

Translation



The following is a draft Chinese government framework for a system of standards for AI. Its authors invited feedback and comments on the draft from the public from January 17 to 31, 2024.

Title

Guidelines for the Construction of a Comprehensive Standardization System for the National Artificial Intelligence Industry (Draft for Feedback)

国家人工智能产业综合标准化体系建设指南（征求意见稿）

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Source

MIIT website. The draft is dated January 17, 2024 and was published the following day.

The Chinese source text is available online at:

https://www.miit.gov.cn/cms_files/filemanager/1226211233/attach/202311/7240bd43f3fc4b598351f9b135e68e4a.pdf

An archived version of the Chinese source text is available online at: <https://perma.cc/3YUQ-ZZPX>
U.S. \$1 ≈ 7.2 Chinese Yuan Renminbi (RMB), as of June 12, 2024.

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Guidelines for the Construction of a Comprehensive Standardization System for the National Artificial Intelligence Industry (Draft for Feedback)

These Guidelines for the Construction of a Comprehensive Standardization System for the National Artificial Intelligence Industry were drafted in order to thoroughly implement the deployment requirements of the Party Central Committee and the State Council on accelerating the development of artificial intelligence (AI), to

thoroughly implement the *National Standardization Development Outline*¹ and the *Global AI Governance Initiative*,² to further strengthen the planning of AI standardization work systems, to accelerate the construction of a standards system that meets the needs of high-quality development in the AI industry, and to make better use of the supporting role of standards in advancing technological progress, promoting enterprise development, leading industrial upgrading, and ensuring industrial security.

I. Industry Development Status

AI is a basic and strategic technology that is leading a new round of scientific and technological (S&T) revolution and industrial transformation. Its deep integration with the real economy is accelerating, and it is profoundly changing industrial production models and economic development formats. It will play an important supporting role in empowering new-style industrialization (新型工业化) and accelerating the construction of China into a manufacturing powerhouse, the construction of China into a cyber powerhouse,³ and the construction of a Digital China. The AI production chain includes four parts: the basic layer, framework layer, model layer, and application layer. The basic layer mainly includes computing power (“compute”), algorithms, and data; the framework layer mainly refers to the deep learning frameworks and tools used for model development; the model layer mainly refers to technologies and products such as large models; and the application layer mainly refers to the applications of AI technology in industry scenarios. In recent years, China's AI industry has achieved rapid development in technological innovation, product creation, and industry applications, forming a market with a massive scale. With the accelerated iteration of new technologies as represented by large models, the AI industry has presented new features such as collective breakthroughs (群体突破) in innovative technology, integrated development of industry applications, and deep collaboration through international cooperation. There is an urgent need to improve the system of standards for the AI industry.

¹ Translator's note: An English translation of the Chinese *National Standardization Development Outline* is available online at: <https://cset.georgetown.edu/publication/the-chinese-communist-party-central-committee-and-the-state-council-publish-the-national-standardization-development-outline/>.

² Translator's note: An English translation of the Chinese *Global AI Governance Initiative* is available online at: <https://perma.cc/F4N3-UGG6>.

³ Translator's note: This translation renders the Chinese word 强国 qiángguó—which literally means "strong nation"—in English as "powerhouse," as in the phrases "manufacturing powerhouse" (制造强国) and "cyber powerhouse" (网络强国). For a more thorough discussion in English of the Chinese word qiángguó, see: <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/lexicon-wangluo-qiangguo/>.

II. Overall Requirements

(i) Guiding ideology

We must persist in being guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, fully implement the spirit of the 20th Party Congress and the Second Plenum of the 20th Central Committee, conscientiously implement the deployment requirements of the Central Economic Work Conference and the National Conference on Promotion of New-Style Industrialization, fully, accurately, and comprehensively implement the new concept of development (新发展理念), promote the construction of the new pattern of development (新发展格局), coordinate high-quality development and high-level security, accelerate the empowerment of new-style industrialization, take seizing the development opportunities in the AI industry as our goal, improve the top-level design of AI standards work, strengthen collaboration in standards work through the production chain, coordinate the research, formulation, implementation, and internationalization of standards, and provide solid technical support for promoting the high-quality development of China's AI industry.

(ii) Construction goals

By 2026, the proportion of general purpose key technology-type and application development-type plans and projects that make up standards results shall reach 60% or more, and the degree of linkage between standards and industrial technological innovation shall continuously increase. At least 50 new national standards and industry standards shall be formulated, accelerating the formation of a standards system to promote the high-quality development of the AI industry. More than 1,000 companies shall engage in standards indoctrination (宣贯) and implementation promotion, further highlighting the innovation and development performance of standards service companies. We shall participate in the formulation of at least 20 international standards, promoting the globalized development of the AI industry.

(iii) Working principles

Persist in being innovation-driven: Optimize the linkage mechanisms between industrial S&T innovation and standardization, accelerate research on key general purpose technologies in the field of AI, and promote the efficient conversion of advanced and applicable S&T innovation achievements into standards.

Persist in being application-led: Persist in making enterprises the mainstay and being market-oriented, look to industry application needs, strengthen the iteration of innovation achievements and the construction of application scenarios, and collaboratively promote the integrated application of AI along with key industries.

Persist in industry collaboration: Strengthen collaboration in standardization

work throughout the entire AI production chain, strengthen technical organization cooperation in cross-industry and cross-field standardization, and create a standardization model for the integrated development of small, medium-sized, and large enterprises.

Persist in open cooperation: Deepen international exchanges and cooperation for standardization, encourage Chinese enterprises and institutions to actively participate in international standardization activities, and work with upstream and downstream enterprises in the global production chain to jointly formulate international standards.

III. Construction Philosophy

(i) Structure of the AI standardization system

The AI standard system architecture includes six parts: basic general purpose, basic support, key technology, intelligent products and services, industry applications, and security and governance standards, as shown in Figure 1. Here, the basic general purpose standards are the basic, framework, and overall standards for AI. Basic support standards mainly provide requirements for technical aspects such as data, compute, and algorithms, laying a solid technical foundation for the development of the AI industry. Key technology standards mainly regulate AI text, speech, images, and the technologies used in fields such as human-machine hybrid augmented intelligence (人机混合增强智能), intelligent agents, cross-media intelligence (跨媒体智能), and embodied intelligence, promoting the research and development (R&D) and innovative application of AI technology. Intelligent product and service standards mainly regulate intelligent product and service models formed by AI technology. Industry application standards mainly specify the technical requirements for AI empowerment of various industries, providing technical support for AI-empowerment of industry applications and promoting the development of industrial intelligentization (智能化). Security and governance standards mainly specify the requirements for AI security and governance, providing security assurance for the development of the AI industry.

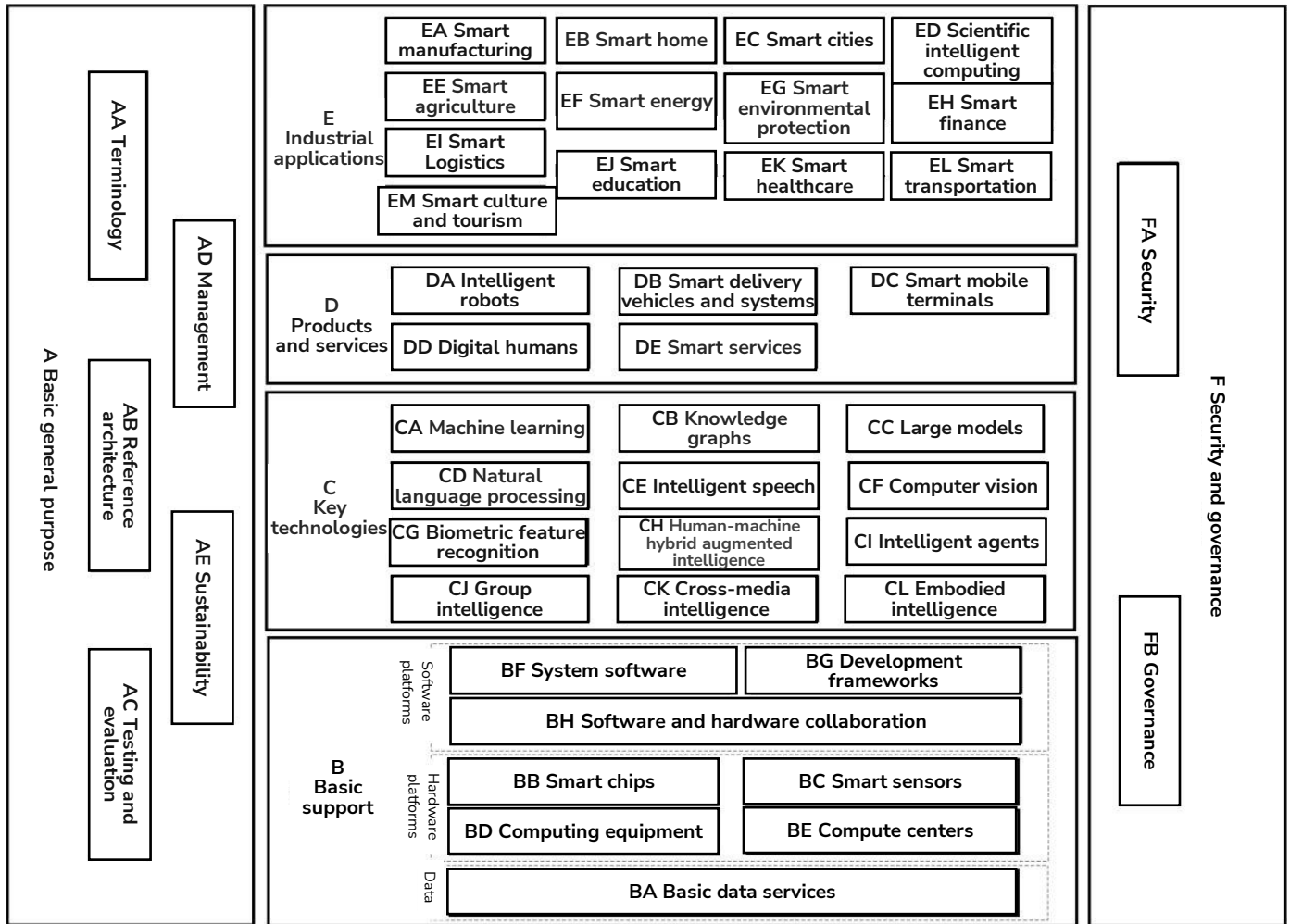


Figure 1. Structural diagram of the AI standards system

(ii) AI standards system framework

The AI standards system framework is composed of six main parts: basic general purpose, basic support, key technology, intelligent products and services, industry applications, and security and governance standards, as shown in Figure 2.

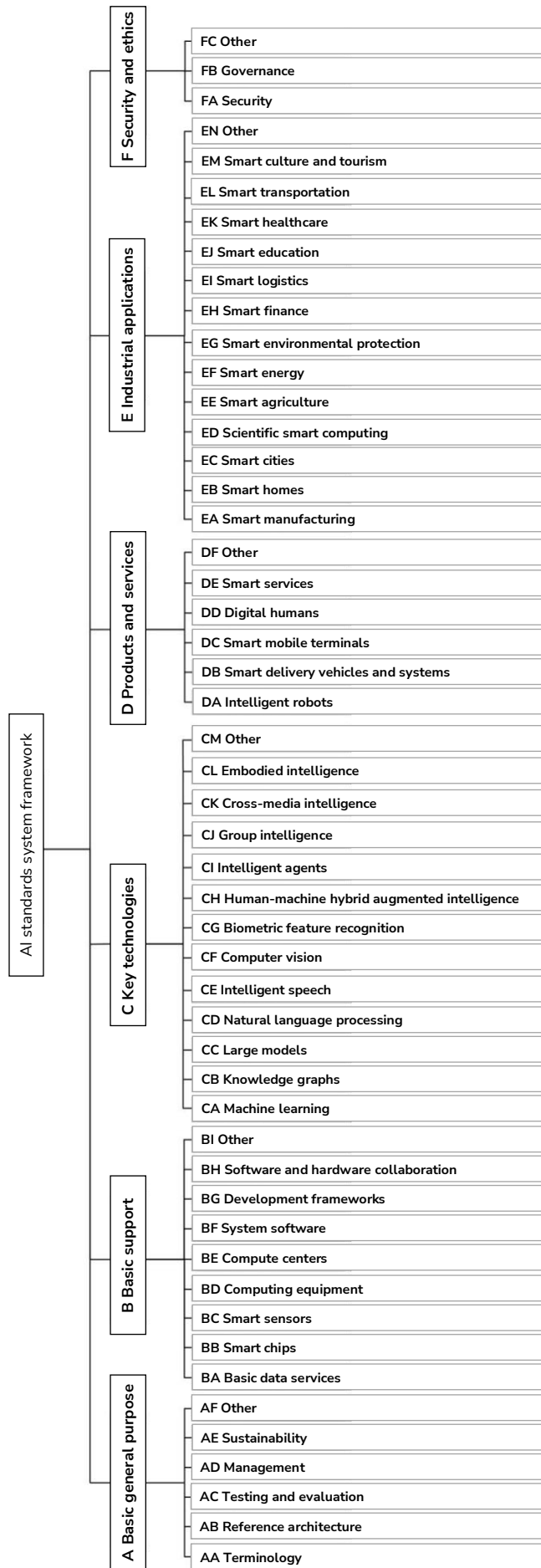


Figure 2. AI Standards System Framework

IV. Key Directions

(i) Basic general purpose standards

Basic general purpose standards mainly regulate AI terminology, reference architecture, testing and evaluation, management, and sustainability.

1 Terminology standards: These standards standardize the conceptual definitions used in AI-related technologies and industrial applications, providing a reference for the formulation of other standards and AI research. They include standards for definitions, categories, and examples of AI terms.

2 Reference architecture standards: These standards standardize the logical relationships and interactions of AI technologies, applications, and systems, and include standards on AI reference architectures, the artificial intelligence system life cycle, and stakeholders.

3 Testing and evaluation standards: These standards standardize the indicator requirements for testing and evaluation of the maturity of AI technology development, for adaptability between AI system architectures, for industry development levels, and for enterprise capabilities. They include standards for AI-related service capability maturity assessments, AI versatility (通用性) testing guidelines, assessment principles and level requirements, corporate capability frameworks, and evaluation requirements.

4 Management standards: These standards standardize the management requirements and evaluation of all personnel and organizations involved in the life cycle of AI technology, products, systems, or services. They include standards for management requirements for AI organizations, AI management systems, categorization methods, and evaluation processes.

5 Sustainability standards: These standards standardize the technical frameworks, methods, and metrics used to measure the impact of AI on the environment and balance industrial development and environmental protection. They include standards for open-source basic frameworks for AI software that promote ecological sustainability, energy efficiency evaluation of AI systems, AI and water resource utilization, carbon emissions, and scrap parts disposal.

(ii) Basic support standards

Basic support standards mainly cover basic data services, smart chips, smart sensors, computing equipment, compute centers, system software, development frameworks, and software and hardware collaboration.

1 Basic data services standards: These standards standardize the requirements for data services involved in the R&D, testing, and application of AI. They include standards for data labeling, data governance, and data quality.

2 Smart chip standards: These standards standardize general technical requirements related to smart chips. They include standards for smart chip architecture, instruction sets, unified programming interfaces and related test requirements, chip data formats, and protocols.

3 Smart sensor standards: These standards standardize the interface protocols, performance evaluation, test methods, and other technical requirements for new single-mode and multimodal sensors. They include standards for smart sensor architecture, instructions, data formats, information extraction methods, information fusion methods, functional integration methods, performance indicators, and evaluation methods.

4 Computing equipment standards: These standards standardize the technical management requirements and testing methods for AI accelerator cards, AI accelerator modules, AI servers, and other computing equipment as well as their enabling software. They include standards for AI computing equipment virtualization methods, AI accelerator module interface protocols and test methods, and the access protocols, functions, performance, energy efficiency test methods, and operations and maintenance (O&M) requirements of enabling software.

5 Compute center standards: These standards standardize the technical requirements and evaluation methods for infrastructure such as large-scale computing clusters, new-style data centers (新型数据中心), intelligent compute centers, and compute networks for AI. They include standards for infrastructure reference architecture, compute assessment, technical requirements, stability requirements, and business service interfaces.

6 System software standards: These standards standardize the software and hardware technical requirements of the AI system layer. They include standards for software and hardware compiler architecture and optimization methods, AI operator libraries, chip software runtime libraries and debugging tools, and AI software and hardware platform computing performance.

7 Development framework standards: These standards standardize technical requirements related to AI development frameworks. They include standards for the functional requirements of development frameworks, interface protocols with application systems, neural network model expression, and compression.

8 Software and hardware collaboration standards: These standards standardize the adaptation requirements between smart chips, computing equipment, and other hardware and system software, development frameworks, and other

software. They include standards for the adaptation requirements of smart chips and development frameworks and the interaction protocols, execution efficiency, and collaborative performance for AI computing task scheduling, distributed computing, and other software and hardware collaborative tasks.

(iii) Key technical standards

Key technical standards mainly cover machine learning, knowledge graphs, large models, natural language processing, intelligent speech, computer vision, biometric feature recognition, human-machine hybrid augmented intelligence, intelligent agents, group intelligence (群体智能), cross-media intelligence, and embodied intelligence.

1 Machine learning standards: These standards standardize machine learning training data, data preprocessing, model expression and formats, and model performance evaluation. They include standards for self-supervised learning, unsupervised learning, semi-supervised learning, deep learning, and reinforcement learning.

2 Knowledge graph standards: These standards standardize the description, construction, O&M, sharing, management, and application of knowledge graphs. They include standards for knowledge representation and modeling, knowledge acquisition and storage, knowledge fusion and visualization, knowledge computation (知识计算) and management, knowledge graph quality evaluation and interconnection, knowledge graph delivery and application, and knowledge graph system architecture and performance requirements.

3 Large model standards: These standards standardize the technical requirements for areas such as large model training, inference, and deployment. They include standards for general technical requirements for large models, evaluation metrics and methods, service capability maturity assessment, and generated content evaluation.

4 Natural language processing standards: These standards standardize the technical requirements and evaluation methods for language information extraction, text processing, and semantic processing in natural language processing. They include standards for parsing (语法分析), semantic understanding, semantic expression, machine translation, automatic summarization, automatic question answering, and large language models (LLMs).

5 Intelligent speech standards: These standards standardize the technical requirements and evaluation methods for front-end processing, speech processing, speech interfaces, and data resources. They include standards for deep synthesis deepfake detection (鉴伪) methods, full-duplex interaction, and general purpose LLMs.

6 Computer vision standards: These standards standardize technical requirements and evaluation methods for image acquisition, image and video processing, image content analysis, three-dimensional computer vision, computational photography, and cross-media fusion. They include standards for functionality, performance, and maintainability.

7 Biometric feature recognition standards: These standards standardize technical requirements for biometric sample processing and biometric data protocols, equipment, and systems. They include standards for biometric data exchange formats and interface protocols.

8 Human-machine hybrid augmented intelligence standards: These standards standardize multi-channel, multimodal, and multi-dimensional interaction pathways, modes, methods, and technical requirements. They include standards for brain-computer interface, online knowledge evolution, dynamic self-adaptation (动态自适应), dynamic recognition, human-computer coordinated perception, and human-computer coordinated decision-making and control.

9 Intelligent agent standards: These standards standardize the technical requirements for intelligent agents based on large models, basic agent functions, and application architecture. They include standards for intelligent agent reinforcement learning, multi-task decomposition, inference, prompt engineering, intelligent agent data interfaces and parameter ranges, human-computer collaboration, intelligent agent autonomous operations, and multi-agent distributed consensus.

10 Group intelligence standards: These standards standardize the technical requirements and evaluation methods for the control, formation, perception, planning, decision-making, and communication of group intelligence algorithms. They include standards for autonomous control, collaborative control, task planning, path planning, collaborative decision-making, and networked communication.

11 Cross-media intelligence standards: These standards standardize the technical requirements for multimodal data processing, conversion analysis (转换分析), and fusion applications for text, images, video, audio, and other media. They include standards for data acquisition and processing, modal conversion, modal alignment, fusion and collaboration, and application expansion.

12 Embodied intelligence standards: These standards standardize multimodal initiative and interaction, autonomous behavioral learning (自主行为学习), emulation and simulation, knowledge inference, embodied navigation, and group embodied intelligence (群体具身智能).

(iv) Intelligent Product and Service Standards

Intelligent product and service standards mainly cover intelligent robots, smart vehicles (智能运载工具), smart mobile terminals, digital humans, and smart services.

1 Intelligent robot standards: These standards standardize the technical requirements for AI applications in the field of robots. They include technical application standards for robot intelligent cognition and intelligent decision-making.

2 Smart vehicle standards: These standards standardize the technical requirements for smart vehicle perception, identification and prediction, collaboration and strategic gameplay (博弈), decision-making and control, and evaluation. They include standards for environmental fusion perception, intelligent identification and prediction, intelligent decision-making and control, and multimodal testing and evaluation.

3 Smart mobile terminal standards: These standards standardize the technical requirements for AI applications in the field of mobile terminals. They include standards for image recognition, facial recognition, and intelligent speech interaction, as well as for the information accessibility and elder-friendliness of intelligent mobile terminals.

4 Digital human standards: These standards standardize the technical requirements for digital human appearance, motion generation, speech recognition and synthesis, and natural language interaction. They include standards for digital human basic ability assessment, multimedia synthesis rendering, basic data collection methods, and identification and recognition methods.

5 Smart service standards: These standards standardize services provided based on AI technologies, such as large models, natural language processing, intelligent speech, and computer vision. They include testing and evaluation standards for intelligent programming, intelligent design, and intelligent deepfake prevention (防伪).

(v) Industry Application Standards

These standards cover key application areas of the AI industry, including smart manufacturing, smart home, smart cities, and scientific intelligent computing (科学智算).

1 Smart manufacturing standards: These standards standardize the integrated application of AI in the industrial field, including technical requirements for intelligentization in the construction of smart factories and smart supply chains. They include standards for industrial knowledge expression (知识表达), industrial knowledge graph construction, and large models for industrial scenarios.

2 Smart home standards: These standards standardize the technical requirements for smart hardware, smart software, smart network connections, service platforms, and application platforms in the home, promote the interconnection of smart

home products, and improve the user experience of smart homes in terms of indoor environment, security monitoring, and other scenarios.

3 Smart city standards: These standards standardize intelligent technical requirements for smart city construction, governance, and ecological livability, and raise the application level of AI systems in urban economic development, resilience building, social governance, and assisted decision-making.

4 Scientific intelligent computing standards: These standards standardize the large-scale application of AI to accelerate basic scientific research.

Considering the requirements for the application of AI technology in agriculture, industry, and the service industry, we must accelerate the development of standards research in the fields of smart agriculture, smart energy, smart environmental protection, smart finance, smart logistics, smart education, smart healthcare, smart transportation, and smart culture and travel.

(vi) Security and Governance Standards

Security and governance standards cover security and governance in the AI field.

1 Security standards: These standards standardize the security requirements throughout the lifecycle of AI technology, products, systems, applications, and services. They include standards for basic security, data, algorithm, and model security, network technology and system security, security management and services, security testing and evaluation, security labeling, content identifiers, and product and application security.

2 Governance standards: Considering the actual needs of AI governance, these standards standardize the requirements for AI technical R&D and operational services, including technical requirements and evaluation methods for the robustness, reliability, and traceability of AI, AI governance support technology, and ethical governance requirements for the entire AI lifecycle. They include standards for AI ethical risk assessment, AI fairness, explainability, and other ethical governance technical requirements and evaluation methods, and AI ethical review.

V. Assurance Measures

(i) Improve organizational construction: Under the guidance of the Standardization Administration of China and the Ministry of Industry and Information Technology, the National Artificial Intelligence Standardization General Working Group (国家人工智能标准化总体组) will be better used to guide enterprises and research institutions throughout the AI production chain to jointly build an advanced and applicable AI standards system.

(ii) Build a talent cadre: Encourage standardization research institutions to

cultivate and recruit elite standardization talents and strengthen special training for standardization practitioners. Encourage enterprises, universities, research institutions, and other organizations to include standardization talents in the scope of their professional ability assessment and incentives and to build standardization talent tiers (人才梯队).

(iii) Increase propaganda and promotion: Guide industry associations, standardization technical organizations, and national technical standards innovation bases (国家技术标准创新基地) to carry out indoctrination and training on AI standards systems and key standards for the benefit of enterprises. Guide enterprises to comply with relevant standards in the R&D, design, production, management, quality inspection and testing, and other stages and continuously improve the efficacy of standards in facilitating the high-quality development of the industry.