Belt and Road”. Promote the establishment of an artificial intelligence international organization to jointly develop relevant international standards. Support related industry associations, alliances and service organizations to build a global service platform for artificial intelligence enterprises.

5. Safeguard measures

Focusing on the realistic requirements of promoting the healthy and rapid development of artificial intelligence in China, we should properly cope with the challenges that artificial intelligence may bring, form an institutional arrangement that adapts to the development of artificial intelligence, build an open and inclusive international environment, and consolidate the social foundation for the development of artificial intelligence.

(1) Formulating laws, regulations and ethical norms that promote the development of artificial intelligence.

Strengthen research on legal, ethical and social issues related to artificial intelligence, and establish laws, regulations and ethical frameworks to ensure the healthy development of artificial intelligence. Conduct research on legal issues such as civil and criminal liability confirmation, privacy and property rights protection, and information security utilization related to artificial intelligence applications, establish a system of traceability and accountability, and clarify the subject of artificial intelligence and related rights, obligations, and responsibilities. Focus on the sub-sectors such as autonomous driving and service robots,

and accelerate the research and development of relevant safety management regulations, laying a legal foundation for the rapid application of new technologies. Carry out research on the issues of artificial intelligence behavioral science and ethics, and establish an ethical and multi-level judgment structure and an ethical framework for human-computer collaboration. Formulate ethics and codes of conduct for R&D designers of artificial intelligence products, strengthen the assessment of potential hazards and benefits of artificial intelligence, and build solutions for emergencies in complex scenarios of artificial intelligence. Actively participate in the global governance of artificial intelligence, strengthen research on major international common problems of artificial intelligence such as robot alienation and safety supervision, deepen international cooperation in artificial intelligence laws and regulations, international rules, etc., and jointly address global challenges.

(2) Improve key policies to support the development of artificial intelligence.

We will implement fiscal and tax incentives for artificial intelligence SMEs and start-ups, and support the development of artificial intelligence enterprises through policies such as tax incentives for high-tech enterprises and deductions for research and development expenses. We will improve the implementation of data opening and protection policies, conduct pilot reforms of public data openness, and support the public and enterprises to fully exploit the commercial value of public data and promote innovation in artificial intelligence applications. Research and improve the education, medical care, insurance, social assistance and other policy systems that adapt to artificial intelligence, and effectively respond to the social problems brought about by artificial intelligence.

(3) Establish artificial intelligence technical standards and intellectual property systems.

Strengthen the research on the artificial intelligence standard framework system. Adhere to the principles of safety, availability, interoperability, and traceability, and gradually establish and improve technical standards such as artificial intelligence basic commonality, interconnection, industry application, network security, and privacy protection. Accelerate the development of relevant standards by industry associations and alliances in sub-application areas such as driverless and service robots. Encourage artificial intelligence enterprises to participate in or lead the development of international standards, and use the technical standards to “go global” to promote the promotion and application of artificial intelligence products and services overseas. Strengthen the protection of intellectual property rights in the field of artificial intelligence, improve the technical support for innovation, patent protection and standardization in the field of artificial intelligence, and promote the intellectual property of artificial intelligence innovation results. Establish a public patent pool for artificial intelligence to promote the use and diffusion of new artificial intelligence technologies.

(4) Establishing an artificial intelligence safety supervision and evaluation system.

Strengthen the research and evaluation of the impact of artificial intelligence on national security and confidentiality, improve the security protection system for people, technology, materials and management, and construct an artificial intelligence security monitoring and early warning mechanism. Strengthen the prediction, research and tracking research on the

development of artificial intelligence technology, adhere to the problem orientation, and accurately grasp the trends of technology and industry development. Enhance risk awareness, attach importance to risk assessment and prevention, strengthen forward-looking prevention and restrictive guidance, and focus on the impact on employment in the near future. Focus on the impact on social ethics in the long-term, and ensure that artificial intelligence development is regulated within a safe and controllable scope. Establish and improve an open and transparent artificial intelligence supervision system, implement a two-tier supervision structure with equal emphasis on design accountability and application supervision, and realize the full process supervision of artificial intelligence algorithm design, product development and application of results. Promote self-discipline in the artificial intelligence industry and enterprises, strengthen management, and increase the punishment for data abuse, invasion of personal privacy, and violation of morality and ethics. Strengthen the research and development of artificial intelligence network security technology, and strengthen the network security protection of artificial intelligence products and systems. Construct a dynamic evaluation and evaluation mechanism for artificial intelligence R&D applications, and develop systematic test methods and indicator systems around the complexity, risk, uncertainty, interpretability, and potential economic impact of artificial intelligence design, product and system, Establish a cross-disciplinary artificial intelligence test platform to promote artificial intelligence safety certification and evaluate the key performance of artificial intelligence products and systems.

(V) Vigorously strengthen the training of artificial intelligence labor.

Accelerate the study of the employment structure brought about by artificial intelligence, the transformation of employment methods and the skills needs of new occupations and jobs, establish a lifelong learning and employment training system that meets the needs of the intelligent economy and the intelligent society, and support higher education institutions, vocational schools and social training. Institutions and other personnel carry out artificial intelligence skills training, greatly improve the professional skills of employed personnel, and meet the needs of high-skilled and high-quality jobs brought about by the development of artificial intelligence in China. Encourage companies and organizations to provide artificial intelligence skills training to employees. Strengthen employee reemployment training and guidance to ensure that the labor force engaged in simple and repetitive work and those who are unemployed due to artificial intelligence are transferred smoothly.

(6) Extensively carry out artificial intelligence science activities.

Support the development of various forms of artificial intelligence science activities, encourage the majority of science and technology workers to participate in the popularization and promotion of artificial intelligence, and comprehensively improve the overall awareness and application level of artificial intelligence in the whole society. Implement the National Intelligence Education Program, set up artificial intelligence related courses in the primary and secondary schools, gradually promote programming education, and encourage social forces to participate in the development and promotion of programming and teaching

software and games. We will build and improve the artificial intelligence science infrastructure, give full play to the popular science role of various artificial intelligence innovation base platforms, encourage artificial intelligence enterprises and scientific research institutions to build open source platforms, and open artificial intelligence research and development platforms, production facilities or exhibition halls to the public. Support the development of artificial intelligence competitions, and encourage the creation of various forms of artificial intelligence science. Encourage scientists to participate in artificial intelligence science.

6. Organization and Implementation

The new generation of artificial intelligence development planning is a forward-looking plan that is related to the overall situation and the long-term. It is necessary to strengthen organizational leadership, improve the mechanism, aim at the goal, keep a close eye on the task, and effectively implement it in a nail-to-nail spirit.

(1) Organizational leadership.

In accordance with the unified arrangements of the Party Central Committee and the State Council, the National Science and Technology System Reform and Innovation System Construction Leading Group will lead the overall coordination, review major tasks, major policies, major issues and key work arrangements, promote the construction of artificial intelligence related laws and regulations, and guide, coordinate and supervise. The relevant departments will carry out the deployment and implementation of the planning tasks. Relying on the joint inter-ministerial meeting of the National Science and Technology Plan (special funds, funds, etc.), the Ministry of Science and Technology and the relevant departments are responsible for promoting the implementation of the new generation of artificial intelligence major science and technology projects, and strengthening coordination with other planning tasks. The establishment of the artificial intelligence planning and promotion office, the office is located in the Ministry of Science and Technology, specifically responsible for promoting the implementation of the plan. Established the Artificial Intelligence Strategy Advisory Committee to study the forward-looking and strategic major issues of artificial intelligence, and provide consultation and evaluation on major decisions of artificial intelligence. Promote the construction of artificial intelligence think tanks, support various think tanks to carry out research on major issues of artificial intelligence, and provide strong intellectual support for the development of artificial intelligence.

(2) Safeguard implementation.

Strengthen the decomposition of planning tasks, clarify the responsible units and schedules, and formulate annual and phased implementation plans. Establish a monitoring and evaluation mechanism for the implementation of the plan such as annual assessment and mid-term assessment. Adapt to the characteristics of rapid development of artificial intelligence, and strengthen the dynamic adjustment of planning and projects according to the progress of tasks, the completion of stage objectives, and new trends in technology development.

(3) Pilot demonstration.

For major tasks and key policy measures of artificial intelligence, it is necessary to formulate specific plans and carry out pilot demonstrations. Strengthen the overall guidance for pilot demonstrations in various departments and localities, and timely summarize and promote the experiences and practices that can be replicated. Promote the healthy and orderly development of artificial intelligence through pilot demonstration and demonstration.

(4) Public opinion guidance.

Make full use of all kinds of traditional media and emerging media, timely publicize the new progress and new achievements of artificial intelligence, let the healthy development of artificial intelligence become the consensus of the whole society, and mobilize the enthusiasm of the whole society to participate in supporting the development of artificial intelligence. Guide public opinion in a timely manner to better cope with the social, ethical and legal challenges that artificial intelligence development may bring.

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