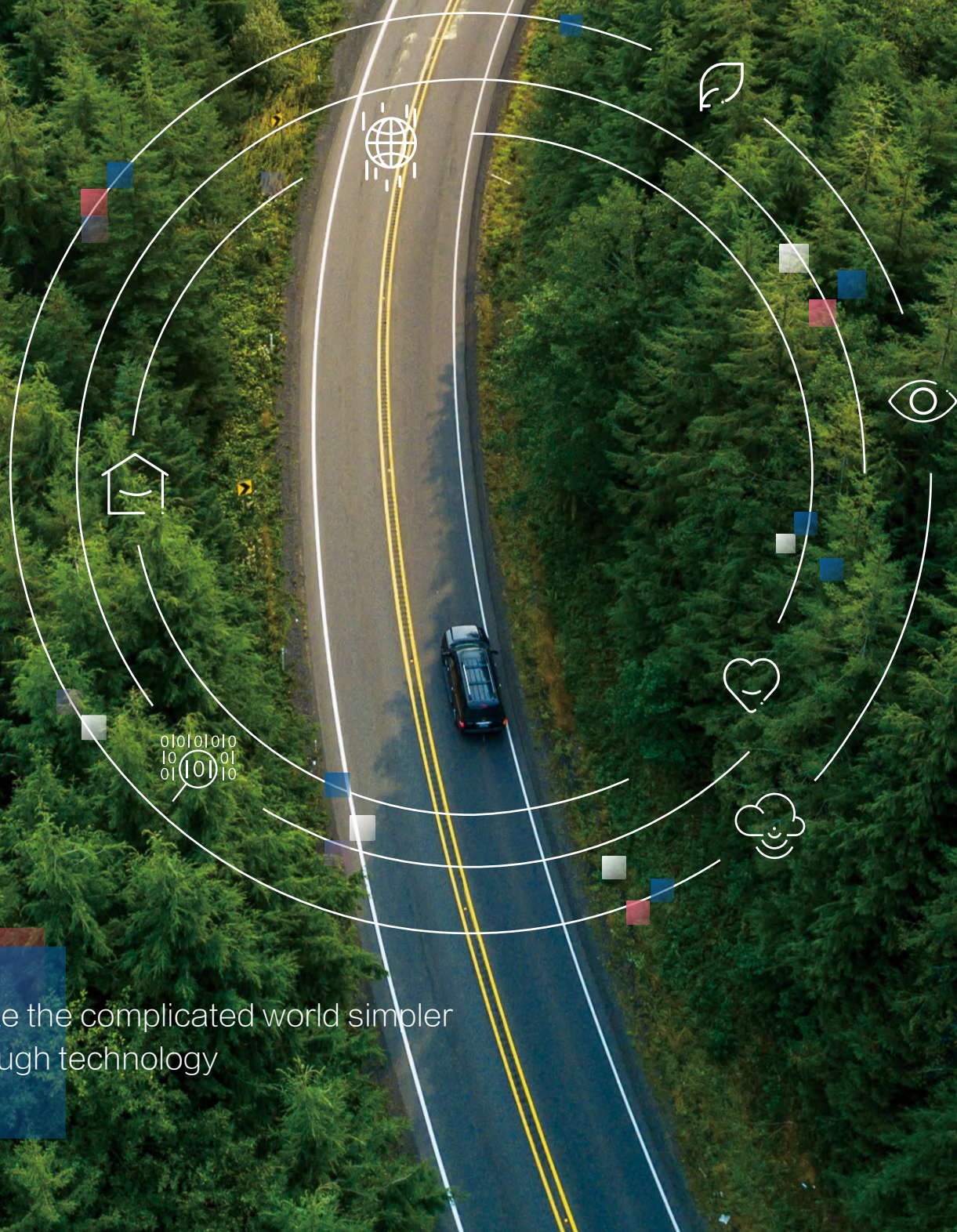


Baidu2021

Environmental, Social and Governance Report



Make the complicated world simpler
through technology



Table of Contents

About This Report

Company Statement

Overview

Our Priorities

Our Performance

Baidu's ESG concept, management,
initiative and performance

Our Practices

Baidu's ESG practices and highlight
cases in 2021

Appendix

Reader Feedback Form

About This Report

Since 2020, Baidu has officially issued the *Environmental, Social and Governance (ESG) Report*, making this Report the third installment.

This Report is compiled in accordance with the *ESG Reporting Guide 2.0* issued by the Nasdaq Stock Market, the consultation documents on the *Environmental, Social and Governance Reporting Guide* and the relevant provisions of the *Listing Rules* issued by the Hong Kong Exchanges and Clearing Limited (HKEX), the Ten Principles of the United Nations Global Compact (UNGC), the *GRI Sustainability Reporting Standards (GRI Standard) for Sustainability Reporting* issued by the Global Sustainability Standard Board and the *SASB Standards* issued by the Sustainability Accounting Standards Board, and the United Nations Sustainable Development Goals (SDGs).

For further details regarding our business ethics, privacy protection and data security, human capital, and low-carbon operations, please visit Baidu ESG website¹.

The data and information disclosed in this Report are from internal official documents and statistical reports of Baidu, covering all Baidu Core businesses from January 1, 2021 to December 31, 2021.

This Report is available on our official website in simplified Chinese, traditional Chinese and English. Your feedback is always welcomed and appreciated, please email us at esg@baidu.com.

¹ <https://esg.baidu.com/en>

Company Statement

Robin Yanhong Li

Chairman, Chief Executive Officer and
Co-founder



In 2021, we faced multiple challenges, including the COVID-19 epidemic and floods. With the novel coronavirus variants ravaging many countries, the fight against COVID-19 remains both severe and complex. Henan was hit by unprecedented extreme heavy rainfall and abnormal weather conditions. As we enter a new and exciting era, the role that a company should play in society is undergoing a dramatic change.

Over the past year, we have continuously explored the ESG value in corporate governance, pursuing the new “intersection” of ESG value with an innovation-driven engine, as well as fulfilling our commitments to the environment and society. We hope that this ESG does not remain a strategic concept but a cornerstone and starting point of our culture and actions.

In 2021, whilst adhering to regular prevention and control measures, we used artificial intelligence (AI) to fight the epidemic together with the country and society in various new scenarios and Baidu became the only internet company named the Advanced Organization of Industrial and Information Systems to Fight the New Coronavirus Epidemic by the Ministry of Industry and Information Technology. In the summer of 2021, when Henan was lashed by record rainstorms, we donated RMB 90 million earmarked for disaster relief, mobilized netizens and supported public welfare organizations to help fight against the disaster. Baidu won the Capital Charity Award for charitable endeavors.

We have every confidence to achieve “dual carbon” goals, which are demanding commitments. In 2021, we announced our goal of achieving carbon neutrality at the Group level by 2030 and working with our ecosystem partners to achieve “zero-carbon growth” with AI. Baidu Yangquan Data Center was awarded the Carbon Neutral Data Center Leader (5A) certification, making it the first data center with the highest low-carbon level in China. We continuously explored pathways to reducing carbon emissions in businesses such as autonomous driving and intelligent transportation and refined them into methodologies and capabilities that are open to society.

The burgeoning stories from PaddlePaddle, a deep learning platform, inspire us to have more expectations for AI to create more social value. A 12-year-old girl, without any prior knowledge of programming, took online PaddlePaddle live courses and successfully developed an AI program that can check whether masks are worn properly, thus reducing the workload of the

subway staff. For many years, we have been continually impressed with female developers, fine art majoring artists and engineers devoted to traditional manufacturing industries. As more and more women realize their dreams with technology, “her power” is shining ever more brightly.

As a high-tech company, Baidu does not only focus on business development, but also the pursuit of growth with industry and society. In 2021, Baidu ranked 1st in China in terms of AI patent applications and grants for the fourth consecutive year as well as winning the second prize of the National Technological Invention Award for “Key Technology for Knowledge-enhanced Cross-modal Semantic Understanding”. We established a data management committee to strengthen supervision and ensure the information security of our users. We also used AI as an engine to facilitate the digital transformation and intelligent upgrading of industries, and to promote the integrated development of both the digital economy and the real economy. Baidu has pledged to nurture 5 million AI talents for society in the next five years and to make greater continuous contributions to the cultivation of national strategic scientific and technological force. We make these efforts to honor our inherent mission “to make the complicated world simpler through technology”.

This is an era defined by profound changes in technology and corporate management. We must stay well-positioned with patience to achieve broader ESG values as well as honor the responsibility of our times to promote common prosperity in the pursuit of high-quality development. This is the original aspiration behind this Report. It is the wish that Baidu's ESG actions be not only visible, but also persistent and sustainable. Only through doing this can it become part of our DNA to drive changes in the world with technology with a firm belief.

A handwritten signature in black ink, likely of Robin Yanhong Li, the Chairman, Chief Executive Officer and Co-founder of Baidu. The signature is stylized and cursive, written in Chinese characters.

Overview

About Baidu

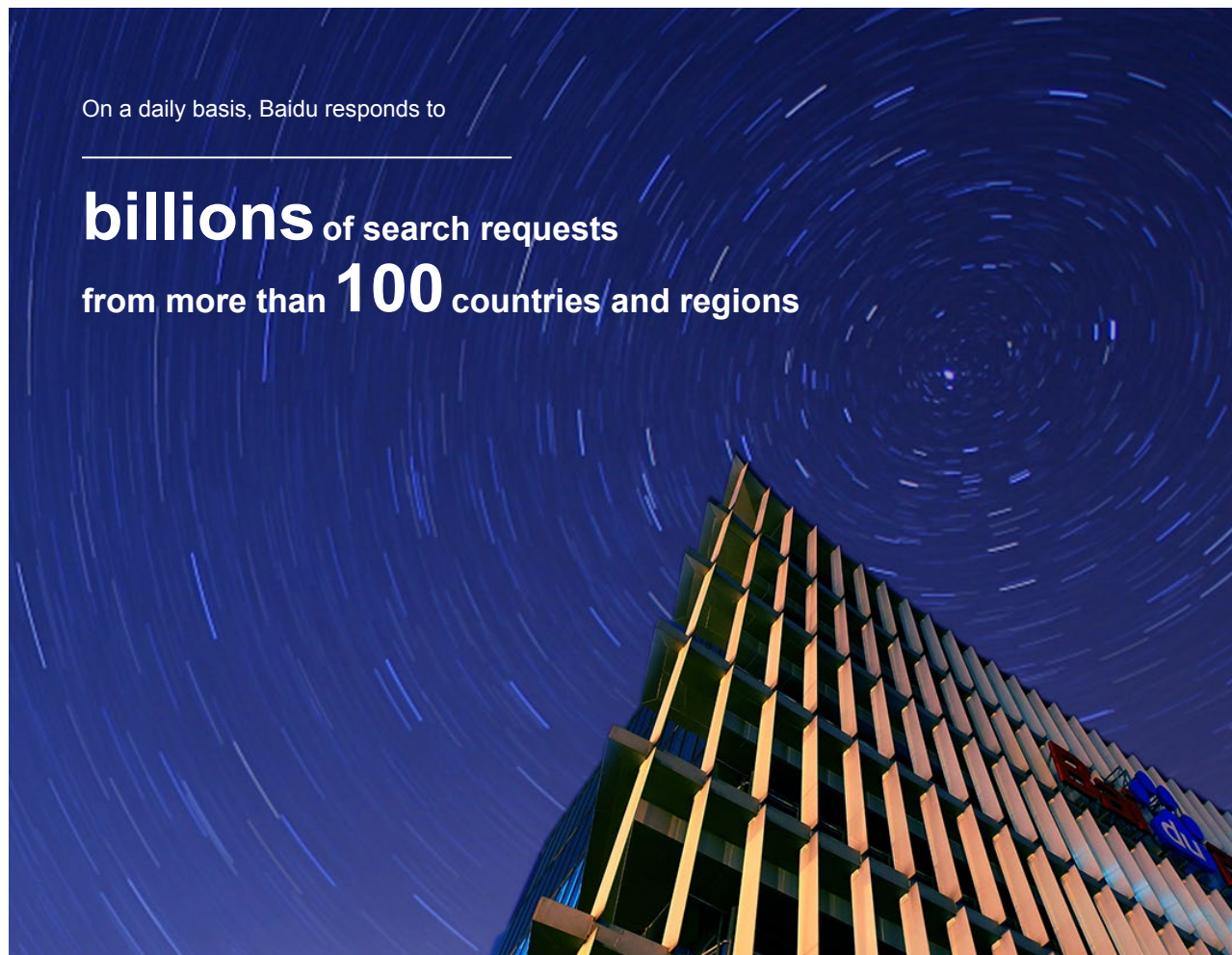
Baidu is the world's leading Chinese search engine, China's leading information and knowledge-centered internet integrated service company, and also the world's leading AI platform company.

Baidu was founded on January 1, 2000. Mr. Robin Yanhong Li, co-founder of Baidu, is the creator of visionary search technology Rankdex, a method of hyperlink analysis, which made China the fourth country in the world with core search technology, the other being the United States, Russia and South Korea. On a daily basis, Baidu responds to billions of search requests from more than 100 countries and regions, making it an important portal for access to Chinese information.

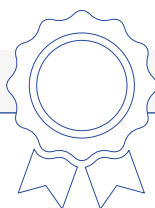
Based on the search engine, Baidu has developed an array of AI technologies such as intelligent voice, intelligent image, knowledge graph, and natural language processing. Over the past decade, Baidu has invested heavily in frontier fields ranging from deep learning and conversational AI operating system to autonomous driving and AI chips. Baidu has emerged as one of the few global providers of full-stack technologies including AI chips, software architecture and applications. Baidu is also rated, by multiple international organizations, as one of the top four AI companies in the world.

On a daily basis, Baidu responds to

billions of search requests
from more than **100** countries and regions



Major ESG Honors in 2021



Baidu won the second prize of National Technological Invention Award for “Key Technology for Knowledge-enhanced Cross-modal Semantic Understanding”.



Baidu ranked 1st in the number of global patent applications for deep learning according to the *Deep Learning 2021 Patent Landscape* released by Questel, the world’s leading intellectual property solutions provider.



Baidu ranked 1st in the autonomous driving patent applications (by family) and 2nd in the intelligent transportation patent applications (by family) in the world according to the Self-Driving Vehicles Patent Landscape Study released by Clarivate Analytics and reported by the Intellectual Asset Management (IAM), a leading international media agency on intellectual property.



Baidu won the China Patent Gold Award for Human-computer Interaction Methods and Systems Based on Artificial Intelligence (ZL201510563338.2).



Baidu was rated excellent for Data Security Governance Capability Assessment by the China Academy of Information and Communications Technology (CAICT).



Baidu was listed in the 2021 China’s Top 100 Enterprises with Comprehensive Competitiveness in Software and IT Service issued by the China Federation of Electronics and Information Technology



Module 1# of the Baidu Yangquan Data Center was awarded the Carbon Neutral Data Center Leader (5A) by People’s Posts and Telecommunications Press, CAICT and the Open Data Center Committee (ODCC).



Baidu was awarded the New Star Award on Climate Change by the Carbon Disclosure Project (CDP).



Baidu ranked 1st in China and 18th in the world for the 150 Most Influential Technology Companies 2021 according to the benchmark report on Data Inclusion by the World Benchmarking Alliance (WBA).



Baidu won the first Integrity and Compliance Innovation Award of Private Enterprises jointly sponsored by the School of Criminal Law of East China University of Political Science and Law (ECUPL) and Anti-Corruption and Compliance Research Institute for Internet Enterprises of ECUPL.



Baidu was awarded the China’s Top 10 Best Employers of the Year by Zhaopin.com.



Baidu was named the Advanced Organization of Industrial and Information Systems to Fight the New Coronavirus Epidemic by the Ministry of Industry and Information Technology.



Baidu was granted the Advanced Private Enterprise in the Fight against COVID-19 by the All-China Federation of Industry and Commerce.



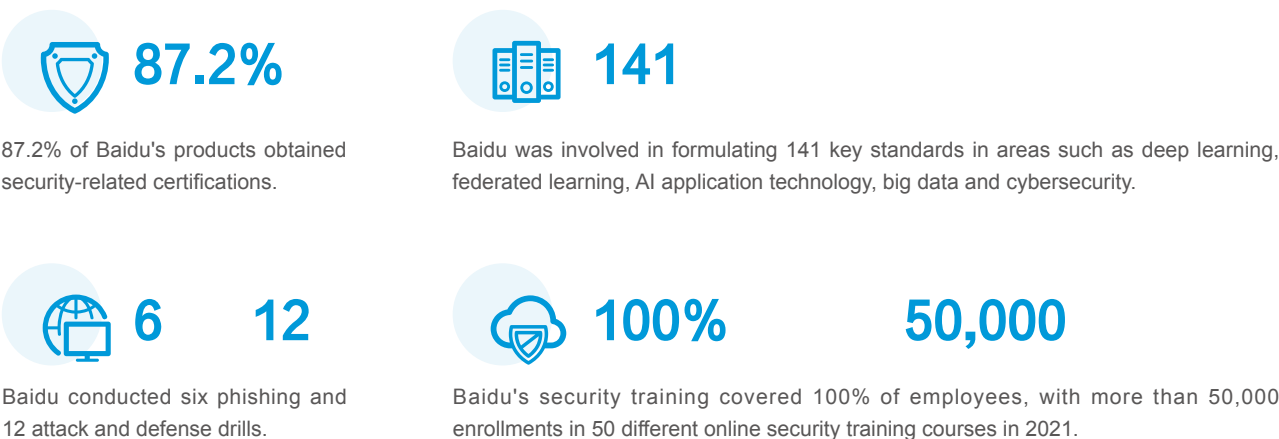
Baidu was awarded the Capital Charity Award by the Capital Charity Federation.

Key ESG Performance in 2021

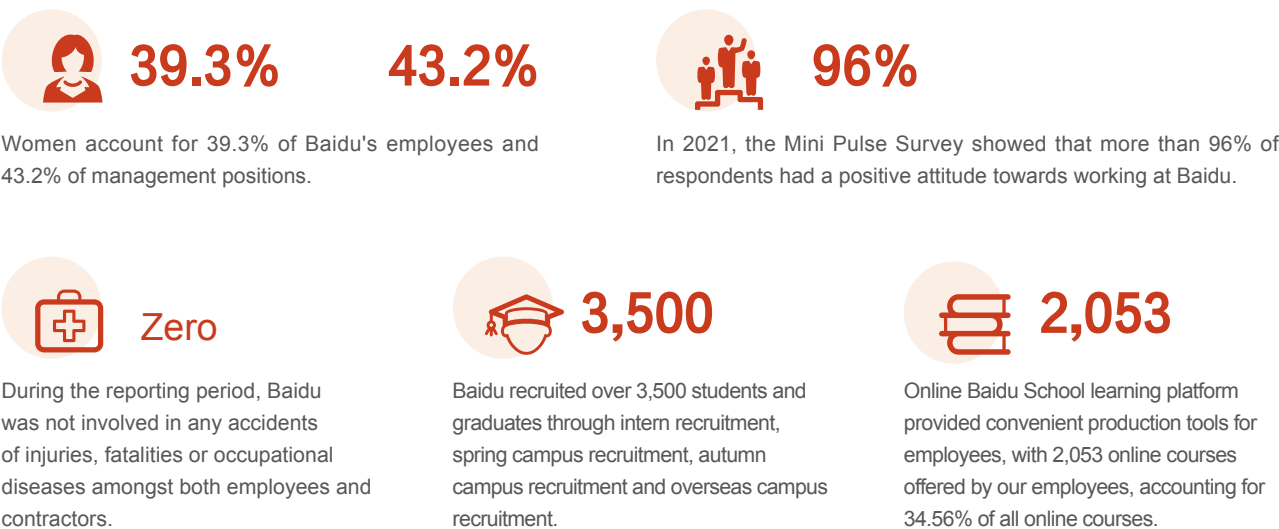
Enhancing corporate governance



Building trust



Nurturing talents



Promoting green ideas



Carbon neutrality by **2030**

Baidu announced the goal of achieving carbon neutrality by 2030 at the Group operational level with 2020 as the baseline year.



USD **1 billion**

Baidu issued the first sustainability bond worth USD 1 billion.



500,000 kWh

Baidu purchased 500,000 kWh of green electricity certificate.



ISO 50001

Baidu office buildings passed the ISO 50001 energy management system certification.

Improving services



56 billion times **27** million times **220,000** times

Baidu annually intercepted malicious information 56 billion times on average, prevented fraudulent websites and Apps from reaching users 27 million times and protected citizens' personal information from malicious disclosures 220,000 times.



100%

100% of Baidu's online complaints were properly handled.



13,000 applications **3,600** grants Rank **1st** for four consecutive years

According to the *Analysis Report on China's High-Value Patents and Innovation Drivers of Artificial Intelligence*, jointly released by the National Industrial Information Security Development Research Center and the Electronic Intellectual Property Center of the Ministry of Industry and Information Technology in October 2021, Baidu applied for more than 13,000 and was granted over 3,600 AI patents. For four consecutive years, Baidu has ranked 1st in China in terms of AI patent applications and grants.



1,000 open-source projects

As of 2021, Baidu led 21 open-source organizations and more than 1,000 open-source projects on Github, with over 18,000 community contributors and more than 370,000 stars gained.

Contributing to society



RMB **198.045** million

RMB **23.8902** million

In 2021, Baidu's charitable donations totaled RMB 198.045 million, including RMB 90 million for affected areas by flood in Henan, RMB 50 million for those in Shanxi, and RMB 58.045 million for others. The total value of material donations from Baidu reached RMB 23.8902 million, including 200 fundus cameras and 10 sets of "Assistance to Doctors" primary medical solutions of Lingyi Zhihui.

Our Priorities

Communicating with Stakeholders

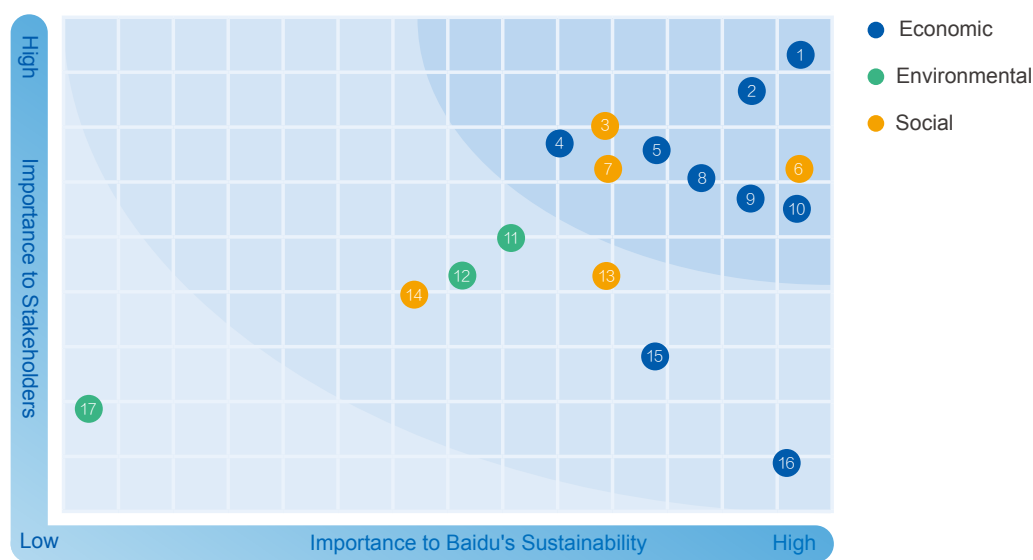
Stakeholders' suggestions are key to Baidu. The Company has established regular communication mechanisms with stakeholders through multiples forms.

Stakeholders	Means of communication		Expectations and demands	
Shareholders and investors	<ul style="list-style-type: none"> General meetings of shareholders Periodic reports and announcements 	<ul style="list-style-type: none"> Communication with investors via emails and conferences 	<ul style="list-style-type: none"> Ongoing and stable growth Compliant operations 	<ul style="list-style-type: none"> Risk management Product service and quality
Users	<ul style="list-style-type: none"> Feedback channels Product surveys Interaction via our websites and social media 		<ul style="list-style-type: none"> Improving user experience Information security Data and privacy protection 	<ul style="list-style-type: none"> Content integrity Product quality assurance
Governments and regulators	<ul style="list-style-type: none"> Information disclosure Collaborative projects Routine communication and reporting 	<ul style="list-style-type: none"> Supervision and inspections Visit reception 	<ul style="list-style-type: none"> Compliant operations Information security 	<ul style="list-style-type: none"> Data and privacy protection Content integrity
Employees	<ul style="list-style-type: none"> Internal office systems Internal meetings 	<ul style="list-style-type: none"> Regular surveys for feedback Online and offline trainings 	<ul style="list-style-type: none"> Protecting employee rights and interests Employee training and development 	<ul style="list-style-type: none"> Employee benefit guarantee Occupational disease prevention
Suppliers	<ul style="list-style-type: none"> Invitation for bids Project procurement Contracts and agreements 	<ul style="list-style-type: none"> Supplier management conferences Supplier business communication meetings Other supplier communications 	<ul style="list-style-type: none"> Integrity Mutual benefit Empowering suppliers 	
Partners/NGOs	<ul style="list-style-type: none"> Baidu World Congress Baidu Create ABC Summit Baidu Union Summit 	<ul style="list-style-type: none"> Project-based cooperation Technology exchanges Achievements sharing 	<ul style="list-style-type: none"> Technological innovation Cooperative development Product quality assurance 	<ul style="list-style-type: none"> Low-carbon operations Corporate social responsibility
Media	<ul style="list-style-type: none"> Press conferences Exclusive interviews Invitation to meetings or events held by Baidu 	<ul style="list-style-type: none"> Interaction via our websites and social media 	<ul style="list-style-type: none"> Transparency Compliant operations Information security 	<ul style="list-style-type: none"> Data and privacy protection Content integrity Corporate social responsibility
Environment	<ul style="list-style-type: none"> Adopting energy-saving and emission reduction technology Developing green products Cultivating low-carbon awareness for users 		<ul style="list-style-type: none"> Emissions management Energy and resource conservation Low-carbon operations 	
Communities	<ul style="list-style-type: none"> Community activities Interaction via our websites and social media 		<ul style="list-style-type: none"> Charity projects Volunteering activities 	

The Communication Mechanisms with Stakeholders of Baidu

Materiality Assessment

In 2021, based on the UN SDGs, *GRI Standards*, *SASB Standards*, mainstream ESG rating indexes in capital markets, and outcomes of the communication with stakeholders as well as discussion and analysis with the management, we reviewed the matrix of material issues after previous assessments. The newly published matrix contains no major changes.



Baidu's 2021 Material ESG Issue Matrix

Importance	Issue	Category
High	1 Data and privacy protection	Economic
	2 Information security	Economic
	3 Protection of employees' rights	Social
	4 Product quality assurance	Economic
	5 Improving user experience	Economic
	6 Staff development	Social
	7 Protecting Employees' benefit	Social
	8 Protecting intellectual property rights	Economic
	9 Anti-corruption and business ethics	Economic
	10 Content integrity	Economic
Medium	11 Energy and resource conservation	Environmental
	12 Low-carbon operations	Environmental
	13 Contribution to community/charity	Social
	14 Occupational health	Social
	15 Supplier sustainability management	Economic
	16 Effectiveness of board governance	Economic
Low	17 Emission management	Environmental

Baidu's 2021 Material ESG Issues

Corporate Governance

Our Performance

- ESG Management
- Compliant Operations



Enhancing Corporate Governance

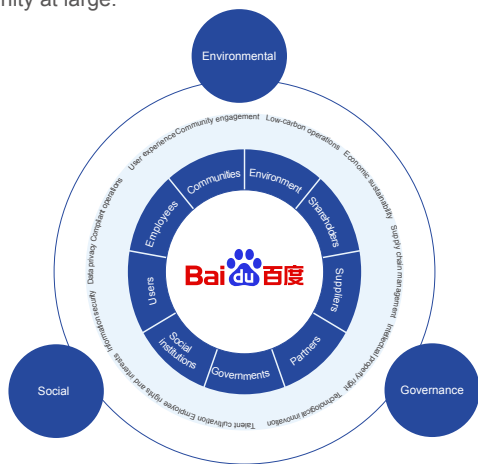


Baidu firmly believes that a good governance structure represents an inexhaustible source of strength for our sustainable development. We continually improve corporate governance, optimize ESG management system, uphold business ethics, and comprehensively improve our risk resistance capacity.

ESG Management

◇ ESG Concept

Committed to the vision of “to be a top global technology company which best understands users’ needs and enables their growth”, Baidu integrates key ESG philosophy and standards into corporate governance as part of the efforts to contribute long-term and sustainable value to stakeholders and humanity at large.



Baidu's ESG Concept

◇ ESG Governance Structure

The Board of Directors of Baidu is the highest authority with ultimate responsibility for ESG-related issues. The Board guides and approves ESG overall plans and implementation objectives as well as assessing ESG risks and formulating responses accordingly.

Baidu established the Environmental, Social, and Governance Committee (ESG Committee) to provide the Board with suggestions for sustainable development and formulate ESG goals

and action paths based on the concerns of stakeholders as well as the wider international community. The ESG Working Group, under the ESG Committee, is in charge of the communication and implementation of ESG-related issues. A performance appraisal mechanism for sustainability has been set up for the members of the ESG Committee to ensure that executive compensation is linked with their sustainability performance.

Baidu has formulated corresponding ESG management regulations or systems targeting specific ESG issues, including business ethics, human rights, environment, health and safety and information security. These policies, or systems, along with *Baidu Environmental, Social and Governance (ESG) Policy*¹, provide an institutional guarantee for the Company's sustainable development.



¹ [https://esg.baidu.com/en/article/Baidu_Environmental_Social_and_Governance_\(ESG\)_Policy](https://esg.baidu.com/en/article/Baidu_Environmental_Social_and_Governance_(ESG)_Policy)

Compliant Operations

◆ Corporate Governance

In strict compliance with the *United State Securities Act of 1933*, the *Nasdaq Stock Market Rules*, the *Hong Kong Listing Rules*, as well as other applicable laws, Baidu has established a well-structured corporate governance mechanism with defined rights and responsibilities.

Baidu adopts the *Code of Business Conduct and Ethics*, which is applied to all Board members, to require them to uphold integrity. Our Board has an Audit Committee, a Remuneration

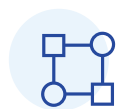
Committee and a Corporate Governance and Nomination Committee. All committees have defined responsibilities and workflow to guarantee that internal resources are allocated appropriately and that decision-making is efficient. (For the *Code of Business Conduct and Ethics*, please refer to the “Corporate Governance” section of the Investor Relations website². For the responsibility of every Committee, please refer to the Prospectus³.)



Board Independence



- The Board comprises five members, including four independent Directors who have no relationships to controlling shareholders.
- Independent Directors provide independent suggestions and judgments on the corporate business strategy, business performance, risk prevention and control, conflicts of interests as well as various other issues. Conflicts of interest are prohibited to ensure they represent the interests of the Company and shareholders to the full extent.



Board Diversity



- Directors are appointed on merit to ensure that they have balanced skills, experience and diverse perspectives to meet business needs.
- All of the current Directors have rich industry experience, including one financial expert who brings diversified experience and expertise to the Company.



Board Engagement



- In 2021, the Board held a total of seven meetings, with a 100% of attendance rate.



Other Governance Measures



- If the Directors reasonably require advice from independent professionals (e.g., a financial adviser), relevant cost should be paid by the Company.
- Third-party compliance consultants are appointed to provide independent compliance suggestions and guidance.

For further details of our corporate governance and Board members, please refer to Baidu's Investor Relations website⁴.

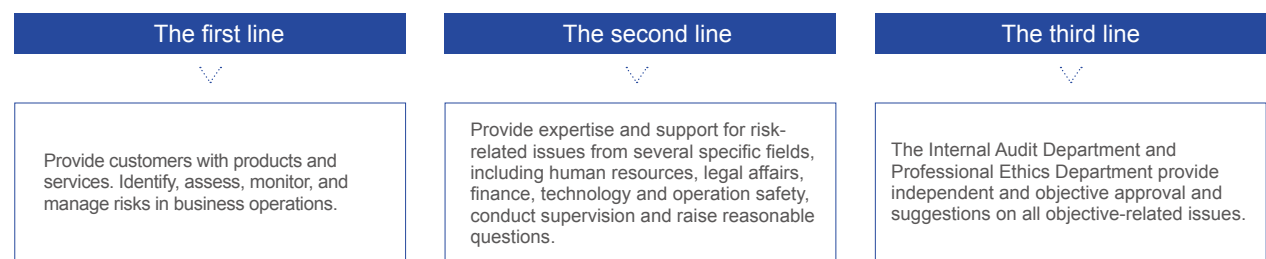
² <https://ir.baidu.com/corporate-governance>

³ <https://www1.hkexnews.hk/listedco/listconews/sehk/2021/0312/2021031200021.pdf>

⁴ <https://ir.baidu.com/>

Baidu gives top priority to risk prevention and management and has established a risk management system that is led by the Board. In 2021, the Company upgraded the philosophy of risk management and introduced the “three lines” risk management model based on the original “three lines of

defense” risk management model. The new model focuses on the cooperation and goal alignment among “three lines”, turning traditional risk prevention to risk management, and underscores the necessary supervision of “three lines” as well as their empowerment and improvement among each other.



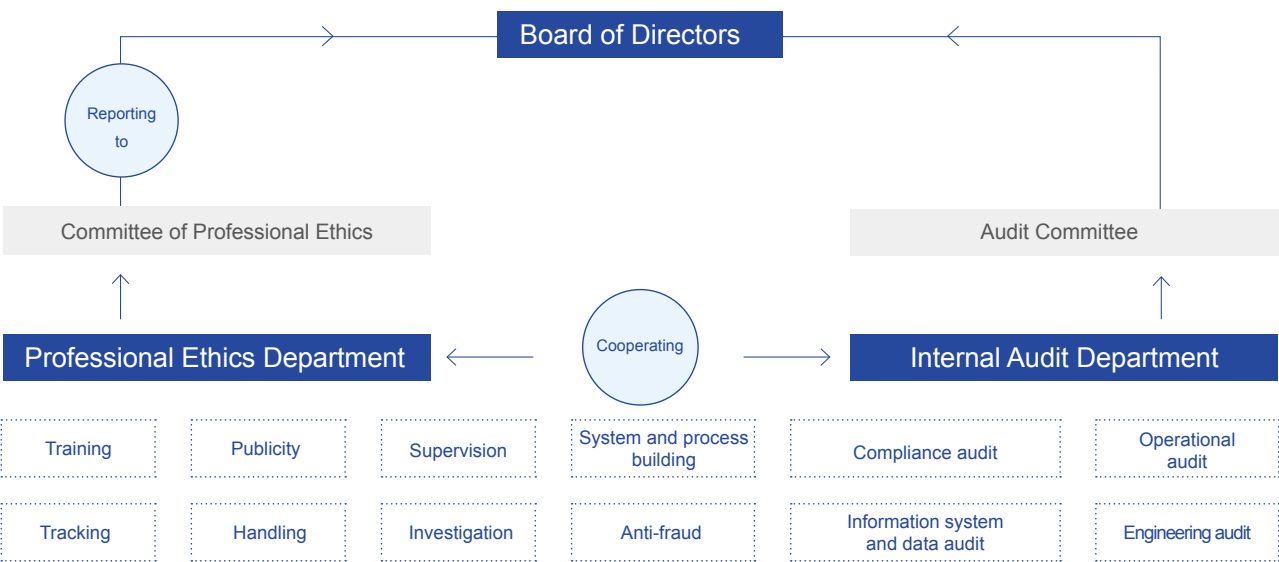
Baidu's “Three Lines” Risk Management Model

Baidu carries out regular internal risk identification as well as analysis and assessment. The Company also collaborates with both internal and external parties to carry out effectiveness analysis and assessment of the risk management and the internal control system. In addition, Baidu formulates a one- to three-year audit plan to ensure the full life cycle risk management of the Company.

◆ Business Ethics

In compliance with advanced laws, regulations, standards and international initiatives such as *United Nations Convention Against Corruption* and the *Business Principles for Countering Bribery*, we constantly improve our business ethics system. At present, we have formed a system consisting of the *Baidu Professional Ethics and Code of Conduct*⁵ as the basis and

other protocols concerning business ethics, professional ethics, and anti-corruption. Our anti-corruption organization consists of three levels of management, including the Board of Directors, the Committee of Professional Ethics and the Professional Ethics Department. The Board of Directors is ultimately responsible for business ethics.



Baidu's Business Ethics Governance Framework and Reporting Levels

⁵ https://esg.baidu.com/en/article/Baidu_Professional_Ethics_and_Code_of_Conduct

In 2021, we constantly advanced the construction of a professional ethics system. We formulated an anti-bribery management manual in the light of the character of our services and the status quo of our management. We developed, implemented, maintained and improved the anti-bribery compliance plan. At the same time, we carried out an internal special audit of business ethics and established a rigorous two-way linkage mechanism via ex-post risk assessment. Through handling cases, Baidu identified and optimized 22 fraud risks within operating processes and mechanisms throughout 2021.



Baidu Receives ISO 37001 Certification

Throughout daily operations, in light of the Company's development and the sensitive spots of industry sectors and commerce, regular identification and self-inspection of business ethics risks that cover whole business lines are carried out. This optimizes supervision mechanisms to ensure they are interlinked and coordinated, as part of the efforts to mitigate our business ethics risks from the outset.



Baidu Wins the First Integrity and Compliance Innovation Award of Private Enterprises

◆ Managing the Value Chain

To build a fair value chain, Baidu is committed to responsible procurement, sticks to the philosophy of whole process management and control and carries out risk identification and management of full life cycle supply chain with links to such areas as access, assessment and exit.

With regard to key network equipment suppliers, Internet Data Center (IDC) infrastructure and others, Baidu abides by supplier rating system to assess and summarize their performance bi-annually and selectively starts on-site review procedures. For substandard suppliers, Baidu helps formulate a rectification plan through operation communications and determines whether to terminate cooperation with them based on rectification results. In 2021, 100% of the market, engineering and administrative suppliers were investigated and assessed.

The Company has formulated the *Baidu Sustainable Development and Social Responsibility Rules for Suppliers*⁶,

which requires all suppliers to establish ESG management systems, including an anti-corruption system. In order to encourage them to improve their ESG performance, Baidu provides suppliers with guidance, training and awareness-raising on ESG system construction, and includes their ESG system construction and performance into their performance appraisal system. In 2021, 100% of domestic suppliers were required to comply with the *Baidu Sustainable Development and Social Responsibility Rules for Suppliers*.

Baidu is committed to teaming up with suppliers to build a fair and clean cooperation environment. We specify our regulations on procurement process and anti-corruption during suppliers' platform registration and urge partners to comply with relevant business ethics and anti-corruption rules by signing our *Honesty and Integrity Agreement*⁷ in addition to the integrity clauses in our contracts. In 2021, the Company signed the *Honesty and Integrity Agreement* with all domestic suppliers.

Location	Number of suppliers
The PRC (including Hong Kong, Macao, and Taiwan)	17,199
Overseas	4,850

The Number of Suppliers by Location⁸

⁶ https://esg.baidu.com/en/article/Baidu_Sustainable_Development_and_Social_Responsibility_Rules_for_Suppliers

⁷ https://esg.baidu.com/en/article/Honesty_and_Integrity_Agreement

⁸ The number of suppliers is the cumulative data of Baidu's supplier pool.

Building Trust

Our Performance

- Cybersecurity
- Data Security

Our Practices

- Case



Building Trust



Cybersecurity and data security are paramount to Baidu. By establishing sound internal systems and security management structures, the Company continuously improves the process management and technology application of security operation.

Cybersecurity

◇ Security Management

In 2021, Baidu updated various regulations and systems, for instance, *Baidu Information and Product Security Punishment Measures*¹ and *Baidu Security Management Standards*².

These regulations and rules cover security redline, office security, basic security, data security, and privacy, product security, third-party cooperation security, security management, and other aspects.

Baidu's Data Management Committee is the top-level decision-making and execution body responsible for handling important matters concerning data management, formulating relevant specifications, processes and mechanisms, issuing data management standards, and auditing the relevant behaviors in daily operation.



¹https://esg.baidu.com/en/article/Statement_on_the_Baidu_Information_and_Product_Security_Punishment_Measures

²https://esg.baidu.com/en/article/Statement_on_the_Baidu_Security_Management_Standards

◇ Security Operation

Baidu has built a sound security management process and emergency response plan.

Process Management

Based on the multi-layer defense system for network anomalies (see Page 35 of *the Baidu 2020 Environmental, Social and Governance (ESG) Report*³ for further details on the multi-layer defense system for network anomalies), Baidu has developed a whole-chain security control process covering pre-event prevention, mid-event handling and post-event traceability.

Technology Application

Baidu continuously relies on AI to ensure network ecological security. We have built an industrial intelligence and systematic security architecture focusing on computing power, algorithms and data in the AI-native era.

Leading security technology system oriented for the AI-native cloud

Security: strong-adversarial security

AI autonomous
framework security

AI model attack detection and
adversarial defense

AI model
anti-stealing

AI deepfake
detection

AI supply
chain security

Safety: non-adversarial security

AI model robustness
evaluation/enhancement

AI model non-interpretability
detection

Security verification under
complex scenarios

AI model multi-sensor
redundancy

Privacy: data security and privacy protection

Data security throughout
the life cycle

Safe collection

Safe collection

Safe circulation

Trusted computing

Machine learning for
privacy protection

Model privacy risk
assessment

Joint modeling of
privacy protection

AI training for
privacy protection

AI reasoning for
privacy protection

Facing threats in a strong adversarial environment, Baidu pioneered the launching of the AdvBox Adversarial Example Toolbox. This helps mainstream machine learning platforms, such as PaddlePaddle and TensorFlow, rapidly improve the model adversarial robustness from multiple aspects. To tackle threats in non-adversarial environments, Baidu released a systematic evaluation framework for model robustness. Focusing on multiple security features, the framework can develop evaluation criteria for different models, tasks and scenarios, as well as help the industry better quantitatively evaluate potential security threats and model robustness.

In the field of cloud security, Baidu introduced a series of AI security technologies such as Privacy Enhanced Computing and Trusted Computing, as well as deeply combining the leading AI security capabilities with Baidu AI Cloud to realize

intelligent and integrated security upgrade of the corporate cloud defense system. Baidu released Anti Distributed Denial of Service (Anti-DDoS), which can provide IDCs with comprehensive and convenient security infrastructure in combination with a series of technologies, including rapid local detection, automated expansion of T-level cloud defense, hacker attack detection, real-time security defense, and threat intelligence.

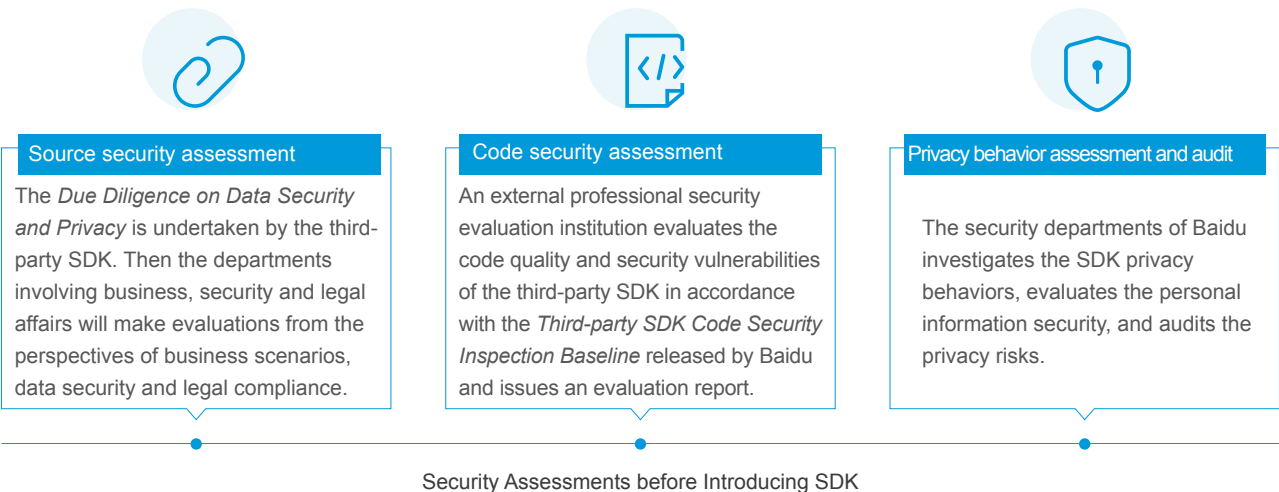
In 2021, Baidu's numerous products and solutions, including Privacy Situational Awareness Systems and Federal Computing, were selected for the *Research on Artificial Intelligence Data Security and Regulatory Mechanism* by the National Industrial Information Security Development Research Center.

³ https://esg.baidu.com/en/article/Baidu_2020_Environmental_Social_and_Governance_Report

◇ Security Audit

In accordance with relevant laws and regulations, Baidu carries out risk assessments and audits for personal information and highly sensitive data. The Internal Audit Department conducts bi-annual special audits on the implementation process and results. In addition, Baidu invites third-party institutions with professional qualifications to conduct audit certification and security assessments annually.

In 2021, Baidu carried out a special audit on personal information protection and information security with reference to the newly adopted *Personal Information Protection Law of the People's Republic of China*. For the third-party SDK⁴ introduced for Baidu Apps, Baidu formulated the *Regulations on Third-party SDK Security Management*, which clearly stipulates that security assessments should be conducted at the level of source, code and privacy behavior before introducing the third-party SDK.



◇ Security Certification

Currently, Baidu has obtained a number of international and domestic authoritative cybersecurity certifications. In 2021, 87.2%⁵ of our products obtained security-related certifications.



ISO 27001 Information Security Management System
ISO 22301 Business Continuity Management System
ISO 27017 Cloud Security Management System
ISO 27032 Cyberspace Security Management System
ISO 27040 Data Storage Security Management System
Classified Protection of Cybersecurity (Level 3)
Classified Protection of Cybersecurity (Level 2)
CSA STAR International Certification of Cloud Security
Multi-tier Cloud Security (MTCS) Standard for Singapore
Information Security Service Qualification (Cloud Computing Level 1)
Classified Protection of Cybersecurity (Level 4) (Baidu Financial Cloud System)
Baidu's Certification in Information Security

⁴ SDK, short for software development kit, refers to a collection of development tools used by software engineers to create application software, such as software package, software framework, hardware platform, and operating system.

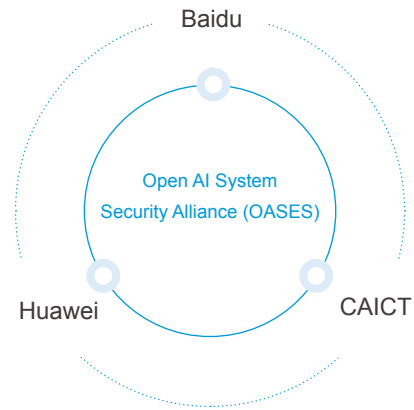
⁵ The percentage of Baidu's products obtaining security-related qualification certifications compared to its products obtaining all qualification certifications. As of December 31, 2021, Baidu's products had obtained a total of 86 qualification certifications, and 75 security-related qualification certifications.

◇ Security Ecosystem

Baidu continually upholds the concept of “win-win cooperation and open-source sharing” and actively participates in the construction of security ecosystem.

Joining Industrial Alliances

Baidu is a member of the International Organization for Standardization/ International Electrotechnical Commission (ISO/IEC JTC1), International Telecommunication Union-Telecommunication Standardization Sector (ITU-T), Institute of Electrical and Electronics Engineers Standards Association (IEEE-SA), China National Information Technology Standardization Technical Committee (TC28), China National Information Technology Standardization Technical Committee (TC260), China Communications Standards Association (CCSA), China Communications Standards Association - the Big Data Technology and Standard Committee (CCSA-TC601) and other important standardization organizations both at home and abroad. Along with Huawei and CAICT, Baidu launched the Open AI System Security Alliance (OASES)⁶ and jointly promoted the construction of a security ecosystem of intelligent terminals.



Formulating Standards and White Papers

Baidu has been involved in the formulation of 141 key standards in areas such as deep learning, federated learning, AI application technology, big data, and cybersecurity. In 2021, Baidu participated in the formulation of international standards including the *ISO/IEC 27035-1 Information Technology - Security Techniques - Information Security Incident Management*, *IEEE P3219 - Standard for Blockchain-based Zero-Trust Framework for Internet of Things (IoT)*, *IEEE Standard for Secure Computing Based on Trusted Execution Environment*, and *IEEE Standard for Technical Framework and Requirements of Shared Machine Learning*. National standards include the *Information Security Technology- Guidance on Security Management of Internet of Things (IoT)*. Industrial

standards include the *Technical Requirements and Testing Methods for Cloud Phones*. Group standards include the *Trusted and Traceable Service Technical Requirement for the Cold Chain Logistics and Specifications on AI Model Protection Based on Trusted Execution Environment*. In August 2021, Baidu PaddlePaddle and CAICT jointly released the ITU-T F.748.12 *Deep Learning Software Framework Evaluation Methodology*⁷, the world's first international testing standard for deep learning software framework.

In July 2021, Baidu participated in the compilation of the *White Paper on AI Standardization (2021 Edition)* issued by the China Electronics Standardization Institute (CESI).

Nurturing Professional Talent

Baidu has actively supported the entry and innovation of international security competitions in China. In recent years, Baidu has held various events such as the Baidu Cybersecurity Skills Competition for College Students, Annual Festival of Baidu Security Response Center, White Hat Night of Baidu Security Response Center, and Cybersecurity Technology Sharing in Universities and Colleges. Baidu, together with 41 major security response centers in China, launched the volunteer program called DEF CON CHINA, providing a platform for the next generation of cybersecurity talent.

Baidu actively cultivates the qualifications and skills of the security personnel, encourages our employees to pursue better personal development, and better show the talent and ability of our security personnel. The security departments of Baidu launched the Certified Security Professional Incentive Plan and completed the Certification for Cyber Security Competence (CCSC) for the employees in the first batch, contributing to the cultivation and reserve of cybersecurity talent.

⁶ OASES, short for Open AI System Security Alliance, is China's first alliance committed to improving the ecological security of smart terminals and promoting the positive interaction and cooperation between mobile phone manufacturers, smart terminal manufacturers, security manufacturers and security experts.

⁷ It refers to deep learning software framework evaluation method.

Building AI Security Ecosystem

Baidu always honors the mission of “making the complicated world simpler through technology” and continuously promotes the development of AI computing ecosystem through technological innovation and open-source sharing.



Open research



- As the first Chinese company to attend the four top conferences on security (CCS, NDSS, S&P and USENIX), Baidu continuously creates world-class research achievements and ranks 1st in the number of papers published at the top conferences in China in the past five years.
- Baidu also participated in the formulation of 141 key international and national standards.



Open code



- Baidu engages in the open source and sharing of code research achievements. Baidu also donated Teaclave, the world's first open-source universal secure computing platform, to the Apache Foundation. It has become the most popular privacy protection and secure computing open-source ecological program in any major open-source community.
- Facing broader challenges presented by the AI security ecosystem, Baidu extends support to resolve a series of security risks in the AI ecosystem at the level of cloud, pipe, terminal, big data and algorithm based on AI security core technologies such as the comprehensive open-source “seven weapons” and the BASS next-generation AI security technology stack.



Open ecosystem



- Baidu is committed to constructing the intelligent terminal ecological security in the AI era, creating a multi-party governance paradigm for security ecosystem, as well as building an international exchange platform for network security talent.

Baidu's Security and Open-source Ecosystem Construction

Data Security

◆ Principles of Personal Information Protection

Baidu has established a data privacy protection system covering all business lines and subsidiaries. Besides the *Baidu Data Security Strategies*⁸, Baidu has formulated relevant regulations and standards applicable to all lines of our products and services, including the *Master Privacy Policy*⁹, *Baidu General Compliance Principles on Users Personal Information Protection*¹⁰, and *Baidu Personal Information Protection Compliance Redline and Code of Conduct*¹¹. Baidu has also developed privacy policies tailored separately to products and services, thus facilitating the application of privacy protection in various products.

Baidu adheres to the four principles of “informed consent, data minimization, user experience, and security assurance” (see Page 40 of the *Baidu 2020 Environmental, Social and Governance (ESG) Report*), guarantees users' right to know, choose and control personal information (see Page 41 of the *Baidu 2020 Environmental, Social and Governance (ESG) Report*), and gives users the right to access, modify and delete personal information. Baidu promises never to sell any personal information to third-parties.



Right to access



- Users have the right to decide on providing and allowing access to their personal information.
- Baidu's platforms shall only collect information with user authorization, or under other circumstances permitted by laws and regulations, and shall never collect it forcefully.
- When the purpose of processing personal information with user authorization changes, Baidu will, in advance, notify users to authorize again in a reasonable way.



Right to modify



- Users have the right to modify their personal information.
- Users can turn the authorization button on or off at any time to grant and revoke their consent respectively.



Right to delete



- Users have the right to request the deletion of personal information and can notify Baidu of their needs on personal information protection at any time through the personal information protection feedback platform¹².
- Baidu follows the principle of “shortest retention period”. If users cancel their accounts or make a request to delete personal information, Baidu will delete the users' personal and relevant information from the backup system when updating the backup in strict accordance with the *Cybersecurity Law of the People's Republic of China* and other laws and regulations regarding the retention period.
- After users cancel their accounts or make a request to delete the above information, Baidu promises not to use the personal information for commercial purposes, however the Company may use the personal information if anonymized¹³.

Baidu Grants Users the Right to Access, Modify and Delete Personal Information

Baidu continuously improves the handling process of complaints about infringement of personal information. Complaints are divided into three categories: basic, risk and confirmation-related complaint. We also clearly stipulate the time limit for handling complaints.

⁸ https://esg.baidu.com/en/article/Statement_on_the_Baidu_Data_Security_Strategies

⁹ <https://www.baidu.com/duty/yinsiguan-policy.html>

¹⁰ https://esg.baidu.com/en/article/Brief_Introduction_of_Baidu_General_Compliance_Principles_on_Users_Personal_Information_Protection

¹¹ https://esg.baidu.com/en/article/Brief_Introduction_of_Baidu_Personal_Information_Protection_Compliance_Redlines_and_Code_of_Conduct

¹² https://help.baidu.com/newadd?prod_id=212

¹³ It refers to the process in which the personal information cannot be identified by the user after technological processing, and the processed information cannot be restored.

◆ Privacy Technology Assurance and Certification

Relying on a series of technologies such as the secure multi-party computation, federated learning, trusted execution environment, security isolation domain, blockchain, and AI security, Baidu has developed data security and privacy protection solutions. These cover the full life cycle of data collection, identification, storage, use, transmission, sharing and destruction of data.

Baidu uses a variety of technologies such as privacy compliance detection, differential privacy, AI automatic desensitization, federated computing and trusted computing. This effectively ensures data security and privacy protection. In terms of processing users' personal sensitive information, Baidu has realized identity authentication and access control for individuals at many levels including system, storage and service.

To further safeguard cloud data security, Baidu launched the Intelligent Data Security Gateway and the Intelligent Threat Hunting Platform and provided the one-stop cloud security management system that covers sensitive information detection, desensitization and audit.

Baidu's products and services have passed a number of authoritative international certifications on data security and privacy protection.

ISO 27701 Privacy Information Management System
ISO 27018 Personally Identifiable Information Protection Management System in Public Clouds
ISO 29151 Personally Identifiable Information Protection Management System
BS 10012 Personal Information Management System
Cloud Service User Data Protection Capability (Public Cloud)
Cloud Service User Data Protection Capability (Private Cloud)
Payment Card Industry (PCI) Data Security Standard (DSS) (Financial Cloud)
Baidu's Certification in Data Security and Privacy Protection

Our products	Security certification
Baidu Dianshi Privacy Computing Platform	Based on four privacy computing engines including data security sandbox, Federal Learning (FL) platform , secure multi-party computation (SMPC), confidential computing (MesaTEE), all of which have passed the “Big Data Product Capability Assessment” by CAICT and award the “Big Data Product Capability Assessment Certificate”.
Baidu AI Cloud	Baidu AI Cloud has obtained security audit certifications including SOC1 Type2, SOC2 Type1, SOC2 Type2, and SOC3, which showcases that Baidu AI Cloud has gained professional recognition in terms of security, availability, confidentiality and privacy. It can meet users' requirements for business, data, operation, and basic security, providing stronger and more effective protection for users.
Baidu Maps	Obtained the First Batch of Mobile Internet Application (App) Security Certification Certificate from the China Cybersecurity Review Technology and Certification Center (CCRC).
Baidu autonomous driving information security protection platform	Obtained the EAL4 security product certification from CCRC

Security Certification of Baidu's Products



Data Security Awards/Honors of Baidu's Products

In March 2021

Baidu received the first batch of "Data Security Governance Capability Assessment" certificate (Excellence) from CAICT.

In July 2021

Bao Chengfu, Chief Security Architect of Baidu, was appointed as Deputy Director of the AI Governance and Trusted Committee of the China Artificial Intelligence Industry Development Alliance (CAIIA).

In October 2021

Baidu's security management and operation business line was successfully included in the list of DCMM Excellent Cases by the China Federation of Electronics and Information Industry (CFEI).

In December 2021

Baidu was selected as the 2021 IT New Governance Leadership Forum - Outstanding Enterprise of the Year by CAICT.

In December 2021

Baidu Dianshi -Innovative Application Case of Privacy Computing in Biomedicine was selected as the benchmark case of Big Data "Galaxy" Privacy Computing in 2021 by CAICT.

In July 2021

The Baidu Security and Privacy Compliance Platform won the "2021 Enterprise Digital Governance Pioneer Practice Cases – Most Valuable Application Case of Intelligent Security and Privacy Compliance" from CAICT.

In October 2021

The Baidu Security and Privacy Compliance Platform and OPENRASP successfully entered the 2021 Cybersecurity Excellent Innovation Competition held by the China Cybersecurity Industry Alliance.

In December 2021

Security products on Baidu Security Cloud were included in the 2021 Trusted Cloud Security Case Collection - Trusted Cloud Service User Data Protection by CAICT, which was distributed as conference handouts at the 2021 Trusted Cloud Security Forum.

In December 2021

Baidu Dianshi - Trusted Cloud Service User Data Protection Case was selected in the 2021 Trusted Cloud Security Case Collection by CAICT, which was distributed as conference handouts at 2021 Trusted Cloud Security Forum.

In December 2021

Baidu Dianshi Data Security Circulation and Privacy Computing Solution was selected as the 2021 IT New Governance Leadership Forum - Outstanding Innovation Case of the Year by CAICT.

◆ Raising Data Security Awareness

Baidu continuously strengthens data security education for employees and develops a training mechanism covering all employees to help them improve their data security literacy and professional skills.

Institutional Safeguards

For classified data of different categories, Baidu formulated corresponding security authority control procedures, defined the access scope of data and operation specifications of each role, and selected appropriate encryption, tracking, key management and other security technologies. The Company also signed confidentiality agreements with employees and partners who have access to users' personal information to clarify their responsibilities and code of conduct.

Data Security Training

Baidu has established a safety training mechanism covering all employees (including the management, regular employees, employees of ecosystem companies, interns, and external employees including dispatched employees).

Coverage	Training courses
The entire workforce	<ul style="list-style-type: none">• In 2021, Baidu reached a talent development cooperation agreement with universities and institutions including Peking University, China University of Political Science and Law and Chinese Academy of Social Sciences, and launched a series of training courses on "Data Security and Privacy Protection" lectured by authoritative legal experts in related fields. This training series covered cybercrime, laws and regulations on data security both at home and abroad, personal information protection, AI and social risks, algorithmic justice, open source and intellectual property protection to name a few.• The Security Department offers a series of courses on security technology sharing within Baidu.
Frontline staff responsible for privacy and data security	<ul style="list-style-type: none">• Developing targeted professional training to help promote business compliance.
New staff	<ul style="list-style-type: none">• Provision of compulsory courses on information security for new hires and evaluating the training results through examination.

Security Training Courses for Employees at Different Levels

In 2021 ,

Baidu achieved 100% coverage of security training

100%

with more than 50,000 enrollments

50,000

in 50 different online security training courses

50



Attack and Defense Drills

Upholding the concept of “promoting defense with an attack”, Baidu regularly holds phishing attack and defense drills for all staff. In 2021, Baidu conducted six phishing drills and 12 attack and defense drills.

Baidu conducted

6 phishing drills and
12 attack and defense drills.



Security Promotion Month

In 2021, Baidu organized the security promotion month with the theme of “silent contest” to popularize security redlines requirements, practical attack and defense exercises, risk event cases, email security knowledge, and other relevant contents for all employees.



Supplier Data Security Training

In terms of the third-party cooperation, Baidu checks the security qualification of our partners as well as inspects and evaluates their security organization, strategy, capability and historical security issues. The Company requires partners to provide data sources, compliance certificates, and security certificates (such as ISO certificates). They also need to sign data security-related agreements. Moreover, Baidu provides data security and privacy protection related resources and training course services for our contractors, suppliers, outsourced employees and other stakeholders free of charge, and helps ecosystem partners improve data security protection and compliance.

[Case]

Baidu Actively Participating in the National Cybersecurity Standards Week Activities

Baidu actively participates in the construction of the cybersecurity ecosystem, incorporates such concepts as network security and data protection into the development of products and services, and continues to provide leading standards and solid technical support for industry development.

The first 2021 working group event “Conference Week” was sponsored by the National Information Security Standardization Technical Committee (TC260) and was held in Wuhan from the 10th and 13th of May 2021. Over 600 members of the working group attended the event, including Baidu and many members of the Open AI System Security Alliance (OASES). Participants facilitated the creation and approval of national cybersecurity standards projects and the implementation of current projects. During the event, Baidu contributed to discussions and deliberations on various topics, including AI security, smart terminal security, Internet of Vehicle (IoV) security,

cloud and data security as well as black market crackdown, App privacy compliance and privacy protection. **A total of 12 standard projects, Baidu participated in, have been advanced to the next stage. Among the 10 standards in whose application for approval Baidu participated, eight have been approved to be initiated, one transited to a research project and one standard research project has been approved.**

Baidu led the application for the standards research project “Information Security Technology – Internet of Things (IoT) Security Management Guide” that was approved at the event. This standard research project, whose implementation is also led by Baidu in conjunction with China Electronics Standardization Institute (CESI), China Mobile and CECGW, is designed to provide corresponding security levels, control measures and evaluation methods for communications and operations management, access control, system acquisition, development

and maintenance of IoT terminals, edge computing and IoT servers on the basis of common Information Security Management System (ISMS). This standard research topic is expected to fill the IoT security management gap in China.

Baidu participated in the compilation of the *White Paper on 5G Cybersecurity Standardization 2021* sponsored by TC260. This provided essential guidance as well as technical support for the development of the 5G cybersecurity framework and key standards, the smooth application of 5G and the orderly development of 5G and industrial integration security.

Baidu will continue to work with OASES members to strengthen cooperation with TC260 and the members of the working group based on the concepts of patent sharing, core open source, standards-driven and win-win industry to jointly promote practical innovation in the field of cybersecurity.



12 standard

projects have been advanced to the next stage



8 standards have been approved to be initiated

1

standard formulation

has been transited to a research project



1

standard research project has been approved



[Case]

Baidu incorporated in the *Artificial Intelligence Open-source Ecosystem and Intellectual Property Report*

Being an AI platform company and adhering to the concept of "Responsible AI", Baidu is committed to building an open and inclusive AI ecosystem, actively providing open-source AI-related technical tools and fully demonstrating excellent contributions in the construction of an open-source AI ecosystem.

At the 2021 First Digital Society Forum hosted by CAICT on September 26, 2021, the Intellectual Property Center of CAICT released the *Artificial Intelligence Open-Source Ecosystem and Intellectual Property Report*. The Report states that **in the field of AI, the open-source projects represented by Baidu's deep learning platform, PaddlePaddle, and autonomous driving system**

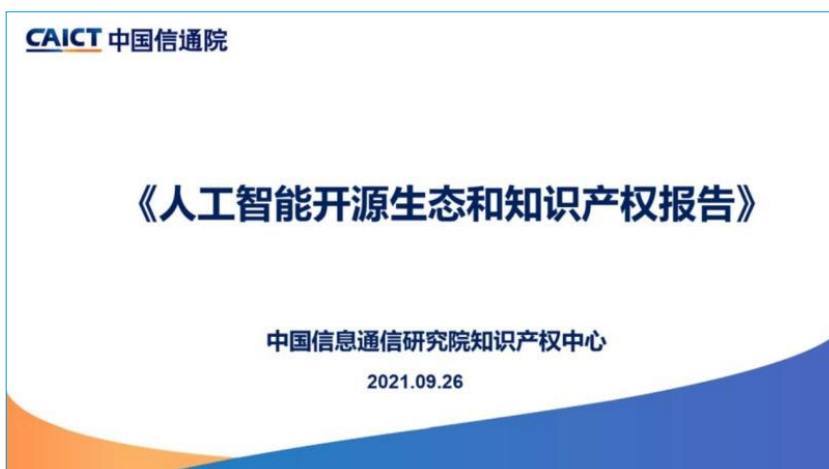
Apollo have grown into world-leading projects of their kind.

According to the abovementioned report, Baidu's innovative initiatives in promoting AI were presented. The Apache 2.0 protocol is adopted for both PaddlePaddle and Apollo, with a view to facilitating the development of AI in China and ensuring the independent and controllable IPR of partners in developing products. Baidu is willing to enable, in an open-source environment, partners to commercialize their innovations on the market.

The Report also gives credit to Baidu for contributions made to the construction of an open-source compliance system. Baidu has formulated open-source

policies and relevant regulations such as the *Guide on Open Source License Compliance*, as well as established a comprehensive open-source compliance system covering different levels and formed dedicated teams such as the Open-Source Office. This is to ensure a secure, compliant, and regulation-based open source.

Looking forward, Baidu will continue to make efforts in such areas as development tools, industrial chain, and a talent pool of basic AI platforms to promote the development and application of AI technology.



The IP Center of CAICT Releasing the Report

「Case」

Apache Doris Granted Multiple Certification Awards at 2021 OSCAR

Dedicated to the mission of making the complicated world simpler through technology, Baidu is committed to pursuing technological innovation and actively driving the development of the AI computing ecosystem by opening sources. Baidu's efforts will enable the tackling of the difficulties existing in data exchange or multi-party computing across departments and companies. In addition, they will provide trusted support for the technological and productivity revolutions brought by big data and AI.

The 2021 OSCAR Open-Source Industry Conference (OSCAR 2021) jointly sponsored by the CAICT and the China Communications Standards Association (CCSA) was held in Beijing on September 17, 2021. At the conference, **Apache Doris**, an **MPP analytical database product independently developed and open-sourced by Baidu**, passed the evaluation of trusted open-source projects, was granted two awards — the “OSCAR Peak Open-Source Community & Projects” and the “Trusted Open-Source Project Certification” as well as becoming a full member of the “Trusted Open-Source Community” (TWOS). As part

of TWOS, Apache Doris's mission will be to enhance the quality of projects and the community through actively mobilizing developers, facilitating user application practices as well as working with all stakeholders in the open-source industry to contribute to the construction of a trusted open-source ecosystem in China.

CAICT established a trusted open-source standard system and has conducted a test to evaluate community open-source projects' capability in license compliance, software security, software

activity, technology maturity, service support, and software compatibility. This will comprehensively measure the properties of open-source projects as well as provide a reference for users to select different types of open-source projects. Apache Doris has successfully obtained the certification of the trusted open-source standard system after rigorous inspection and evaluation. Apache Doris will continue to develop and explore open-source technologies, optimize the governance methods of open-source communities and contribute to the construction of a trusted open-source ecosystem.



Apache Doris Granted Multiple Certification Awards at OSCAR 2021

[Case]

Baidu Security Releasing PaddleSleeve to Provide Security and Privacy Protection in AI Models Applicable to Industrial Practices

Dedicated fully to the protection of personal privacy, Baidu actively develops privacy protection enhancement technologies and continuously explores data security and privacy protection solutions that cover the entire data life cycle.

On September 26, 2021, Baidu Security officially released PaddleSleeve, a security and privacy protection tool based on PaddlePaddle. PaddleSleeve is designed to serve as a security tool that is not only applicable for academic research, but also suitable for use in industrial practices. Driven by scenarios, PaddleSleeve addresses realistic risks and supports industrial-level models. PaddleSleeve provides end-to-end security technical support for scenarios with high security and privacy requirements, and fully tackles the challenges that AI models need to navigate including security, safety, and privacy.

PaddleSleeve specifically provides enterprises and developers practical functions from the following two aspects, model attack and defense:

In terms of model attack and evaluation, PaddleSleeve is equipped with several capabilities such as Baidu Security Advbox adversarial sample attack and robustness evaluation. This is compatible with Paddle 2.X and has introduced more cutting-edge attack algorithms and model integration as well as migrated attack strategies. With a focus on protecting privacy, PaddleSleeve supports seven types of privacy attack-effect evaluation indicators, thereby realizing the detection of model data restoration and key information leakage risks.

In terms of model defense, PaddleSleeve supports several industry-leading and high-performance adversarial training methods. Enterprises and developers can conduct adversarial training

through new training or just with fine-tuning of the model. They can also enhance the robustness of non-invasive countermeasures without modifying the model by leveraging various filtering algorithms. The privacy enhancement optimizer, leveraging differential privacy disturbance, gradient compression and other methods, can also enable enterprises and developers to train models that can resist common privacy theft attacks more easily.

At present, PaddleSleeve has been employed in multiple scenarios to provide support for various general industrial, pre-trained and PaddlePaddle-defined models. By gradually equipping PaddleSleeve with more new features, Baidu Security hopes to maintain cooperation with the academic community and industry to provide scenario-driven solutions to industrial practices and ultimately, to provide more capability support for defending AI model security and privacy.

[Case]

Baidu Dianshi Federated Learning Platform Passing National Tests

Baidu highly values data security by continuously innovating and developing privacy protection technologies and products and has obtained certifications from widely recognized standards.

The Baidu Dianshi federated learning platform, supported by such technologies as Multi-party Computation (MPC), Federated Learning (FL) and Differential Privacy (DP), is capable of effectively defending the data security of users. Through exchanging and optimizing the parameters of shared encrypted data with multiple users while keeping data local, it can enable machine learning, the establishment of virtual sharing models, so as to realize multi-party collaboration and authorized sharing of data, to obtain more accurate and efficient models and decisions, and further unleash the value of data involved. Baidu Dianshi provides customers in finance, automobile, education, the internet and other industries with government data, empowering them to manage risks, achieve precision marketing and meet other business needs, thereby breaking data silos and realizing the full flow of data value.

Baidu Dianshi boasts both the technology and product guarantee for data security. It is the sole big data platform in China that has passed both the “Technical Requirements and Test Methods for Data Circulation Products Based on Basic and Secure

Multi-party Computing” test and the “Trusted Data Circulation Platform” test. It is also the first platform to pass the China Financial Certification Authority (CFCA)’secure multi-party computing evaluation. Baidu Dianshi meets the requirements of the *Secure Multi-Party Computing Financial Application Technical Specification* (JR/T 0196-2020) and the *Secure Multi-Party Computing Financial Application Evaluation Specification* (T/PCAC 0009-2021). It enables Secure Multi-Party Computation (SMPC) technology to serve financial scenarios, and standardizes data sharing and collaboration.

By using the *Data Circulation Products Based on Federated Learning-Technical Requirements and Test Methods* (BDC 41-2020) as the basis for assessment, CAICT conducted a detailed evaluation of Baidu Dianshi from five assessment

dimensions – dispatching management ability, data processing ability, the implementation, effect and performance and security of algorithm, stability, and scalability. **Baidu Dianshi passed the above-mentioned “Federated Learning-Special Assessment of Basic Capability” with all dimensions qualified.**

Looking ahead, Baidu Dianshi will continue to conduct independent research and development. In addition, Baidu Dianshi will cooperate closely with industry, academic and research communities as well as continually improve products and services. Baidu Dianshi will strive to promote the continuous improvement of China’s technological strength in big data and privacy computing products, thereby contributing to building China into a strong player in the data industry.



Baidu Dianshi Federated Learning Platform Passing National Tests

¹CFCA was incorporated in 1998 under the approval of China’s information security management agencies and its major sponsor is the People’s Bank of China. As one of the important national financial information security facilities, it organizes the formulation of nearly a hundred national standards, financial industry standards, cryptographic industry standards and important group standards.

「 Case 」

Baidu Conducting the PIPL Publicity Month Events

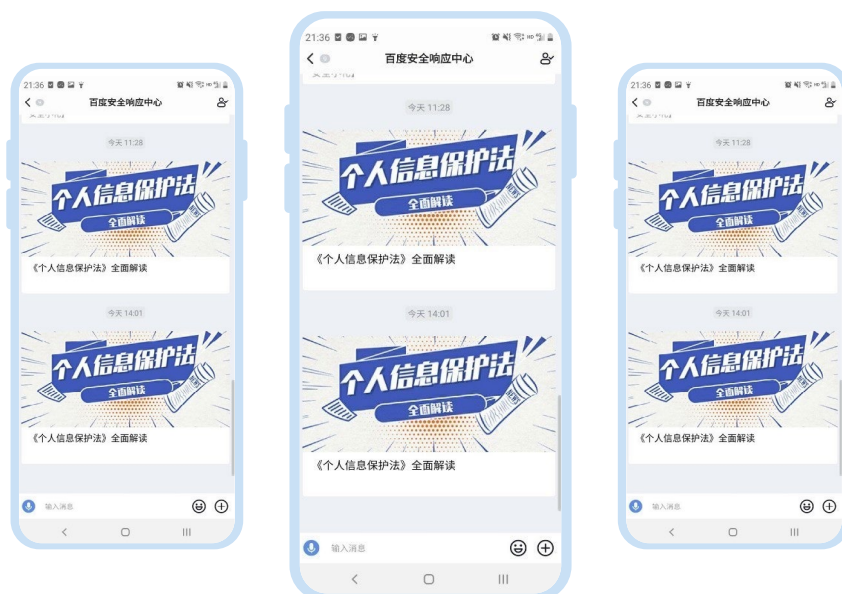
Baidu emphasizes the protection of personal data and has carried out a series of publicity efforts, covering all employees, so as to comprehensively improve their awareness of personal data protection.

In response to China's newly promulgated *Personal Information Protection Law* (PIPL), **Baidu held the special publicity month activity titled “In the Vast Sea of AI, Building A Safe Harbor for Personal information”, which comprehensively explained how enterprises can effectively protect personal information on the**

Baidu Security Response Center's WeChat official account. The event is designed to advocate for the cultivation of a new compliant culture in which users' personal information is appropriately used.

On October 15, 2021, the “Law-based Personal Information Security” event was live-streamed with a panel of experts. The event was hosted by the CCIA Data Security Working Committee and co-organized by Baidu Security, DBAPP Security and OASES. It was designed to respond to the activities of the National Cyber Security

Publicity Week, promote compliance with related laws, transmit knowledge on cyber security and demonstrate our corporate social responsibilities. Focusing on the *Personal Information Protection Law*, the experts made in-depth discussions on a series of issues of high social concern and offered their suggestions and solutions from the perspectives of personal information, determination of excessive collection of personal information, core obligations of enterprises, the realization of individual rights, the impact of law enforcement and the method of individual rights protection.



Baidu Security Response Center Providing Comprehensive Interpretation of the Personal Information Protection Law

[Case]

Baidu Face In-vivo Detection System (V2.0) Passing the TFAPP of CAICT and Rated as Excellent in Security Protection

Being fully dedicated to the protection of personal privacy in business operations, Baidu continuously strengthens data security in the entire life cycle of products to protect user privacy. Baidu's innovative security products have also been certified to widely recognized standards in information security.

In 2021, Baidu Face In-vivo Detection System (V2.0) successfully passed the test of "Trustworthy Face Application Guardian Program" of CAICT with excellent results in all aspects, and was rated as Excellent (Level 4) security protection level. It became the first batch of systems to pass the evaluation designed for trusted facial systems, demonstrating the reliability of Baidu's face detection system V2.0 in security, reliability, transparency, data protection, clear responsibilities and fairness as well as reflecting Baidu's leading position in the live body attack resistance and security of facial recognition technology.

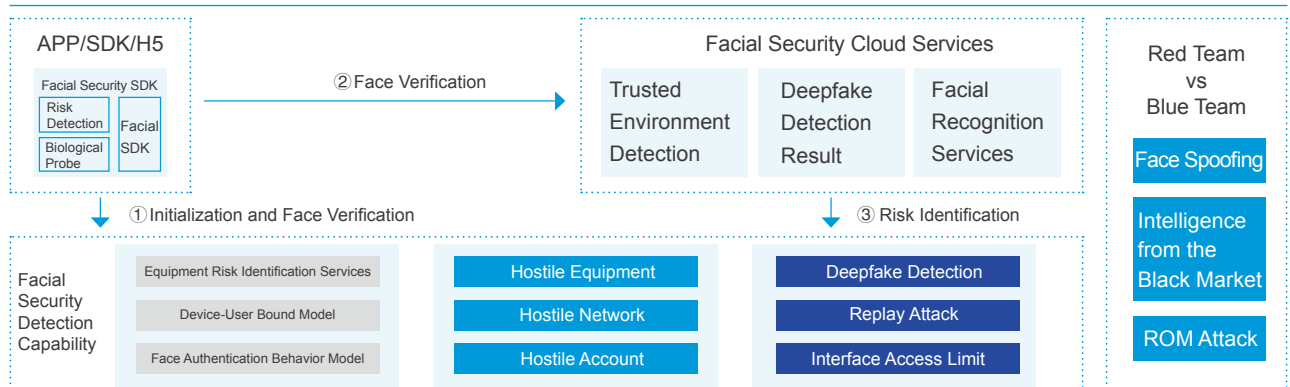
In recent years, facial recognition technology has been widely implemented in public

security, financial payment, transportation as well as various other fields. However, with wide application use, it comes privacy infringement and security risks. Baidu's development of facial security solutions is based on live facial detection technology, deep learning AI cutting-edge technology framework, years of experience cracking down on the black market and a new generation of security SDK technology developed internally. The real-name authentication, that the facial recognition solution offers, comes with high security, passing and recognition rate. Turning away from the tradition of directly collecting camera data with the face SDK, the solution has been upgraded to collect data through a secure channel, whereby security is enhanced from code logic, method of collection and data transmission. The solution also represents the successful encryption of the white box where the collected data, images or videos, are stored. The data is decrypted and analyzed in the cloud, to avoid data tampering. This ensures

the security of data transmission, guarantees the authenticity and validates the facial data collected. **With high security guaranteed in data collection, the solution is also equipped with up to 10 face anti-spoofing options through images, videos, voices, moves and innovative eye color amongst other factors. All these methods help enhance the reliability and convenience of facial real-name verification in APPs, H5 and mini-programs.**

Looking into the future, Baidu will continue to improve facial security technology solutions to ensure the security of facial recognition in different life cycles. Baidu will also actively cooperate with all parties in the ecosystem to effectively respond to users' trust concerns through standard formulation, testing and evaluation, industry self-discipline and co-governance of threats. This will enhance the industry and society's understanding of facial recognition security issues as well as promote the healthy and orderly development of the biometrics industry.

One-stop Solution to Facial Recognition Security



[Case]

Baidu and DEF CON Jointly Holding the World's First VR DEF CON

Baidu has continually adhered to the concept of “pursuing win-win cooperation in an open-source environment”, actively participates in the construction of the security ecosystem, and contributes to the improvement of security technology capabilities of the entire ecosystem.

On March 20, 2021, Baidu Security and DEF CON held DEF CON CHINA Party, the world's first online VR DEF CON. The conference brought together many experts, researchers and enthusiasts in the field of security both in and outside of China to conduct both exchanges of ideas and practical exercises, contributing to the growth of experts in China.

Initiated in 1993, DEF CON, the top conference in the global security field, annually convenes global network security researchers to conduct cutting-edge security technology exchange and research projects. In 2018, Baidu Security made great efforts to introduce DEF CON into China, that not only promoted cross-border exchange between security practitioners, but also cooperated with DEF CON to defend global network security.

In addition, Baidu introduced other international security events into China with localization and innovation efforts made. Baidu Security has held activities such as the Baidu Cybersecurity Skills Competition for College Students, Annual Festival of Baidu Security Response Center, White Hat Night of Baidu Security Response Center and cybersecurity technology exchanges in universities. In collaboration with 41 other major security response centers in China, Baidu Security also launched the DEF CON CHINA Volunteer Program to contribute to the cultivation of next-generation cybersecurity talents in China.

As an AI ecological company, Baidu always highly values privacy and data security, and has been making efforts in this regard. In the future, Baidu will also cooperate with universities and scientific research institutions to build an international exchange and cooperation platform to promote security education and nurture talents in the data security industry.

Nurturing Talents

Our Performance

- Talent First
- Professional Ethics

Our Practices

- Case



Nurturing Talents



Baidu regards outstanding individuals and collaborative teams as the foundation of our value creation. We uphold the human resource philosophy of “recruiting the best employees, providing the largest growth space, focusing on the final results, and letting the outstanding stand out”. We also strive to achieve alignment between corporate development and employee value.

Talent First

◇ Talent Protection

According to the *Management Standard of Baidu Recruitment*¹, Baidu adheres to equal employment and diversified recruitment, implements strict job description review system, and avoids both child labor and forced labor. Baidu respects and protects the legitimate rights and interests of all employees.

In 2021, Baidu independently developed the intelligent recruitment system and diversified recruitment system and used AI to help analyze posts that suit candidates most and offer consultation to them. In addition, we attract talent that matches the needs of the posts through the project-based campus and social recruitment. We organize various well-known competitions at home and abroad, such as Baidu Star, so as to provide green channels of campus recruitment and internship for outstanding students, as well as further enriching the talent pool.

In 2021, Baidu recruited more than 3,500 students and graduates through intern, spring campus, autumn campus and overseas campus recruitment. We hired 5,167 new female employees in 2021. As of December 31, 2021, Baidu had a total of 36,413 regular employees.

In 2021, Baidu won various honors, including “China Top 10 Best Employers”², “Top 10 Most Attractive Employers for College Students”³, “Top 50 Best Employers for College

Students”, “Most Attractive Employers for College Students 2021”⁴, “Top 10 Popular Employer Brands for the Youth”⁵, and “Most Favorite Employers for Chinese College Students”⁶.

Recruited more than

3,500

students and graduates



5,167

new female hires



36,413

regular employees



¹ https://esg.baidu.com/en/article/Brief_Introduction_to_the_Management_Standard_of_Baidu_Recruitment

² 2021 China Top 30 Best Employers. https://www.sohu.com/a/517057298_120636225

³ 2021 College Students Seeking Stable Employment in 2021: Key SOEs, Banks and Internet companies Listed in the Top 10. <https://new.qq.com/omn/20211218/20211218A0587600.html>

⁴ Top 50 Best Employers for College Students 2021&Best and Most Attractive Employer for College Students 2021. <https://hrnode.58.com/zcm/employersBrandCelebration#currList>

⁵ CIWEI “Youth, Shining Power” The Second Employer Brand Festival Successfully Concluded! <https://finance.ifeng.com/c/8CEdAqeZVQn>

⁶ 2021 Most Favorite Employers for Chinese College Students <https://hrwards.51job.com/channel/graduate2020.php>

Indicator	Category	Unit	2021 Data
Total number of employees	/	Person	36,413
Number of employees by gender	Male	Person	22,109
	Female	Person	14,304
Number of employees by age	30 years of age and under	Person	20,080
	31 to 40 years of age	Person	15,019
	41 years of age and over	Person	1,314
Number of employees by rank	Senior managers	Person	20
	Middle managers	Person	234
	Junior employees	Person	36,159
Turnover rate by age	30 years of age and under	%	30.5
	31 to 40 years of age	%	20.0
	41 years of age and over	%	17.0
Turnover rate by region	Chinese mainland	%	24.9
	Hong Kong, Macao and Taiwan	%	35.9
	Overseas	%	30.4
Turnover rate by employment type	Full-time employees	%	25.7
	Contractors/consultants	%	16.7
Baidu's Employee Composition			

◇ Diversity and Inclusion

Baidu continually improves *Baidu's Human Rights Policy*⁷, *Baidu Employee Manual* and other internal systems. We pledge to respect and protect the rights and interests of employees and to prevent any employment discrimination. Baidu requires partners and suppliers to comply with relevant regulations and encourages them to develop relevant regulations tailored to

their own characteristics. We uphold the concept of gender equality, ensure equal access to employment opportunities for female employees, strictly insist on equal pay for equal work, and attract global talent.

Indicator	Category	Unit	2021 Data
Proportion of female employees	Proportion of women in management	%	43.2
	Proportion of women in middle management	%	23.9
	Proportion of women in senior management	%	25.0
	Proportion of women in the C-suite	%	22.2
	Proportion of women in income-generating business management	%	53.0
	Proportion of women in research and development	%	16.1
	Proportion of women in technology/engineering	%	31.4
Minority groups	Employees with disabilities	Person	24
	Employees from Hong Kong, Macao and Taiwan	Person	39
	Overseas employees	Person	168
	Minority employees	Person	1,944
Percentage of local employment	South Korea	%	100.0
	The United States	%	10.2
	Japan	%	62.8
	Thailand	%	50.0
	Indonesia	%	100.0

Baidu's Employee Diversity Indicators

⁷ https://esg.baidu.com/en/article/Baidu's_Human_Rights_Policy

Baidu has established a long-term employee engagement mechanism through establishing free speech communities such as internal online forums and classmate circles, organizing internal communication activities, and ensuring complaints, feedback and protection (see Page 26-28 of the *Baidu Special Report on Human Capital 2020*⁸).

Baidu has established a comprehensive satisfaction survey and feedback mechanism. The themes of employee engagement surveys such as Mini Pulse Survey cover internal system feedback, satisfaction evaluation, product hearings, employee care and other aspects. According to the results

of Mini Pulse Survey in 2021, over 96% of respondents have a positive attitude towards working at Baidu. In 2021, Baidu carried out 44 surveys of such type, and senior executives directly responded to the topics that employees cared about through such means as live streaming. In addition, we regularly conduct organizational atmosphere surveys to reflect the overall atmosphere of the organization from the perspective of employees. This helps to assist team leaders and human resource business partners (HRBP) to better understand the organizational atmosphere and urge managers to make targeted improvements.

◆ Employee Care

In 2021, Baidu updated policies such as the *Baidu Compensation Management Standard* and the *Baidu Instructions on Management of Leaves and Vacations*⁹. On the basis of the original compensation system, performance and incentive system (see Page 34-35 of the *Baidu Special Report on Human Capital 2020*), the Company increased the year-end bonus for employees. In addition, Baidu invited professional third-party institutions to research and analyze excellent salary incentive practices, to ensure the external competitiveness and internal fairness of differentiated compensation strategy.

Baidu implemented a performance incentive model combining long-term and short-term incentives based on the *2018 Equity Incentive Plan*. The equity incentive plan covers senior executives, board members, mid-level managers as well as some professional experts among rank and file employees. The employees that hold equity make up nearly half of the entire workforce. In 2021, Baidu continued to grant awards such as Baidu Top Award and Baidu Pride to outstanding employees and teams. Four teams won the Baidu Top Award with a bonus of USD 1 million respectively whilst ten teams won the Baidu Pride. More than 200 employees received a total bonus of RMB 1.45 million.

In 2021, Baidu provided benefits for all regular employees and interns besides salary in terms of work-life balance, health support, and employee care (see Page 31 of the *Baidu Special Report on Human Capital 2020*). The Company offered staff public rental housing with related support services and launched “Baidu Gift” for family members of employees. Baidu protected the legitimate rights and interests of female employees by offering additional benefits to female employees who gave birth, adding new parental leave and parental care leave with full pay, and extending the length of maternity leave.

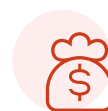
In 2021, Baidu organized more than 30 cultural and sports activities with various themes, including sports and competitions, festival care and lectures, to enrich employees’ cultural life and improve their sense of happiness.

Baidu regularly organizes fire safety inspections and drills. The Company adopts prevention and control measures during the epidemic to ensure the health and safety of employees. We also offer free physical checkups for all employees. A healthy space has been set up to organize fitness and gymnastics activities. There is also the provision of third-party psychological counseling services. In 2021, Baidu equipped all the office areas with AED first aid equipment.

In 2021, no incidents of injuries, fatalities or occupational diseases occurred amongst our employees and contractors.

4 teams won the Baidu Top Award with a bonus of

USD 1 million respectively



10 teams won the Baidu Pride with a total bonus of

RMB 1.45 million



30 cultural and sports activities held



⁸ https://esg.baidu.com/en/article/Baidu_Special_Report_on_Human_Capital_2020

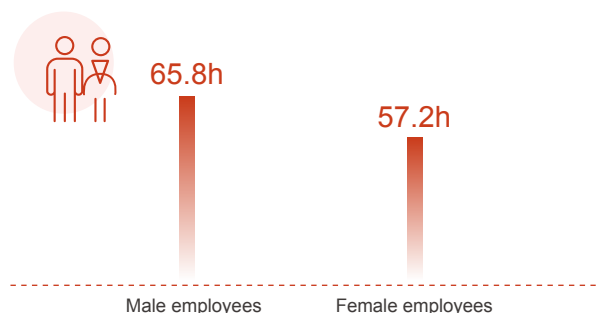
⁹ https://esg.baidu.com/en/article/Brief_Introduction_to_the_Baidu_Instructions_on_Management_of_Leaves_and_Vacations

◆ Talent Cultivation

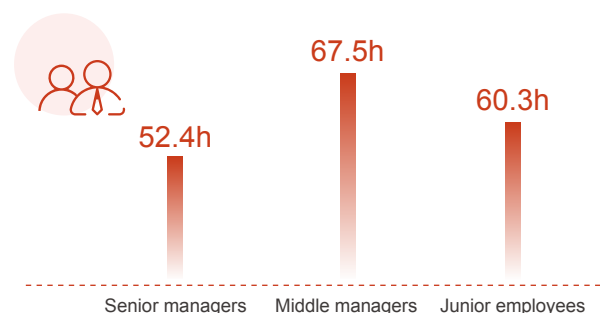
Baidu continually improves the *Baidu Training Management Standard*¹⁰, develops diversified training courses and self-improvement channels for all employees. A hierarchical management system has been established as well as the creation of career development training plans. In 2021, we revised the *Baidu's Learning Credits* (see Page 21 of the

Baidu Special Report on Human Capital 2020) and combined the "Baidu Classmate Credit System" and the "Manager Credit System". We updated relevant provisions based on the feedback from corporate guidance, junior staff and management, so as to meet the diversified employee needs for learning and development

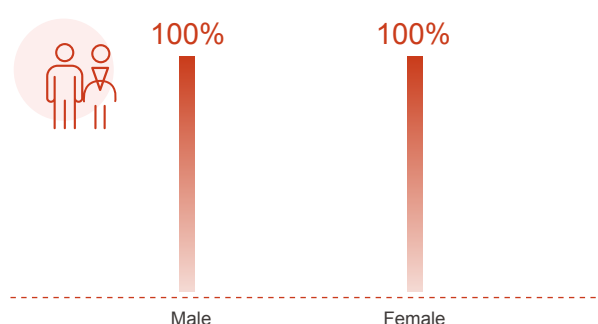
Average training hours by gender



Average training hours by rank



Percentage of employees trained by gender



Percentage of employees trained by rank



Baidu's Employee Training

Baidu has established a new mechanism to collect historical business data of mid-level managers to strengthen the management and inheritance of relevant knowledge. It also enables improved application of the experience and knowledge of various businesses and key positions to our management. Baidu also uses the convenient production tools of online Baidu School learning platform and encourages employees to actively share valuable experience and knowledge. Currently, employees have developed 2,053 courses, accounting for 34.56% of all online courses.

To comprehensively improve the management and leadership ability of managers, Baidu carried out a series of systematic leadership development projects for junior and middle management in 2021 (see Page 19 of the *Baidu Special Report on Human Capital 2020*). These projects covered 2,450 managers, with a satisfaction score of 9.5 points (on a scale of 0 to 10).

Baidu further reviews employee promotion systems and development channels and adjusts the length of service required for promotion to facilitate the growth and discovery of talent whilst nurturing them with diverse abilities. We encourage our employees to study in professional institutions and obtain relevant degrees and certificates. We provide support for middle and senior management to study abroad for EMBA and offer tuition reimbursement with a specific proportion to middle and senior management who are admitted to our university partners. We also help middle and senior management improve their comprehensive management ability to enhance our inter-disciplinary talent pool. In addition, we established the Baidu AI Integration & Innovation Research Workshop, which creates opportunities for talents from multiple industries to explore paths towards integration and innovation and promotes the industrial upgrading together with workshop members, heads of our partners, and leaders of the industry.

¹⁰ https://esg.baidu.com/en/article/Baidu_Training_Management_Standard

Professional Ethics

◆ Behavioral Guidance

Baidu has established a sound professional ethics training and assessment system for all employees and business departments (see Page 20-21 of the *Baidu Special Report on Healthy Workplace Action 2020*¹¹).

In 2021, Baidu launched the Healthy Workplace Growth Plan. We encouraged all employees to acquire legal knowledge independently and obtain corresponding credits through assessment. We awarded the badge of Healthy Workplace Achiever to those with outstanding performance. We organized the Professional Ethics and Healthy Workplace orientation training on professional ethics redlines, reward and punishment management system and other topics. We also engaged the Institute of Psychology of the Chinese Academy of Sciences in the research on preventing employee corruption. In addition, Baidu organized special training programs tailored to the characteristics of business departments. During the training,

violations of relevant laws and professional ethics were presented by analyzing concluded corruption-related cases, enabling targeted publicity.

Baidu includes the professional ethics training course into the executive training course lists, and encourages the management to organize professional ethics activities, training, and examination. The Company also delivers work reports regarding professional ethics and compliance requirements to the Board of Directors on a quarterly basis.

In 2021, Baidu organized 32 sessions professional ethics-related training and more than 10 sessions professional ethics-related education events, achieving an employee participation rate of 100% for the professional ethics-related examination.

◆ Code of Conduct

The *Baidu Management Measures on Business Ethics Red Lines*¹² clearly specifies the countermeasure to bribery received by employees and their family members (see Page 29 of the *Baidu Special Report on Healthy Workplace Action 2020*). The Baidu Foundation holds the Sunny Workplace Charity Auction twice a year, and reports all collected gifts for the auction. In 2021, the Baidu Gift Reporting System received 4,037 gift reports, and raised RMB 4,596.27 million, all of which was devoted to charities (see the case of Contributing to Society - Public Welfare Activities Initiated by Baidu Employees in this Report).

◆ Check and Rectification

In 2021, Baidu updated existing whistleblowing systems to enhance rewards and protection for whistleblowers and provided more secured incentive measures and legal aid. In strict accordance with the *Baidu Professional Ethics Reporting Management Regulations*¹³, the Company raised the protection for whistleblowers, kept their information strictly confidential and assigned dedicated personnel responsible for the handling of whistleblowers. In 2021, the Professional Ethics Department received 103 complaints about professional ethics. With reference to the handling results, the Professional Ethics Department further strengthened the whistleblowing mechanism, enhanced risk identification, and effectively prevented relevant risks. The department also identified 22 fraud risk points and made timely rectifications.

The Baidu Gift Reporting System

received **4,037** gift reports



The Sunny Workplace Charity Auction raised RMB

4,596.27 million



The Professional Ethics Department

received **103** complaints about professional ethics



22 fraud risk points in business processes and mechanisms through case handling identified and rectified



¹¹ https://esg.baidu.com/en/article/Baidu_Special_Report_on_Healthy_Workplace_Action_2020

¹² https://esg.baidu.com/en/article/Brief_Introduction_to_the_Baidu_Management_Measures_on_Business_Ethics_Red_Lines

¹³ https://esg.baidu.com/en/article/Brief_Introduction_to_the_Baidu_Professional_Ethics_Reporting_Management_Regulations

「 Case 」

Baidu Implementing Management Trainee Recruitment and the AIDU Program

Baidu actively expands talent pools and improves corporate diversity and inclusion based on development needs to further improve talent reserve and development strategies.

Dedicate to achieving diversified recruitment through different channels, in 2021, Baidu opened a large number of new positions in chip development, human resources, integrated marketing, public communication, business research and analysis and other fields. This coincided with the launch of featured campus recruitment programs such as the Management Trainee Program, and the Baidu Campus AIDU Program. These were designed to recruit social elites suitable for the technology and products-related vacancies. The efforts are aimed at cultivating a new generation of young managers and leaders in the field of technical products for an integrated technological innovation enterprise in the AI era.

To better locate the management trainee targeting groups, Baidu has established close ties with well-known universities in and outside of China, so as to achieve point-to-point recruitment where the talent demands are promoted through the faculties and career centers in these universities. The candidates are selected and trained by the directors



2021/2022 Management Trainee Program Presentation

and executives at Baidu. Through arrangements such as job rotation of key positions in core departments, tailored learning and development plans, growing with special teams, the newly recruited college graduates can grow at a fast pace into young managers at Baidu.

In 2021, through the Baidu Campus AIDU Program, Baidu implemented a “dual track” recruitment plan to recruit elite talents suitable for technical and product positions in various fields at the company. During the process, we focused mainly on recruiting the

fresh graduates who have excellent performance in AI technology research and projects, or who have excellent product awareness and user thinking. Graduates were then offered high-level team guidance, vocational training and competitive compensation and benefits. Baidu values the development and training of each AIDU candidate, creates an exclusive “AIDU Small Class” training program for them as well as assigning senior leaders as mentors with regular one-to-one communication to facilitate rapid growth.

「 Case 」

Shanshan Fruit Tea Party



Shanshan Fruit Tea Party

Baidu values both employee communication and feedback, and adopts multiple channels to monitor and survey employee satisfaction and engagement. By creating a warm corporate culture, we improve employees' sense of happiness at work.

In 2021, besides the traditional communication activities such as the Senior Management Face to Face,

an internal communication meeting, Baidu also held for the first time, "Shanshan Fruit Tea Party", a small communication meeting designed to provide opportunities for HRVP to talk face-to-face with frontline employees about their concerns and interests. The activity was held in a comfortable and cozy reading room. Management was encouraged to use this activity as a channel to communicate with their team members, to enhance



34 sessions of the
Shanshan Fruit Tea Party

Communication with **400**
frontline employees



team communication. **As of the end of December 2021, a total of 34 sessions of the Shanshan Fruit Tea Party activity had been held with the participation of nearly 400 frontline employees.**

Promoting Green Ideas

Our Performance

- Addressing Climate Change
- Green Operations
- Green Products and Services

Our Practices

- Case



Promoting Green Ideas



Baidu fully recognizes the systemic impact of climate change on businesses. On June 22, 2021, Baidu announced the goal to achieve carbon neutrality by 2030 at the Group operational level. Taking 2020 as the baseline year, Baidu plans to comprehensively build science-based pathways to achieve carbon neutrality in fields covering data centers, office buildings, carbon offset, intelligent transportation, intelligent cloud and supply chain, based on existing green practices and with reference to Scope 1 and Scope 2 of the Greenhouse Gas Protocol (GHGP).

Addressing Climate Change

◆ Addressing Climate-related Risks

From the Board of Directors, the CEO to the executives, Baidu clearly defines responsibilities relating to climate change. Upholding our green ideas, we analyze and respond to the operating risks and opportunities presented by climate change, and develop and implement relevant work arrangements, including the carbon neutrality target and the carbon neutrality strategy. We regularly submit climate change response disclosures to stakeholders.

In 2021, with reference to the framework and recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), Baidu proactively identified and analyzed various physical and transition risks relating to climate change, assessed their financial impacts, and promptly formulated climate risk management and response measures.

Risk category	Specific risk	Risk description	Risk response
Transition risk	Policy and legal risk	<p>Environmental information disclosure</p> <p>As international and domestic regulatory agencies and capital market rating indexes raised the disclosure requirements for environmental information of enterprises, Baidu must continuously improve the environmental performance disclosure in terms of completeness and accuracy. Failure to disclose environmental information as required will lead to compliance risks.</p>	<ul style="list-style-type: none">Baidu pledges to align our actions with the Paris Agreement and China's dual carbon goals, and further plans of carbon reduction pathways. In the future, Baidu will fully consider new disclosure policies, strengthen communication with regulators, and make timely adjustments to the ESG management strategy, climate strategy and environmental information disclosure models according to the guidelines.As to the legal risk, the Legal Affairs Department receives consultation on commercial law risks, evaluates the legal risks faced by the Company, and regularly assesses the impact of violations on the Company.

Risk category	Specific risk	Risk description	Risk response
Transition risk	Technical risk	<p>Low-carbon technology transition</p> <p>As international and domestic regulatory agencies and capital market rating indexes raised the disclosure requirements for environmental information of enterprises, Baidu must continuously improve the environmental performance disclosure in terms of completeness and accuracy. Failure to disclose environmental information as required will lead to compliance risks.</p>	<ul style="list-style-type: none"> As an internet technology company, Baidu regards technological change as an integral element of the overall strategic risk. In the future, Baidu plans to identify climate-related risks with technological factors as an important consideration. Baidu will also actively engage in energy-saving and emissions reduction practices with years of layout and technological advantages in data centers, big data and AI, as well as rich experience in business service scenarios.
	Market risk	<p>Customers' growing low-carbon consumption preference</p> <p>In the context of the national "dual carbon" goals, Baidu must to apply more energy-saving and environment-friendly technologies and facilities, increase investment in energy conservation and emission reduction, build green data centers, share energy-saving and emission reduction technology applications with the society, and reduce the carbon emissions at society level.</p>	<ul style="list-style-type: none"> As a practitioner of sustainability, Baidu has established a diversified development model of green products. Through various channels and diversified promotion methods, Baidu persistently delivers the idea of sustainability to users through products. This helps users to form green living habits and guides the trend of green consumption in society.
	Reputational risk	<p>Public doubt</p> <p>As climate change, sustainable development and other issues become more popular, Baidu may be questioned by customers, investors and the public due to the "greenwashing behavior" if Baidu only releases the climate strategy or relevant statement without concrete actions, which will undermine the corporate image.</p>	<ul style="list-style-type: none"> In addition to the carbon neutrality target, Baidu also sorts out the existing types of business and the future development direction, comprehensively build science-based pathways to achieve carbon neutrality in fields covering data centers, office buildings, carbon offset, intelligent transportation, intelligent cloud and supply chain. Alongside aiming to achieve the carbon neutrality target in operations, Baidu also helps the society with energy conservation and emissions reduction through technologies. All these efforts prove that Baidu is making active improvements and taking measures to tackle climate change.
Physical risk	Acute risk	<p>Impacts of extreme weather</p> <p>Extreme weather events such as typhoons and extreme precipitation may disrupt the daily operations of data centers and the Company, thus negatively affecting the operating revenue and market value of Baidu.</p>	<ul style="list-style-type: none"> Baidu fully considers the operation conditions during extreme weather events. At the early stage of data center construction, Baidu takes the impact of various climate risks and avoids high-risk areas into account when site selecting. During daily operations, we regularly identify external risk factors in the area where the project is located and develop countermeasures. Baidu also formulates emergency response measures for extreme scenarios. Focusing on six extreme scenarios, namely public health emergency, earthquake, typhoon, fire, personnel adjustment, and security accidents, we regularly carry out emergency drills, scientifically distribute machine rooms, and prepare backup for important systems and business data, to ensure the continuity of business operations under extreme conditions.
	Chronic risk	<p>Change in climate and rainfall pattern</p> <p>Changes in climate and rainfall pattern may lead to risks such as continuous high temperatures and water scarcity, which may increase the water use cost for data center operations and pose greater challenges to data center cooling and water saving technologies.</p>	<ul style="list-style-type: none"> Baidu adopts an industry-leading cooling system and improves the efficiency of water resource management in data center operation and maintenance, effectively addressing the risk of water scarcity caused by climate change.

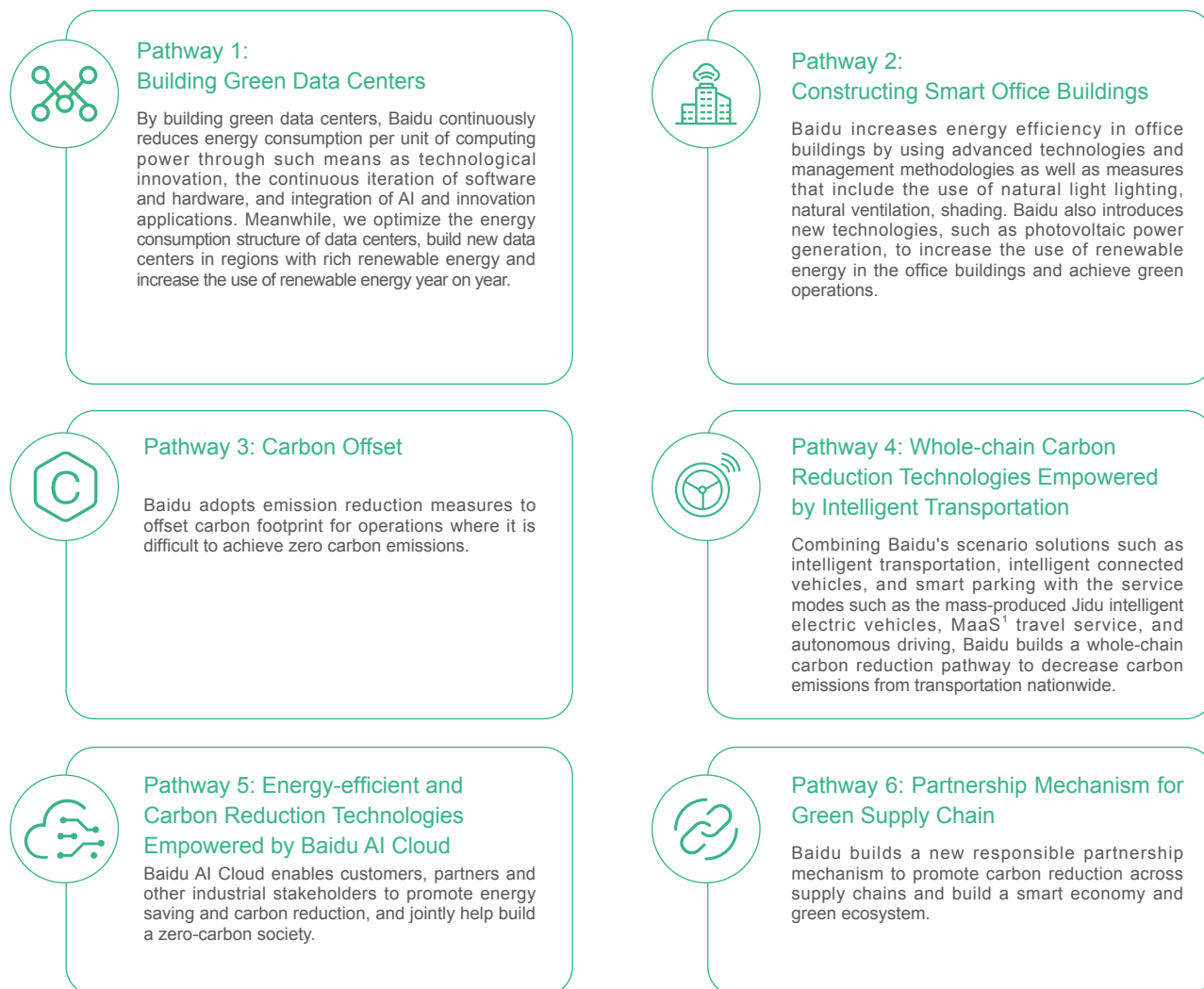
In 2021, Baidu continued to revise relevant emergency guidelines with reference to the original extreme weather emergency plan and the latest international experience in tackling climate change and emergency rescue methods adopted in China. A tiered response mechanism was adopted based on the early-warning levels for emergencies, weather disasters and security accidents in China. Baidu also put in place an inter-departmental

communication and cooperation mechanism, updated disaster information and response simultaneously, and discussed the response strategies and measures. Relevant groups, including logistics group, security group, and engineering group, cooperated with each other to implement weather emergency response measures, thereby maximizing the protection of employees' personal and property security.

◆ Climate Strategy and Pathway

In 2021, Baidu comprehensively reviewed the energy use structure and greenhouse gas (GHG) emissions in operations. After scientifically assessing the potential of emission reduction and considering green actions, Baidu announced the goal to achieve carbon neutrality by 2030 at the Group operational

level. In 2021, Baidu initiated carbon accounting actions at 32 operation locations, including office buildings and data centers, to fully understand their carbon emission characteristics and assess their potential for emission reduction.



◆ Green Finance

Baidu provides effective and stable fund support for the carbon neutrality target through green finance. In 2021, Baidu set up a working group on sustainable finance, and issued the *Baidu Sustainable Finance Framework*², which regulates the financing for sustainability, including the use of raised funds, project selection, the management of raised funds,

and information disclosure. Under the guidance of the *Baidu Sustainable Finance Framework*, Baidu successfully issued the first sustainability bond worth USD 1 billion on August 18, 2021, further enhancing the environmental performance and social impact of our operations in China and contributing to the UN SDGs.

¹ MaaS, short for Mobility as a service, involves accessing and managing traffic-related services through electronic interactive interfaces to meet the travel requirements of consumers.

² https://esg.baidu.com/en/article/Baidu_Sustainable_Finance_Framework

Green Operations

Key Environmental Performance in 2021³

In strict accordance with the *Environmental Protection Law of the People's Republic of China*, the *Energy Conservation Law of the People's Republic of China* and other laws and regulations, Baidu earnestly puts the idea of energy conservation and emission reduction into actions and actively implements relevant policies.

Indicator	Unit	2020 Data	2021 Data
Diesel	t	617.5	184.0
Gasoline	kg	7,911.9	8,712.7
Natural gas	10,000 m ³	256.5	260.0
Electricity	MWh	529,137.4	673,829.3
Purchased heat	GJ	75,063.7	110,680.7
Clean energy	kWh	/	3,049,469.3

Baidu's Energy Consumption

Scope	Unit	2020 Data	2021 Data
Scope 1 ⁴	tCO ₂ e	5,974.1	16,407.0
Scope 2 ⁵	tCO ₂ e	468,245.5	601,740.2
Scope 3 ⁶	tCO ₂ e	16,621.8	1,173,460.6
Total	tCO ₂ e	490,841.4	1,791,607.8
GHG emissions intensity	tCO ₂ e / person	15.6	49.2

Baidu's GHG Emissions⁷

Indicator	Unit	2020 Data	2021 Data
Total non-hazardous waste ⁸	t	3,907.6	6,939
Non-hazardous waste intensity	kg/person	0.1	0.2
Total hazardous waste ⁹	t	27.2	27.5
Hazardous waste intensity	kg/person	0.0009	0.0008

Waste Produced by Baidu

Indicator	Unit	2020 Data	2021 Data
Water consumption	t	1,279,940.6	1,576,309.8
Water consumption intensity	t/person	40.8	43.3
Wastewater discharged	t	591,523.5	584,399.9
Rainwater collected	t	4,900.0	6,640.0

Baidu's Water Consumption

³ In 2021, Baidu's key environmental performance indicators covered all Headquarter office buildings in Beijing; Tianjin, Suzhou, Guangzhou, Shanghai, Dongguan, Chengdu, Foshan, Shenzhen, Jinan subsidiaries; R&D centers in Shanghai and Shenzhen; and all data centers.

⁴ Direct emissions, including losses and fugitive emissions from stationary combustion sources, boilers, kitchen equipment, refrigerators, etc.

⁵ Indirect emissions, involving emissions from purchased electricity, steam and heating.

⁶ Other indirect emissions, involving employee commuting and power consumption of leased data centers.

⁷ Baidu's GHG emissions (Scope 1, 2 and 3) in 2021 are verified and certified by third-party professional institutions

⁸ Including office paper, waste cartons, books and newspapers, scrap metal, waste plastic, kitchen waste, and other non-hazardous waste.

⁹ Including used lamps, used electronic equipment, used toner cartridges, and used batteries. In 2021, Baidu sold obsolete electronic equipment to the second-hand market, greatly reducing emissions from hazardous wastes.

◇ Greening Our Data Centers

Greening our data centers is an important pathway for Baidu to achieve carbon neutrality. Baidu has established a data center low-carbon management team composed of senior executives and professional technical engineers. The team is responsible for formulating and implementing relevant systems and management standards related to energy conservation and emission reduction, as well as setting, implementing and supervising energy-saving targets. With reference to previous power usage effectiveness (PUE)¹⁰, we also set quarterly OKR¹¹ for energy consumption and carbon emissions for the teams and individuals involved.

Baidu consistently strives to build low-carbon, energy-saving and environment-friendly cloud computing centers. We boast over 600 self-developed technology patents in the field of data centers. A number of original energy-saving and emission-reducing technologies are applied on a massive scale and hit numerous records both at home and abroad.

Over **600** self-developed
technology patents



Baidu adopted the world's first one-way main supply + UPS/HVDC offline infrastructure power architecture for data centers and pioneered in the large-scale deployment of the server rack cabinets based on battery backup units (BBU) in China with the power supply efficiency up to 99.5%. In November 2021, along with seven partners, Baidu launched the Pinghu DC lithium battery system. Through such means as the customized control system, linkage with AI technologies, and optimization of power supply, Baidu made the system "safe, reliable, intelligent, efficient, flexible, and economical" whilst also realizing the function of peak load regulation. This promoted the low-carbon and efficient transition of Baidu's data centers. As Baidu's in-house cutting-edge technology for data centers, the Pinghu DC lithium battery system has been applied in several data center parks, which undeniably proved that the technology is highly feasible and advanced.

The power supply efficiency
reaches as high as

99.5%



Baidu adopts the industry-leading cooling system called "Iceberg" transformer cooling, liquid cooling and other new technologies. Besides supporting various cold sources and terminals, this system realizes the smooth collaboration between software and hardware whilst tapping into the natural cooling capacity. The "Iceberg" transformer cooling system is the first to introduce the oil-free concept into the air conditioning system. Built on the hardware including air pump, liquid pump, evaporative condenser and parallel terminal, and controlled by AI, the system flexibly meets the cooling needs of data centers, with energy efficiency increasing by more than 40%. Baidu also applies liquid cooling to server cooling, providing high-density cooling solutions for data centers. Due to the ultra-energy saving architecture with 100% natural cooling, the liquid cooling system improves the energy efficiency by 50% compared with traditional cooling systems and helps data centers save energy and reduce emissions.

In terms of system operation, Baidu uses the AI intelligent control system based on PaddlePaddle and builds deep learning models tailored to data centers to monitor operation data and optimize system in real time. In addition to intelligent power supply and intelligent heat dissipation, Baidu ensures the green, energy-saving and efficient operation of data centers.

The "Iceberg" transformer
cooling system improves
energy efficiency by more than

40%



The liquid cooling system
improves the energy efficiency by

50%



¹⁰ Power Usage Effectiveness (PUE) is the ratio between the total energy used by a data center and the energy delivered to IT equipment. It is a commonly used metric for the energy efficiency of a data center. A PUE value approaching 1.0 would indicate 100% energy efficiency in the data center.

¹¹ OKR refers to Objectives and Key Results.

In addition, Baidu utilizes the tidal computing technology to comprehensively integrate and coordinate online and offline computing resources, thus realizing cross-business flow and reuse and meeting the demand for new resources in some business scenarios. In 2021, the average annual PUE of Baidu's self-built data centers reached 1.16¹², and the average annual PUE of the most energy-efficient single data center decreased to 1.08, earning Baidu a leading position in the industry.

The average annual PUE of all Baidu's self-built data

centers reached **1.16**

The average annual PUE of the most energy-efficient single data center

decreased to **1.08**



In addition to innovation-driven energy conservation and emission reduction, Baidu actively explores and uses clean energy. For example, rooftop photovoltaic systems and other renewable energy power generation projects are carried out in self-built data centers. The Company also signs contracts with partners to purchase renewable energy. In 2021, our data centers generated 268,021 kWh of renewable energy and purchased 500,000 kWh of green electricity, and reduced GHG emissions by approximately 577 tons of carbon dioxide equivalent.

Reduced GHG emissions by approximately

577 tons of carbon dioxide equivalent



While continuously reducing the energy consumption of data centers, Baidu adopts various measures for water management:

Recording the water consumption of the equipment room and office area daily.

Regularly observing and analyzing the water consumption, conducting weekly statistical analysis of water consumption and WUE¹³, making reports, checking and improving the abnormal consumption of water resources in a timely manner.

Regularly inspecting and maintaining water supply equipment and facilities.

Regularly compiling water quality test reports.



With the wastewater recovery and reuse technologies, Baidu carries out the ultrafiltration, desalination and other treatments to turn the wastewater into qualified cooling water, which will be used in the refrigeration system. The water retention rate of the cooling water system reaches 44.8%. For the Baidu Yangquan Data Center Phase 1, the sewage discharged per day was reduced by 1,328 tons.

The water retention rate of the cooling water system reaches

44.8%



¹² The PUE value of data centers is related to the load factor of IT equipment. When the load factor is low, the PUE value is usually higher than that at full load. In 2021, IT equipment in Baidu's newly-built data centers was not at full load during the shelving period, so PUE witnessed a slight increase compared with the previous year, from 1.14 to 1.16.

¹³ WUE (Water use efficiency) is the ratio between water consumption of data center and the electricity consumption of IT equipment.

◇ Greening Our Offices

Upholding the idea of scientific energy management, Baidu establishes various energy statistical ledgers, formulates the *Monthly Energy Analysis*, records and analyzes energy use, and guides the revision of relevant systems with actual data. Besides, Baidu make continuous efforts to obtain the international standardized energy management system and environmental management system certifications. As of

December 31, 2021, Baidu's office buildings became the ISO 50001 energy management system certified. The Company's property manager Anxinhang Property Management held the ISO 14001:2015 environmental management system certification. All of these efforts further realize the value of green supply service chain.

In 2021, Baidu improved operational energy efficiency by launching multiple initiatives:



Baidu insists on water-saving management in daily offices, optimizing and upgrading the equipment whilst strengthening wastewater treatment and recycling of water resources. The water treatment system of Baidu Campus reused 3,836 tons of wastewater annually in 2021 and turned wastewater into flushing water. Baidu persists in publicizing water conservation among our employees.

Baidu insists on refined waste management. The production of all types of waste are monitored and recorded on a daily basis as well as the deposit of waste according to type in order to improve the recycling efficiency. In the daily operation and office, Baidu sells the electronic products with reuse value into the second-hand market to reduce the discharge of hazardous waste.

The water treatment system of
Baidu Campus reused

3,836 tons
of waste water in 2021



Office waste category	Unit	2021 Data
Office paper	kg	9,399.7
Waste cartons, books and newspapers	kg	17,904.4
Scrap metal	kg	640.0
Waste plastics	kg	984.0
Tube	piece	57,068.0
Electronic equipment	set	1,464.0
Toner cartridge and ink cartridge	piece	241.0
Battery	piece	32,640.0
Kitchen waste	t	2,926.2
Others	t	3,983.9

Baidu's Office Waste in 2021

Green Products and Services

◇ Intelligent Transportation

Developing intelligent and green transportation is an important pathway for Baidu to contribute to the national “dual carbon” goals. Relying on intelligent connected vehicle technology, Baidu develops intelligent transportation products and comprehensively upgrades vehicles, roads and modes of travel.



Vehicles



- Cooperating with FAW to launch Hongqi EV, China’s first mass-produced self-driving passenger car (Robotaxi), to facilitate the promotion and development of new energy vehicles (NEV).
- Cooperating with ARCFOX to launch Apollo Moon, a new-generation, mass-produced NEV model built on the lightweight “ANP-Robotaxi” architecture¹⁴ to reduce production materials use and save resources.



Roads



- Developing smart traffic signals, which can intelligently change the duration of traffic lights according to traffic volume, reduce the traffic congestion and cut carbon emissions from parking.
- Developing sixth-generation smart parking with large-tilt-angle, high-level video technology and functions such as parking space guidance, unmanned charging, and unmanned management, to greatly improve parking space operation efficiency, and reduce the carbon emissions generated by vehicles due to seeking parking space and paying fees.
- Building Baidu ACE intelligent transportation engine¹⁵ and the full-stack intelligent transportation system to meet the needs of intelligent transportation in various scenarios and comprehensively promote low-carbon travel.



Modes of travel



- Launching Luobokuaipao, a new autonomous ride-hailing platform which covers various models and utilizing the big data technology to optimize resource allocation and decision-making. Providing green and low-carbon travel services for the public.

¹⁴ANP-Robotaxi is an architecture combining L4 Robotaxi autonomous driving technology and L2+ driver assistance features

¹⁵Baidu ACE intelligent transportation engine is a full-stack intelligent transportation solution unveiled by Baidu Apollo. ACE is short for Autonomous Driving, Connected Road, and Efficient Mobility.

◇ Baidu AI Cloud

Facing the opportunities presented by the national “dual carbon” strategy, Baidu leverages the digital and intelligent technologies to empower the design, construction, operation and sustainability of zero-carbon parks. The Baidu digital and intelligent zero-carbon park maturity model has been developed to conduct zero-carbon evaluation, research the zero-carbon pathway through top-level design, and further steer the development of zero-carbon parks. In doing this, Baidu finally extended the “dual carbon” solutions to all aspects of zero-carbon parks.

Aligning with relevant standards and guidelines, such as the *National Low-carbon City Evaluation Index System*, the *Europe-China Eco-Cities Index System Indicator System*, the *Evaluation Guide for Low-carbon Parks*, and the *Standard for Design of Intelligent Building*, and the *Assessment Standard for Green Eco-district*, Baidu has developed an index system featuring efficient energy, low-carbon transportation, green building, ecological carbon sinks, environmental quality, and recycling. This provides a theoretical basis and control standard for the digital and intelligent construction of zero-carbon parks.



Baidu's Digital and Intelligent Solutions for Zero-carbon Parks

To facilitate the implementation of zero-carbon park solutions, Baidu AI Cloud has developed a series of energy and resource management platforms:



Relying on Baidu Smart Internet of Things (IoT) Platform, Du Neng Comprehensive Energy Service Platform blends AI with energy scenarios to provide enterprise customers with energy management, energy efficiency optimization, carbon emissions, and carbon asset management services, thereby facilitating the green and low-carbon transformation of enterprises.



With water quality and quantity management and comprehensive watercourse management functions, Baidu Smart Water Platform provides integrated water management services for enterprises, including water quality management and comprehensive canal management, thereby contributing to the effectiveness of comprehensive water environment management.



Baidu Renewable Resources Management System effectively coordinates the solid waste transportation systems in zero-carbon parks. In addition to garbage classification and traceability, garbage transportation route optimization, and whole-process garbage transportation tracking, the system can also build and manage the archive of resident garbage classification information. This promotes renewable resource transportation in an information-based, intelligent, efficient, and low-carbon manner.

◇ Green Apps

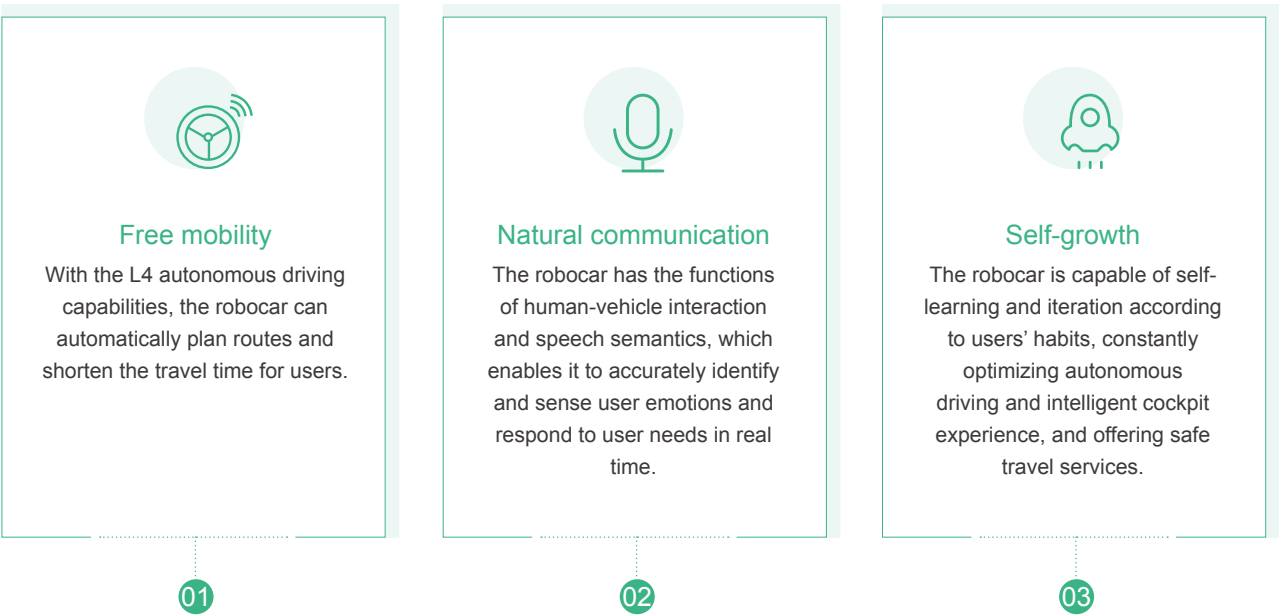
Baidu has added a “green module” in Apps to raise the public awareness of environmental protection in daily life. Baidu has developed an AI Waste Sorting mini program to assist our users with garbage classification. In addition, Baidu Maps also launches new services, such as Green Travel Program and New Energy Navigation to diversify the green travel experience for our users.



◇ Jidu

Jidu is a robocar startup sponsored by Baidu and strategically invested by Geely. It is devoted to the engineering, R&D and commercialization of the world’s top autonomous driving and human-computer interaction technologies. The company aims to create revolutionary robocars with emotions and wisdom, help people enjoy more space and time, and achieve more possibilities.

The robocars of Jidu are defined by “free mobility, natural communication and self-growth”. Empowered by cutting-edge core technologies such as intelligent driving and intelligent cockpit, Jidu brings an energy-saving, environment-friendly and intelligent travel experience to users.



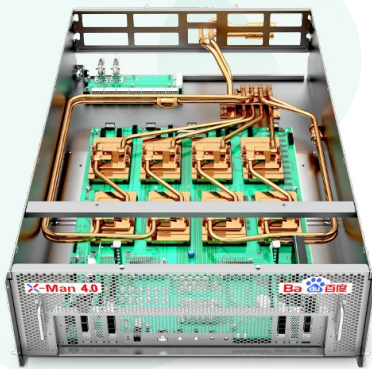
Built in line with the Sustainable Experience Architecture (SEA), the world-class pure electric vehicle architecture, Jidu has developed the industry-leading L4 autonomous driving technology architecture JET, which integrates the Electrical & Electronic Architecture (EEA) and Service-Oriented Architecture (SOA). As a new-generation electric vehicle enterprise, Jidu adopts advanced electric vehicle technologies

to reduce the consumption cost of travel and helps the public practice the idea of green and low-carbon travel. While offering a more convenient travel experience, the autonomous driving technology can improve the utilization rate of traffic roads, reduce the carbon emissions caused by congestion, and advance the green transformation of the transportation system.

◇ Liquid Cooling System

The liquid cooling technology, as a replacement of air-cooling technology, can reduce the power consumption of the air-cooling system and meet the increasing heat dissipation requirements of servers. To support the implementation of liquid cooling technology, Baidu continuously updates the cold-plate liquid cooling system and promotes the large-scale application of immersion liquid cooling server.

The cold-plate liquid cooling technology has the advantages of low noise and energy saving. In 2021, Baidu, as one of the sponsors of the Scorpio Project, took the lead to release



X-MAN 4.0 liquid-cooled Plate Server

The immersion liquid cooling technology is characterized by higher heat transfer efficiency, which makes it the most energy saving and efficient technology. Baidu will launch the immersion liquid-cooled cabinet and immersion liquid-cooled computing server in 2022. The single-phase immersion liquid-cooled technology can achieve zero power consumption of server fans. The power consumption of the single general-purpose computing server and the single GPU server is expected to be



Baidu's Liquid Immersion Cooling Cab

the *Scorpio Open Standard 4.0 for Liquid-Cooled Cabinets* in the Open Data Center Committee (ODCC), which is the first industry standard for the cold-plate liquid-cooled cabinet. This standard not only regulates the cabinet servers in China but also promotes the large-scale application of liquid cooling technology. In addition, Baidu plans to develop the cold-plate liquid-cooled general-purpose computing server in 2022, which can reduce the power consumption of the single server by at least 3%. Baidu will carry out a pilot project to launch the second-generation cold-plate liquid cooled GPU server to support eight GPU. At that time, the power consumption of the server fans will be reduced by about 80% and that of a single GPU server will be decreased by at least 12%.

Baidu plans to develop the cold-plate liquid cooled general-purpose computing server in 2022, which can reduce the power consumption of the single server by at least

3%



reduced by at least 5% and 13.5%, respectively. In the future, Baidu will promote the large-scale application of immersion liquid-cooled servers, advance the qualitative transformation of data centers from air to liquid-cooled data centers, realize the energy conservation and emission reduction of data centers, and contribute to the national initiative to channel the computing demands of east China into west China as well as the "dual carbon" targets.

Baidu will launch the immersion liquid cooled cabinet and immersion liquid cooled computing server in 2022, the power consumption of the single general-purpose computing server is expected to be reduced by at least

5%

The power consumption of the single GPU server is expected to be reduced by at least

13.5%



[Case]

Baidu's Intelligent Traffic Control System Contributing to Emission Reduction in the Transportation Industry

While pursuing carbon neutrality in daily operations, Baidu also contributes to the energy transformation and conversation, and emission reduction of the whole society by harnessing technological advantages. By offering Baidu AI Cloud technologies, we support the efforts of ourselves, customers, partners and other stakeholders in the industry to jointly cope with climate change.

Focusing on intelligence information network building and the integration and application of information resources, Baidu assisted Baoding Municipal People's Government in building the first intelligent transportation program in Hebei province. The center, also the "Baoding AI Traffic Management Brain", will enable comprehensive data access,

governance, analysis and application, as well as presenting a new development paradigm with traffic command, traffic congestion relief and traffic safety management integrated with the feature of "one-image display, one-click dispatch, front-line tracking, full closed-loop management" integrated.

In the program, 176 intelligent intersections were set up in the downtown of Baoding to manage vehicles in an automatic, precise and intelligent manner in addition to achieving intelligent timing of signal lights. When the center was put into use, the number of undesirable driving scenarios such as tapping on brakes to slow down, idling and waiting, and slow-speed traffic at the intersections among main roads witnessed significant decrease. At present,

the congestion index during peak hours in downtown Baoding has dropped by 4.6%, average traffic flow speed increased by 11.6%, efficiency of traffic flow at a single intersection increased by over 5.3%, average vehicle intersection-passing time reduced by around 20%, and average vehicle speed grown by 6.5 km/h. **The average carbon emission reduction of each intersection is around 138.6 tons per year, and the emission reduction rate is 20 to 30%. Assuming that 300 intelligent intersections are set up in Baoding, then a carbon emission reduction of 41,600 tons can be achieved annually. This is equivalent to total carbon dioxide emissions produced by 14,000 private cars in a year, demonstrating a remarkable carbon emission reduction capability.**



Baoding AI Traffic Management Brain

[Case]

Baidu Yangquan Data Center Awarded the First 5A Green Data Center Certification in China

Baidu actively responds to the national low-carbon development strategy, continues to carry out technological innovation, actively applies cutting-edge technologies for energy conservation and emission reduction, establishes green data centers, and realizes a high-efficiency, low-emission operation model.

Baidu Cloud Computing Center in Yangquan (Baidu Yangquan Data Center) has been continuously developing innovative technologies since its operation, realizing energy conservation, emission reduction and resource utilization efficiency improvement in all links of operations. In terms of electronic architecture, **the world's first Mains Supply + UPS/HVDC offline infrastructure and China's first distributed battery backup units (BBU) based cabinet server installed in the data center, enables a power supply efficiency of 99.5%**. In terms of cooling systems, the "zero-power" rooftop cooling system OCU independently developed by Baidu, has integrated with the high-temperature server technology and a new type of air distribution. This has enabled over 98% of cooling time to be free of charge. The PaddlePaddle deep learning structure employed in the center can

build deep learning model to realize intelligent optimization of the cooling source system.

The center actively adopts clean and low-carbon energy. In 2015, the solar photovoltaic power generation project was designed to make full use of the roof space of the center, leading to it becoming the first data center in China to apply solar photovoltaic direct grid-connected power generation technology. **Since 2017, it has contracted 156 million kWh of renewable energy including wind power.**

In October 2020, Yangquan Data Center introduced the electromagnetic wave technology and conducted testing and verification. By leveraging electromagnetic wave transmitters and through the oscillations of magnetic wave in different frequency bands, the technology can change the energy of water molecules to enhance activation energy, thereby achieving such effects as anti-scaling, anti-corrosion, sterilization and algae suppression. Compared with traditional water treatment methods that use chemical agents, the electromagnetic wave technology improves the efficiency of water treatment by achieving a higher conductivity through increased upper limits of the conductivity

of sewage. **After a year of operation and testing, we have found that one set of cooling unit has the potential to reduce annual sewage discharge by 3,000 tons and save water consumption by over 25%.**

On May 13, 2015, Baidu Yangquan Data Center Module 1# was awarded the title of "Carbon Neutral Data Center Leader" (5A) - the highest level of green data center certification and became the first green data center in China to receive this honor. It has been included in the *White Paper on the Development of Low-carbon Data Center* as an outstanding example and has become a low-carbon benchmark amongst data centers.



Baidu Yangquan Data Center Awarded the First 5A Green Data Center Certification in China

The pioneering installment of distributed battery backup units (BBU) based cabinet server enables a power supply efficiency of

99.5%



Since 2017, Baidu Yangquan Data Center has contracted

156

 million kWh of renewable energy including wind power


One set of cooling unit can reduce annual sewage discharge by

3,000

 tons


Saving water consumption by over

25%



[Case]

Baidu Maps Helping Promote Green Transportation

Baidu has developed green products in active response to China's call for switching to green and low-carbon development. Baidu Maps has launched the "Low-Carbon Planning" and "Navigation Services for New Energy Vehicles (NEVs)" program, with an aim of promoting the concept of green consumption among users. This will accelerate the transition to green consumption and contribute to achieving the national carbon neutrality goal.

"Low-Carbon Plan" Program

Since 2020, in order to promote the concept of low-carbon travel and green life, Baidu has participated in the MaaS Alliance Forum, and worked closely with Beijing Municipal of Transport, as well as other parties related to the alliance, to jointly launch the "Low-Carbon Plan" program.

In 2021, Baidu Maps continued to optimize such aspects as location positioning, route guidance, and route planning to provide users with high-quality travel services. In terms of location positioning, Baidu introduced the multi-dimensional positioning technology to stably present positioning information in indoors, tunnels and other places where GPS is not available, to guide users to the destination quickly. In terms of route guidance, Baidu Maps refined the blueprints of intersections and leveraged the AR technology to reduce the probability of users going wrong at intersections and being led into cobweb-like paths. In terms of route planning, Baidu has optimized the road network model to provide users with route designs that are more in line with

their habits and avoid carbon emissions caused by selecting wrong routes.

Baidu has also launched a number of low-carbon and inclusive initiatives to encourage users to actively join in green travel. When users select green travel options, the amount of carbon emissions reduced is manifested as points in their accounts, which can be redeemed in various ways such as e-coupons, vouchers, memberships of Baidu Netdisk, Baidu Wenku and IQIYI that can be found on the rewards page of the Baidu Maps APP. For users in Beijing, their Baidu Maps account can be combined with the Beijing Municipal Administration & Communication Card to receive rewards if they choose green travel. **By December 31, 2021, Baidu Maps' Low-Carbon Plan had received more than 40 million visits throughout the year, and the accumulated carbon dioxide emissions reduced was in excess of 3,800 tons.**

More than

40 million
visits throughout the year



Reduced carbon dioxide emissions
by over

3,800 tons



Navigation Services for NEVs

Switching the automobile industry to new energy is an important strategy for China to achieve carbon neutrality goals. In 2021, by leveraging advantages in profiling the landscape, Baidu Maps added the module of "Navigation Services for NEVs" to provide route guidance for NEVs to be recharged. The module offers a one-stop service that covers the location of charging piles, route planning, navigation, scanning QR code to recharge, thereby increasing the convenience of using NEVs and expanding their travel range.

Unlike gas stations, the lack of sufficient charging piles and their uneven distribution have been troubling the users of NEVs. To alleviate the problem, Baidu Maps' "Navigation Services for NEVs" function can enable users to get to know the availability and types of charging piles by searching, checking surroundings, using the map of charging piles and looking at the dynamic recommendations.

Baidu Maps is able to estimate the potential power consumption of choosing a specific route based on basic information of the roads, real-time road conditions and related power consumption factors. Therefore, it can intelligently plan the optimized routes for NEV users and navigate them to the charging pile. Users are also reminded of the real-time status of the charging piles along the way. This function can not only plan the most suitable route for NEV users to get their vehicles recharged, but also enable them accurately locate charging piles on the APP conveniently, thus freeing them from travel anxieties about recharging.

[Case]

Baidu Baike Conducting Biodiversity Popularization Activities

Dedicated to promoting the concept of Shared Life on the Earth among the public, Baidu Baike cooperates with all sectors of society and leverages platform advantages to conduct a series of publicity activities aimed at protecting the ecosystem. Thus, the public can have a better understanding of the harmonious coexistence between humanity and nature.

In 2021, Baidu Baike worked with the Center for Environmental Education and Communications of Ministry of Ecology and Environment of the PRC (CEEC), and together launched the "Harmonious Coexistence" popularization program. This promoted education and the dissemination of information on the protection of ecological environment through live broadcasts, short videos

and trustable entries. The program has been listed by the Ministry as one of the 15 important publicity campaigns for COP15¹. During the first phase of COP15, Baidu Baike launched the first episode of the "Harmonious Coexistence" popularization program — "Baidu Wiki Virtual Zoo" wildlife conservation live broadcasts, in which wildlife protection volunteers, popular science writers and celebrities were invited to visit various parks including Xining Wildlife Park and Nanjing Hongshan Forest Zoo. In the parks, four sessions of livestreaming were held to introduce popular local species, and increase the awareness of scientific knowledge of animal protection, animal medical treatment and extinct animals to the public. According to statistics, the total number of audiences exceeded 1.5

million, and the short videos cut from the live broadcasts went viral online, with a total of 5 million views.

In addition, Baidu Baike and the Science and Technology Popularization Department of China Association for Science and Technology jointly launched the "Construction of Aggregate Searching for Science Popularization in China" pilot project, bringing high-quality popular science content to users in areas including but not limited to cutting-edge technology, environment, ecology, and biology. A total of 3,000 customized Q&A cards, 50 popular animal cards and three special themed cards were developed in the project. The project is expected to have more than 30 million views by the end of May 2022.

1.5

million live stream viewers



3,000

customized Q&A cards

50

popular animal cards

3

special themed cards



Popular Animal Cards

¹ COP 15 refers to the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity. It was held in Kunming, China in October 2021, themed with ecological civilization for the first time.

Improving Services

Our Performance

- Content Management
- User Experience
- Intellectual Property Rights Management

Our Practices

- Case

Improving Services



Baidu is committed to providing users with high-quality products and services. Baidu values online content management, continuously improves user experience, protects intellectual property rights and respects the creative works of others, realizing corporate social value.

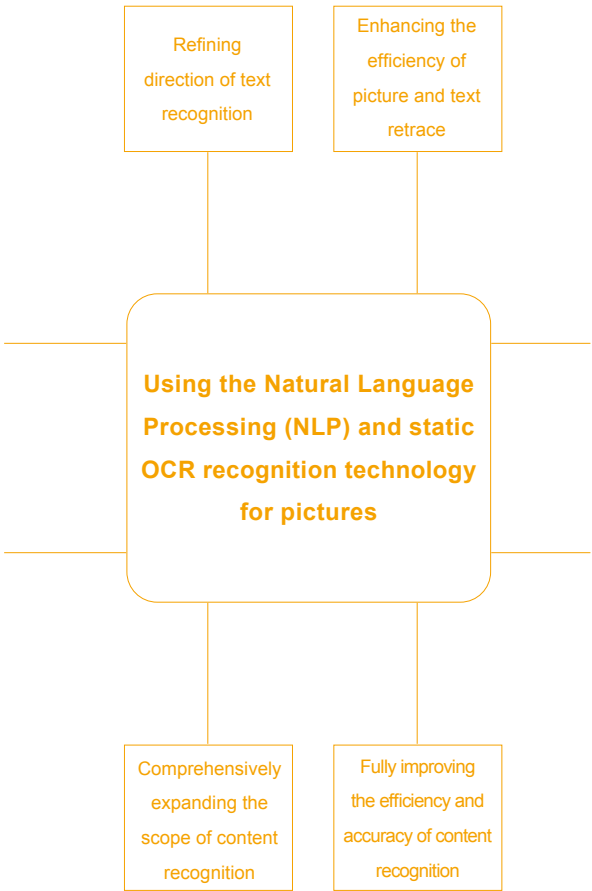
Content Management

◆ Product Content Management

Baidu has formulated a standardized product content management system, unified risk control standards, established a content risk management department, conducted compliance management of products and services and fulfilled the main responsibilities of the online information content service platform.

In 2021, Baidu continued to optimize the risk identification process, innovate the AI identification technology, and enhance the ability to actively detect risks. Baidu comprehensively expanded the scope of content recognition, and fully improved the efficiency and accuracy of content recognition through refining direction of text recognition and enhancing the efficiency of picture and text retrace with the Natural Language Processing (NLP)¹ and static OCR recognition technology for pictures. In addition, the Company has carried out special actions on content management and built the identification strategy model for different special topics including celebrity fan culture, historical nihilism, underground economies, to effectively improve the accuracy of content identification.

Baidu regularly conducts content management training activities, including empowerment training for new hires and regular trainings for all employees. In 2021, 265 training sessions were conducted in this regard.



265 content management training sessions in 2021



¹ Natural Language Processing (NLP) is an important direction in computer science and artificial intelligence, studying theories and methods that can realize effective communication between people and computers with natural language.

Combating Harmful Information

Baidu continues to combat all kinds of harmful information on the Internet and regularly releases the *Monthly Report of Comprehensive Governance of Information Security*, intercepting malicious information 56 billion times, blocking harassment of users from suspected fraud websites and Apps 27 million times, and protecting their personal information from malicious disclosure 220,000 times a day.

Blocking harassment of users from suspected fraud websites and Apps for

27 million times



Protecting personal information of users from malicious disclosure

220,000 times a day



Intercepting malicious information for

56 billion times



Violence	120,000 pieces
Pornography	120,000 pieces
Tobacco product	438,000 pieces
Alcohol product	30,000 pieces
Weapon	36,000 pieces
Gambling	19,810,000 pieces
Discrimination	146 pieces

Number of Harmful Information Deleted by Baidu in 2021

Optimizing Content Ecology

Baidu respects cultural diversity, provides users with equal and diversified quality services and guarantees freedom of speech based on safeguarding public interests. We attach great importance to the protection of minors and launch a series of “protecting minors” services, including the launching of a dedicated hotline for minors, releasing teen network mode, limiting the teen’s screen time, and building a response mechanism for vulgar content.

In addition, Baidu actively carries out wildlife protection and public health management actions through wildlife keyword increase and targeting key Tieba forums. In 2021, Baidu wildlife keyword increased to 3,497, including ivory trafficking, wildlife hunting and other content. Baidu Tieba optimized a total of 819,000 pieces of wildlife information.

Baidu wildlife keyword increased to

3,497 in 2021



Baidu Tieba optimized a total of

819,000 pieces of wildlife information



◇ Business Promotion Content Management

Baidu has built a risk control system of “AI inspection plus human double-check plus human patrol”, which realized the full life cycle content management system for business promotion through the inspection mechanism of pre-monitoring, instant interception, and post-tracing processes (see page 77 of the *Baidu 2020 Environmental, Social and Governance (ESG) Report*² for further details). In addition, Baidu built a model based on deep image semantics and designed an algorithm based on the temporal changes of video frames, which effectively improved the accuracy of inspection of business promotion content. In 2021, Baidu AI robots inspected 11.3 billion pieces of business promotion information per day on average and filtered more than 1.57 million banned terms in total.

To better empower our partners, Baidu regularly carry out advertising management training for agents and strengthen business promotion control. The “Jimuyu” product was launched to provide advertisers with a unified website building tool to ensure the compliance and authenticity of business promotion. In addition, Baidu further protects users from frauds, by carrying out offline verification of advertisers’ information.

Baidu AI robots inspected

11.3 billion pieces
of business promotion information per day



Filtered more than

1.57 million
banned terms



Offline verification of medical institutions

Baidu identifies risks existing in the diagnosis and treatment process of private hospitals, carries out on-site investigations on malpractices such as exaggerating illness, over-examination, over-treatment, practicing medicine without a license, excavates the “bad money” subjects of the medical industry, and promotes the ecological health of the medical industry. In 2021, Baidu verified 1,314 medical entities offline, and assessed the risk level according to the verification conclusion, with corresponding penalties and rectification measures taken.

Baidu verified **1,314**
medical entities offline in 2021



Offline verification of pharmaceutical products,
catering food, health food, cosmetics,
and medical devices

Baidu conducts WeChat and telephone research on advertisers of pharmaceutical products, catering food, health food, cosmetics and medical devices, to have deep insights into advertisers’ promotion methods, products, and service scope, and comprehensively identify and crackdown on high-risk products. In 2021, Baidu’s offline verification covered a total of 35,946 advertisements, involving 8,500 promotion subjects, and achieved full real-time coverage of advertisers, all of which were given corresponding disposal measures according to the verification conclusion.

Baidu's offline verification covered
35,946 advertisements in 2021



² https://esg.baidu.com/en/article/Baidu_2020_Environmental_Social_and_Governance_Report

User Experience

◇ Protecting Users' Rights and Interests

Baidu has established a customer protection service system to improve advanced service in terms of organizational, innovation and service capacity.

Baidu launched the result labeling function for official website searching to protect users from malicious sites (see page 79 of the Baidu 2020 Environmental, Social and Governance (ESG) Report for further details). To improve the resolution rate of both online and offline service disputes, Baidu launched the "Baidu Netizen Rights Protection Plan" and set up the "Baidu People's Mediation Committee" to better protect users' rights and interests. As of December 31, 2021, 34,000 offline disputes had been resolved. Baidu also regularly launched a series of live-streaming of "Safeguarding Heroes" to popularize network security knowledge to users, with more than 500,000 viewers in total for this activity.

Baidu has improved response mechanisms to customer complaints by setting up diversified channels including a hotline, website, mailbox, and reception room. In 2021, Baidu handled 100% of online complaints. Baidu also conducted regular surveys on users' satisfaction with complaint settlement, earning 95% of user satisfaction for Baidu hotline and 82% for online consultation in 2021.

34,000
offline disputes resolved



Baidu regularly launched a series of live-streaming of "Safeguarding Heroes" Attracting over

500,000 viewers



100% of online complaints handled
95% of user satisfaction for Baidu hotline
82% of user satisfaction for online consultation



◇ Improving User Experience

Guided by user needs, Baidu continues to improve the popularity and applicability of products from product design, development, upgrading and other links, launch elderly-oriented products, and create information barrier-free experience.

In 2021, the first group standard for complaint handling service for internet enterprises in China was issued and Baidu played a leading role in its drafting. Its release and implementation are pivotal in regulating the development of the industry, reducing internet complaints and improving people's sense of gain and satisfaction.

Baidu also set up the Duyouyou Service Committee, inviting experts both inside and outside of the industry to study service strategies and jointly supervise the service, to further promote the healthy development of high-quality service in the industry. Baidu cooperated with China Consumers' Association to hold a consumer rights protection activity themed "Safeguarding Safety for Unimpeded Consumption" for the improvement of consumer quality.



Specification of Excellent Complaints Handling Service for Internet Enterprises



Offer Letter of the Duyouyou Service Committee

Intellectual Property Rights Management

◆ Patent System Construction

Baidu has strengthened independent innovation atmosphere, formulated a sound management system and mechanism for intellectual property rights protection, organized training on the popularization of intellectual property rights knowledge, and invited external experts to conduct training for all employees to improve the employees' understanding of the importance of sustainable development and innovation. In 2021, Baidu conducted a total of 60 training sessions on intellectual property rights with more than 3,000 participants.

60 training sessions on intellectual property rights



3,000 participants



◆ Innovation and Development Achievements

Baidu has made remarkable achievements in research, development, and innovation of AI technology. Currently, Baidu has filed more than 13,000 AI patent applications with more than 3,600 granted, holding the first place in China in terms of AI patent applications and grants for four consecutive years. The number of patent applications and patent quality of deep learning, natural language processing, intelligent voice, knowledge mapping, automatic driving, intelligent recommendation, wisdom mapping, computer vision and other offshoots ranked first in China. The number of patent applications in wise information technology of med(WIT-MED), smart city and other branches ranked first in China. In September 2021, according to the global *Deep Learning 2021 Patent Landscape* released by Questel, the world's leading intellectual property solution provider, Baidu made efforts to innovate in key core technologies such as deep learning, with a rapid increase in patent applications, ranking first in the world. In December 2021, Intellectual Asset Management (IAM), an authoritative international Intellectual property media, reported on the *Self-Driving Vehicles Patent Landscape Study* of Clarivate Analytics. Baidu ranked first in autonomous driving patent application (by family) and second in intelligent transportation patent application (by family) in the world. In 2021, Baidu filed more than 5,900 patent applications with more than 2,700 patents granted.

Over 13,000 AI patent applications



Over 5,900 patent applications



Baidu has set up teams such as open-source offices, open-source law groups and security groups to ensure licensing compliance and the respect of third-party intellectual property rights. The *Report on the AI Open-source Ecology and Intellectual Property* released by CAICT in September 2021 shows that the domestic open-source projects represented by Baidu PaddlePaddle's deep learning framework and the Apollo autonomous driving platform have grown into the top open-source projects in the world. As of 2021, Baidu led 21 open-source organizations and more than 1,000 open-source projects on Github, with more than 18,000 community contributors and more than 370,000 stars gained.

Baidu led **21** open-source organizations on Github



Baidu led over **1,000** open-source projects



Over **18,000** community contributors



370,000 stars gained



◇ Safeguarding Original Rights and Interests

Baidu respects every intellectual property achievement. To protect the intellectual property of content producers, the Company has established the Baidu Copyright Service Platform and provided smooth channels for user complaints and feedback. In June 2021, Baidu Baijiahao officially announced the comprehensive upgrade of the "Protection Plan for Original Content"³ to accurately crack down on plagiarism and safeguard the rights and interests of originators.

◇ Leading Ecological Co-construction

Baidu, demonstrating our strength as an "industry leader", empowers the prosperous AI ecology with the advantages of leading AI patents in the cooperative spirit of openness and inclusiveness.

In 2021, Baidu released the *White Paper on Baidu AI Patents*, which showed Baidu's exploration and practices in the creation, transformation, and application of AI patents and expanded the way to realize patent value. In addition, Baidu promoted the Patent Protection Association of China (PPAC) to establish an AI Professional Committee and an AI Industry Intellectual Property Operation Center in Beijing to enhance the independent intellectual property capability of the industrial chain.

In 2021, Baidu joined hands with seven Chinese AI-related enterprises, including Alibaba, Auto Quicker, Ant Technology, Midea, Meizu and Shangtang Technology, to jointly set up a patent pool of the AI industry based on voluntariness, equality, mutual benefit, and collaboration, aiming at serving public welfare and society, to jointly guide patent creation and realize patent value.

³ https://esg.baidu.com/en/article/Baidu_Baijiahao_Releases_Q2_2021_Content_Governance_Report

「 Case 」

“Protecting Minors Action” Offering a Clean Online Environment

Baidu is committed to regulating web content and fulfilling entity responsibility as an online service provider to optimize both product content and services. Baidu has carried out special actions to create a safe and healthy online environment for minors with sustainable content services.

The protection of minors has consistently been a topic of public concern. Baidu has established a special team to protect minors online. This involves

the addition of a function for reporting “harmful information involving minors” on vertical products and services to rigorously handle such harmful information. Since April 2021, the Duchacha Self-Disciplinary Committee launched the “Protecting Minors Action” in communities, whereby education activities are conducted to keep children safe online, so as to strengthen the attention of community residents, especially parents, on children’s internet safety. The activities were

highly praised by both the community neighborhood committees and residents involved.

As the revised *Law of the People’s Republic of China on the Protection of Minors* went into effect, Baidu partnered with organizations and experts in various fields, and launched special live broadcast activities to promote high quality public welfare content. One of these is the “Protecting Minors with Joint Efforts” thematic activity co-organized by Baidu and the Cyberspace Administration of China (CAC). In terms of the regulation of platform content, Baidu also worked with the Self-regulatory Advertising Platform for Minors to conduct research on specific regulatory measures. The results of which were combined with the AI technology capabilities of Baidu to launch the products and services that are more suitable for juveniles.

In the future, Baidu will continue to improve all links of services relating to the protection of minors. This involves forming a closed loop of safe, reliable, efficient and high-quality user service whilst conveying the kindness of technology and protecting the healthy growth of minors.



The Protecting Minors Action Publicity Picture in a Community

「 Case 」

Baidu Anti-Fraud Publicity Activities

By focusing on users, Baidu strengthens online platform and assumes responsibility whilst comprehensively popularizing anti-fraud knowledge for users to enhance their awareness of self-protection, thus creating a safe cyberspace.

In recent years, telefraud has become one of the fastest growing types of criminal crimes. In September 2021, under the guidance of the National Anti-fraud Center, Baidu set up an anti-fraud center to strengthen the governance of the ecological anti-fraud chain in an all-round manner. Baidu also brings into full play the platform's technical advantages, actively assists the authorities to curb the wave of telecom fraud, and strives for the vision of "no scams on Baidu".

Baidu continuously upgrades the organizational guarantee mechanism, provides full support in such aspects as strategy and algorithm model, improves the monitoring and identification capabilities of the system, and creates a "rapid, efficient, and accurate" early-warning paradigm. **In 2021, Baidu search engine blocked 2.3 million links to fraudulent Apps and 54,000 fraudulent website addresses. Baidu App protected 1379,000 users from installing fraudulent Apps and gave early warnings 1.42 million times.**

On the strength of the technology and platform advantages, Baidu helps public security organs to crack down on telecom fraud cases. In 2021, Baidu cooperated with public security organs across China to fight various telecom fraud cases lurking behind the business lines of Baidu, such as romance scam, fake cyber police and fake lawyers, and illegal game trading. A total of 439 suspects were arrested. After sorting out telecom fraud cases, Baidu organized teams to share the tactics about how to fight telecom fraud with national anti-fraud experts. Baidu gave a detailed introduction to its excellent abilities in such aspects as data and technology, and strived to explore new pathways for the anti-fraud cooperation between police and enterprise.

In addition, Baidu highly values cybersecurity awareness education for users, and continuously organizes publicity activities for the prevention and control of telecom fraud. In 2021, the Duchacha Self-Disciplinary Committee of Baidu launched the "Duchacha Security Protection Plan", in which it, together with the Panyu District People's Government of Guangzhou, the Anti-fraud Center of the Beijing Municipal Public Security Bureau, and the Chinese Communist Youth League committee of Panyu, conducted anti-fraud themed live broadcasts and offline activities to promote anti-fraud knowledge to internet users. This enabled them to better understand the tricks used in online fraud, to achieve the publicity goal of "sharing a safe cyberspace where online frauds are well prevented". This endeavor was launched together with the Panyu District People's Government of Guangzhou, Anti-fraud Center of the Beijing Municipal Public

Security Bureau and Chinese Communist Youth League committee of Panyu. In the live broadcast "Together with Millions of Volunteers, Police and the Public Working together to Crack Down on Online Fraud" held on October 3, 2021, police officers were invited as special guests to explain the tricks employed by cyber criminals and to elaborate the functions and usage of the National Anti-fraud Center APP. Members of Baidu Mobile Party Branch in Guangzhou also shared the cases of online fraud they encountered in their daily work and introduced the channels for reporting fraud cases with the audience.

In 2021, Baidu launched such programs as "Xiaobao Detective", "Xiaobao Talk" and "Xiaobao in Action", in which education on the protection of users' rights was conducted in the form of live broadcasts and short videos. The new series "Guide on Avoiding Online Shopping Scams" was also released, and legal advisers of the Legal Department of Baidu were invited to offer their professional advice. **The Xiaobao series have held nine live broadcasts and delivered over 60 short videos, with a total number of views exceeding 2 million, thus effectively improving users' awareness of consumer rights protection.** On December 24, 2021, Baidu Protection invited Guo Yuzhong, Chief Mediator of the Mediation Center of the Internet Society of China and Chairman of Beijing SunShine Poverty Alleviation and Public Welfare Promotion Center, as well as Chen Chen, Head of the Department of Business Supervision and Senior Legal Manager of Baidu to the "Xiaobao Detective" live broadcast to introduce to the audience the various forms of online frauds and how potential victims can protect their rights.

As the largest Chinese search engine in the world, Baidu is obliged to protect the legitimate rights and interests of users. Looking ahead, Baidu will continue to leverage technological advantages and influence whilst actively cooperating with the anti-fraud publicity campaigns of various regulatory agencies and organizations. This will ensure the construction of a clean cyberspace and make every user assured with safe service experience.

反诈直播活动：《百万志愿行，警民共反诈》活动宣传



Publicity Pictures of Baidu's Anti-fraud Activities

「 Case 」

The “Warm Sun Project” Making Life Easier for the Elderly with Technology

With “enhancing user trust with warm and professional services” as the mission, Baidu is committed to improving user experience and satisfaction, whilst also becoming a leading provider of intelligent service solutions.

As China's elderly population is increasing, Baidu endeavors to solve the challenges the elderly face in the use of intelligent technology and empower them with intelligent elderly care technologies, the aim is to meet their varied needs and enhance their life quality and sense of happiness. In order to cope with the problems senior citizens face when using the internet, Baidu launched the “Warm Sun Project” to offer accompaniment through products and services, both online and offline. The Baidu APP has

been equipped with an elderly-targeted “Warm Sun Hotline”, where a human assistant is available in just one click. The function enables the online and offline combined assistance in a single APP. **Through this function, assistance to over 7,000 senior citizens have been provided by various means, including guidance via telephone, communication through video calls and on-the-spot assistance.** Baidu has also embedded products that are suitable for the aging population in services. For example, the Baidu App (Big Character Version) is designed with simpler and clearer interface and functions, effectively reducing the accessibility barriers for the elderly.

Baidu has received inquiries for the

elderly across the country since the Warm Sun Hotline was opened: Mr. He from Guangdong was assisted to handle his feedback on the e-book purchased on Baidu APP; Mr. Zhang from Shandong was helped to properly use the voice search and input functions equipped with the Baidu App (Big Character Version); Mr. Sun from Suzhou, Jiangsu was aided with his Baidu account login issues; and in Guizhou, Mr. Yang's question was answered on how to use the functions of the Baidu App (Big Character Version).

The “Warm Sun Project” is dedicated to providing the elderly with care and love, making their life easier with technology, and building itself into a service platform that the senior users can rely on and enjoy using.

The Baidu APP has been equipped with an elderly-targeted “Warm Sun Hotline”, where a human assistant is available in just one click. The function enables the online and offline combined assistance in a single APP. Through this function, assistance to over 7,000 senior citizens have been provided by various means, including guidance via telephone, communication through video calls and on-the-spot assistance.

7,000 senior users



The Warm Sun Hotline Function on Baidu APP

「 Case 」

Baidu Granted Multiple AI Innovation Awards

The quality of patents holds the key to high-quality innovation. Baidu highly values and encourages technological innovation, promotes the application of innovative results, further improves intelligence services of products and continues to contribute to the AI industry.

On June 25, 2021, the 22nd China Patent Awards honored **Baidu's patent Human-computer Interaction Method and System Based on Artificial Intelligence (ZL201510563338.2) with a Gold Award**. China Patent Gold Award is the highest award in the field of intellectual property in China. It is jointly awarded by the National Intellectual Property Administration (NIPA) and the World Intellectual Property Organization (WIPO). The Gold Award demonstrates not only the recognition of the core AI technology independently developed by Baidu, but also the high quality and value of the patent. This consolidated the leadership and strengths of Baidu in this field and provided strong support of the high-quality development of the company.

At the Future Technologies Conference (FTC) 2021 organized by iiMedia Consulting Group, **Baidu Input Method won the “2021 Best Artificial Intelligence Innovation Application Platform” award**. According to the *Research Report on the Trend of China's Third-party Mobile Phone Input Method Industry in the First Half of 2021* released by iiMedia Consulting, Baidu Input Method leads the industry with over 600 million monthly active users and more than 1.2 billion voice requests per day. Baidu Input Method has obtained nearly 80 input method-related invention authorized patents,

and innovatively launched many AI functions such as AI intelligent engine, multilingual mixed voice input, intelligent translation, intelligent prediction, AI-assisted chat and AI character creation. This has enabled flexible use in various communication scenarios.

Empowered by AI technology, intelligent interactive applications with conversation interaction as its core and equipped with widely used language, voice, images and other features. The human-machine conversation technology for multimedia information comprehension has become one of the core challenges in the AI industry. It has also been listed as a key generic technology in the *New Generation Artificial Intelligence Development Plan* issued by the State Council. In Baidu's award-winning patent, technologies such as knowledge graph and deep learning are implemented and deep semantic comprehension is used as the basis to realize intelligent human-computer interaction across language, voice, image and other modalities. The

patented technology has been equipped to Baidu Search, Baidu Maps, Xiaodu smart speaker and other products. It has also been implemented through Baidu AI Cloud to facilitate the intelligent upgrade of such industries as telecommunications, energy, finance, municipal services, healthcare and education.

As Liang Zhixiang, Senior VP and Party Secretary of Baidu Group stated: “We believe in the value of innovation and strive to achieve technological independence with high-quality innovation; we also believe in the value and use of high-value patents to stimulate high-quality innovation. With strengthened protection of intellectual property rights, the value of AI patents will be further unleashed to spur innovation”. Looking into the future, Baidu will continue to play the leading role in the AI field, promoting the coordinated development of the entire industry and building AI patents into a new driving force of the intelligent economy.



Baidu Input Method Granted the “2021 Best Artificial Intelligence Innovation Application Platform” Award.

[Case]

Baidu (Shanxi) Artificial Intelligence Data Annotation Center Contributing to the Growth of Regional Digital Economy

By integrating AI into the cultivation of talents for society, Baidu closely combines the concept of digital inclusion with public welfare activities to build a public welfare culture with Baidu's characteristics as well as benefitting community development with technological achievements.

We are committed to building a sustainable AI data service ecosystem and empowering the construction of a regional digital economic system by leveraging Baidu AI Cloud Data Crowdsourcing. At present, we have established a number of AI data annotation centers across the country. Baidu focuses a new type of position, AI Trainer. This enables the laid-off workers in traditional industries to upskill, so as to open up new paths for regional employment and contribute to the creation of tens of thousands of jobs.

Since its operation in 2018, the Baidu

(Shanxi) Artificial Intelligence Data Annotation Center (the Center), jointly established by Baidu and the government in the Shanxi Transformation and Comprehensive Reform Demonstration Zone, has been contributing to increasing employment in the region, as well as promoting gender equality in employment and helping disadvantaged groups finding jobs. **In 2021, The Center had a similar balance of male and female employees, 49.5% and 50.5% respectively,** contributing to gender equality in employment.

Through implementing innovative management models such as personnel training, management empowerment, and business expansion in the centers, we incubate high-tech enterprises for various regions, enhance local entrepreneurial vitality, build regional data industry clusters, and promote industrial upgrading and economic development in the surrounding

areas. We also take our leading advantages in data annotation, leverage short, medium and long-term economic advantages, honor social responsibility and deliver industrial benefits.

In 2021, the centers were successively built in Jinan (Shandong), Linfen (Shanxi), and Fengjie (Chongqing). At present, the centers in Jinan, Linfen and the Baidu (Shanxi) Artificial Intelligence Data Annotation Center have been put into production. **This has equipped with 8,000 AI trainers working every workday.** As of December 31, 2021, **the cumulative output value of the centers had reached RMB 400 million,** effectively promoting the development of the local digital economy. In 2022, Baidu will continue to promote the construction of centers, which are expected to gradually **provide more than 20,000 jobs and train 30,000 AI trainers for the regions involved.**



Employees at the Center

[Case]

AI Technology Empowering Intelligent Epidemic Prevention and Inclusive Medical Care

Baidu is committed to delivering the benefits of AI technology that are brought about in communities and to all aspects of people's lives.

Intelligent Epidemic Prevention

As Covid-19 spreads, Baidu continues to leverage technical strengths to contribute to epidemic prevention and control. Baidu Maps, AI temperature measurement system, and intelligent call-out platform has played their roles in facilitating efficient epidemic prevention and control in 2021. Baidu has also developed a number of series of AI anti-epidemic products based on Baidu Brain and they have been quickly applied.

C-Watcher, a machine learning framework proposed by Baidu is designed to screen every neighborhood in a target city and predict infection risks, prior to the spread of COVID-19 from epicenters to the city, and **the papers describing the framework have been included in AAAI 2021¹**. Baidu has published its patents related to epidemic forecasting method and maximized the accuracy of epidemic forecasting. Baidu is the only internet company that has been awarded the title of **"Advanced Organization of Industrial and Information Systems to Fight the New Coronavirus Epidemic"** issued by the Ministry of Industry and Information

Technology of the PRC. In 2021, Baidu Infocloud launched an **"all-round intelligent epidemic response solution"**, adding a number of epidemic prevention applications and intelligently recommending epidemic prevention knowledge. It helped enterprises to efficiently prevent epidemics with technology and to quickly resume production and work through features such as, but not limited to, entry temperature measurement and reporting, AI infrared temperature measurement software and hardware integration, face mask wearing AI recognition.

AI Empowering Primary Medical Care

In 2019, Baidu launched the AI medical brand Linyi Zhihui. The brand is designed, with the vision of **"evidence-based AI empowering primary medical care"** in mind and against the backdrop of insufficient primary medical care resources and capabilities, to provide four core features – medical knowledge, clinical decision support, intelligent follow-up services and regional health cockpit. Among them, the primary care solution of "Assistance to Doctors" helped improve the quality and effect of diagnosis and treatment whilst minimizing misdiagnosis and missed diagnosis by standardizing the consultation process, providing diagnosis suggestions,

recommending treatment plans, detecting incompatible medications and generating medical records with one click, thus effectively improving the capability of primary medical care.

Linyi Zhihui takes advantage of AI technology to continuously break through technical bottlenecks, deliver medical scenario-based AI capabilities and AI-based comprehensive solutions and launch new products such as medical big data and smart medical records. In 2021, it undertook the National Health and Health Commission's family doctor clinical service capacity building pilot project and was responsible for establishing AI-assisted applications at the primary medical institutions in six pilot counties, municipalities or districts, namely in Jinzhou city, Longhua County, Wen'an County in Hebei Province and Huaiyin District, Yiyuan County and Fei County in Shandong Province. Through these efforts, it facilitated the application of AI technology in the medical industry and contributed to the development of nationally important industries. At present, product solutions of Linyi Zhihui in the field of AI medical care have reached nearly 500 hospitals and 2,500 primary medical institutions in 29 provinces, municipalities and autonomous regions, serving tens of thousands of doctors and benefiting tens of millions of patients.

Establishing AI-assisted applications

at the primary medical institutions in
6 pilot counties, municipalities or districts

Product solutions of Linyi Zhihui in the field of AI medical care have

reached nearly **500** hospitals and **2,500** primary
medical institutions in **29** provinces, municipalities and autonomous
regions



¹ AAAI 2021 | Baidu Proposing C-Watcher: A Framework for Early Detection of High-Risk Neighborhoods <https://zhuanlan.zhihu.com/p/351383625>

[Case]

Intelligent Transportation

Baidu is constantly exploring carbon-reducing technologies in the entire industrial chain. Baidu also focuses on delivering the benefits brought about by technological achievements to the public and promotes the green and low-carbon travel mode empowered by the Mobility as a service (MaaS) one-stop travel service.

With practice in operating the Apollo car robot in the past two years, Baidu has developed the Luobokuaipao mobile platform to provide the public with commercial operations and diversified value-added services. **As of the first half of 2021, the Luobokuaipao service had covered Yizhuang (Beijing), Changsha (Hunan), Cangzhou (Hebei) and Guangzhou, and had served over 400,000 passengers, with a test mileage of more than 14 million kilometers and**

more than 2,900 self-driving related patents.

Innovation in vehicles is just part of the efforts to transform travel mode. To build an efficient and safe travel future in an all-round way requires not only a “smarter” vehicle but also a more “intelligent” road network. In terms of transforming road networks, AI also has a crucial role to play. In 2020, Baidu launched the ACE Intelligent Transportation Engine Version 1.0 through the *Apollo Intelligent Transportation Whitepaper* and released the upgraded version 2.0 (ACE 2.0) in 2021. Besides self-driving and Cooperative Vehicle Infrastructure Systems (CVIS), a MaaS intelligent engine was also integrated into ACE 2.0, incorporating MaaS into the intelligent transportation solution.

At present, Baidu ACE intelligent

transportation is exploring its capabilities in different fields such as intelligent network connection, intelligent traffic management, intelligent expressway, and intelligent parking. **The relevant achievements have been commercialized in nearly 30 cities including Beijing, Shanghai, Guangzhou and Chongqing.** Taking Baoding as a pilot city in Hebei province, Baidu has deployed the AI intelligent transportation information control system at 84 intersections. Based on the AI technology imbedded in the ACE intelligent traffic engine, the system enables traffic lights to identify information such as vehicle type, speed and traffic flow, and calculate the time for vehicles and traffic flow to pass the intersection, so as to achieve efficient management of road conditions and provide smooth traffic for passengers by shortening the average passing time by about 20%¹.



Efficient Management Reducing Traffic Jam by 30%

¹Baidu World Conference 2021: Traffic Lights Flashing Green on CCTV 1: Remarkable Achievements Delivered in Pilot Intelligent Transportation Program in Baoding
https://www.sohu.com/a/484151439_120129306

[Case]

Kaiwu, A Newborn Industrial Internet Brand of Baidu AI Cloud Facilitating the Transformation of China's Industries¹

With a focus on the urgent technological bottlenecks in China's industries, Baidu continuously improves industrial internet technology, provides integrated solutions for enterprises, builds infrastructure in the AI era and accelerates the integration of AI technology and the concept of "Made in China".

At present, enterprises are troubled by high technical barriers in accessing data resources. Baidu AI Cloud Kaiwu, as a representative of Baidu's experience of many years as an internet company, takes "accelerating the intelligent upgrading of the industry" as its mission and relies on the strong foundation Baidu has in the internet community as well as its leading full-stack AI technology to provide "**AI + Industrial Internet**" and intelligent manufacturing and integrated solutions for manufacturing, energy, power and other industries, industrial chains and regional industrial clusters. This aims to help enterprises reduce cost and improve quality and efficiency by leveraging the new generation of IT, industrial and supply chains whilst enhancing coordination and regional industries' realization of digitalization and intelligent upgrading.

Integrated with leading "**integrating cloud and AI**" capabilities, Kaiwu boasts the all-round empowerment capability at the device level.

At device level, Kaiwu can enable the intelligent management, operation and maintenance of devices through connecting them to cloud, using data, and empowering intelligence and equipping the devices with features such as cloud connection, visual management, fault prediction and intelligent

operation and maintenance.

At production level, Kaiwu can enable the optimization of processes and quality links of the production line to "improve quality, reduce cost and enhance efficiency" as well as equipping the production line with features such as intelligent quality inspection, safety inspection, process optimization and energy consumption optimization.

At enterprise level, Kaiwu can empower the optimization of product development, manufacturing, sales, services and other links by leveraging data resources. It can also help enterprises build digital infrastructure such as IoT, big data platforms, maps, knowledge platforms to achieve intelligent operations and management.

At industry and regional level, Kaiwu can enable better collaboration between the upstream and downstream of the supply chains as well as between enterprises and governments to facilitate "industrial digital transformation". It can enable the application of industrial internet platforms in supply and demand matching, capacity sharing, industrial analysis, supply chain finance as well as other scenarios.

At present, Baidu AI Cloud Kaiwu has been selected as a **national-level featured and professional industrial internet platform**. It has been cited as one of the "**first-tier**" national industrial Internet platforms.



Baidu AI Cloud Releasing Kaiwu, a Newborn Industrial Internet Brand

¹ Kaiwu, a Newborn Industrial Internet Brand of Baidu AI Cloud Facilitating the Transformation of China's Industries
<http://caijing.chinadaily.com.cn/a/202105/19/WS60a4760ca3101e7ce9750453.html>

[Case]

Baidu AI Cloud Empowering the Development of the Real Economy with Digital Technologies

Regarding contributing to social and economic development as one of the driving forces for creating value, Baidu is committed to applying digital technology achievements to the development of the real economy. Baidu AI Cloud has formed a unique “Cloud + AI” competitive advantage with “cloud computing as the foundation, AI as the leverage, and important development tracks as a focus”, enabling the development of Baidu’s industrial internet technology capabilities and empowering that of enterprises, industrial chains and regional governments through integrating applications in industrial procurement, production, quality, management and other business scenarios.

Finance: Baidu AI Cloud Serverless Facilitating Financial IT Reform

Although operating expenses have been reduced after going to the Cloud, Baidu AI Cloud launched Serverless to provide computing capability in the form of services

to further meet the needs of enterprises to “achieve zero expense in operation, high resilience and low general cost”. Based on Baidu AI Cloud Tianhe Stack cloud-native and private cloud platform, our bank clients can build a complete serverless functional computing technology architecture. With Tianhe Stack’s function computing products as the core, and by connecting with the bank’s existing distributed and cloud computing technology platform, bank clients can provide a complete function core engine, function management capabilities, and development and delivery capabilities for applications. This accelerates the upgrade of financial-grade cloud platforms.¹ At the “Financial Street Releasing Special Event” of the Annual Conference of Financial Street Forum 2021, Baidu officially released the *Wise Fields to Witness the Future - Regional Banks Digital Transformation White Paper*, which provided a comprehensive summary of the strategic industry solutions of Baidu AI Cloud².

Water: “Water Management Brain” Enabling the Intelligent Upgrading of Water Management

Baidu AI Cloud has launched a “One Platform and Two Core Technologies” solution for the water industry. The solution is integrated with a single big data platform to provide distributed computing, data lake and data visualization technologies, through which the visual management of various production facilities can be achieved. Baidu participated in the development of the “Quanzhou Water Management Brain” and smart water management applications³, through which automatic control, operation and maintenance of the production process of water plants can be achieved. Quanzhou Water Management Brain can accurately identify a safe production environment, and predict water consumption through ML algorithms combined with various factors, thus achieving remote monitoring of the dispatch center and saving on the inspection manpower as well as operation and maintenance costs for Quanzhou Water Group.



The Dispatch Center of Quanzhou Water Co., Ltd.

¹ Implementing | Empowering Financial IT Transformation, Interpreting Baidu AI Cloud Serverless https://mp.weixin.qq.com/s/U51_GXybaU10xJzj6kZvhQ

² At the Annual Conference of Financial Street Forum 2021, Baidu officially released the *Wise Fields to Witness the Future - Regional Banks Digital Transformation White Paper* <https://www.donews.com/news/detail/4/3177606.html>

³ First Hand Experience of Frontline Employees at Quanzhou Water Management Brain: Baidu AI Cloud Leading in Intelligent Management of Water <https://www.leiphone.com/category/smartcity/TgyvZmKQ5iSDt2eJ.html>

[Case]

Baidu AI Cloud Empowering the Development of the Real Economy with Digital Technologies

Manufacturing: Industrial Internet Platforms Facilitating Energy Conservation and Consumption Reduction

In the manufacturing industry, Baidu has launched industrial internet platforms to help the development of new industrialization and fully promote the upgrading of featured industries. In all the production areas of Guizhou Baixun Zhihui Technology Co., Ltd.¹, jointly established by Baidu and Guiyang Economic and Technological Development Zone, AI security inspections are deployed to conduct real-time monitoring of each area by leveraging the industrial internet platform's temperature and humidity monitoring analysis functions. Through the platform, control and analysis of energy consumption can be achieved on the cloud to offer guidance on effectively saving energy and reducing consumption, and to prevent abnormal situations such as transformer overload, thus ensuring the safe operation of equipment.

Textiles: AIoT Enabling Intelligent Energy Management in the Textile Industry

Baidu AI Cloud launched the AIoT intelligent solution and successfully built an AIoT intelligent energy management service platform for the textile industry. In response to the needs of Zhejiang Mizuda Textile Printing & Dyeing Co., Ltd (Mizuda) to "achieve cost control in energy consumption through multi-dimensional analysis of data measurement", Baidu customized an intelligent energy management model² for it. Through close cooperation with Baidu AI Cloud, Mizuda has realized comprehensive intelligent energy management and control from quality inspection to production control. The real-time information on on-site energy use, the analysis of data on quality and data on energy consumption are also displayed on the platform, ensuring the stability of production processes whilst monitoring carbon emissions. This sets a new benchmark for intelligent production and energy efficiency management in the traditional manufacturing industry.



AIoT Intelligent Energy Management Service Platform



Guiyang Big Data Security Industry Exhibition Center

¹ Guizhou Baixun Zhihui: AI Industrial Internet Platform Empowering "Guizhou Intelligent Manufacturing". http://gjz.app.todayguizhou.com/news/news-news_detail-news_id-11515115739285.html

² AIoT Enabling Intelligent Textile Industry: Baidu AI Cloud Upgrading Mizuda's Energy Management. https://mp.weixin.qq.com/s/qlcoxl_CZjpISYqu8XIIlRQ

Contributing to Society

Our Performance

- Philanthropy
- AI for Social Good

Our Practices

- Case



Contributing to Society

As a responsible company, upholding the social responsibility concept of “Do Better with Tech”, Baidu has been committed to social causes and philanthropy, fully leveraging industrial strengths and empowering social sustainable development with AI technology.

Philanthropy

◇ Digital Education

Taking industrial practice as the start, Baidu has established Baidu Pinecone Academy, an AI talent training platform, built in a close collaboration mechanism with the Ministry of Education, and actively carried out collaborative talent cultivation projects of industry-university collaboration.



Ministry of Education

- » Supporting the industry-university collaborative education project for seven consecutive years, investing a total of more than 10 million yuan as teaching and research funds, and accumulating many excellent cases for AI teaching reform, AI innovation and entrepreneurship, and AI teacher training.
- » Organizing competitions with the Computer Specialty Teaching Steering Committee of the Ministry of Education, Software Engineering Education Steering Committee, University Computer Course Teaching Steering Committee, Computer Education Research Association, and other organizations whilst assisting in teacher training.

Baidu has partnered with information technology associations for cultivating AI talents.



Information technology associations

- » **Association for Computing Machinery (ACM)**
Entering into a strategic collaboration agreement with ACM China Branch and becoming the strategic partner of ACM TURC.
- » **China Computer Federation (CCF)**
Supporting “CCF-IEEE CS Young Scientist Award” and jointly setting up the “CCF-Baidu Pinecone Fund” to build industry-university-research collaboration and academic exchange platform for young scholars from universities and research institutes at home and abroad.
- » **The Alliance of Emerging Engineering Education for Information Technologies**
Jointly establishing the AI Collaborative Education Working Committee and the Intelligent Driving Collaborative Education Working Committee.

Organizing training sessions for teachers and building the Deqing AI talent training base.

Baidu has invested in AI teaching materials, training platforms, data and computing power, algorithms, engineers and other resources, and carried out strategic collaboration with universities in scientific research, discipline co-construction, talent training, campus activities and other aspects. At present, Baidu has signed university-level strategic collaboration and college-level cooperation agreements with more than 100 universities.

University-level strategic cooperative universities

Tsinghua University, Peking University, Zhejiang University, University of Science and Technology of China, University of Chinese Academy of Sciences, Nanjing University, Tongji University, Harbin Institute of Technology, Tianjin University, Xi'an Jiaotong University

College-level deep cooperative universities

Renmin University of China, Fudan University, Wuhan University, University of Electronic Science and Technology of China, Nankai University, Southeast University, Hunan University, Central South University, Sichuan University, Jilin University, Chongqing University, Beijing Institute of Technology, China Agricultural University, etc.

Partner Universities of Baidu

According to the characteristics of different groups of people, Baidu customized the AI skills education path, equipped targeted teaching materials, organized online and offline training courses and events for teenagers, students and teachers in universities and colleges, AI beginners, intermediate developers and advanced developers.

For teenagers, Baidu insisted on the cultivation of interest, supplemented by competitions and practices, carrying out AI enlightenment education. Based on the characteristics of primary and secondary school students, Baidu has compiled course materials and launched online courses on learning platforms.

Baidu has carried out deep collaboration with colleges and universities. On the one hand, we empower teachers, compile industry-university-research teaching materials, and carry out training activities for teachers. On the other hand, we organize learning communities for university students and carry out special training programs. We provide special courses including "PaddlePaddle AI Studio"¹, "Apollo"² and "Hyperlink"³ in learning communities and regularly hold the "International Knowledge Center for Engineering Science and Technology (IKCEST)", the "China Collegiate Computing Contest — Artificial Intelligence Innovation Contest", the "Baidu Star (Astar) Competition" and other AI technical competitions. In addition, we have set up Baidu Scholarship to discover young AI talents and provide a platform for industry-university-research collaboration.

For social AI developers, Baidu has teamed up with well-known universities and excellent lecturers to provide differentiated

learning resources for junior, mid-level and advanced developers on the PaddlePaddle platform. Baidu offers basic courses for junior developers such as the seven-day PaddlePaddle camp. For mid-level developers, there is the establishment of communities including special interest groups for PaddlePaddle and carries out offline communication activities whilst providing special learning courses to facilitate efficient collaboration among intermediate developers in special fields. For advanced developers, we put in place special training programs such as the technical expert program for PaddlePaddle developers and the training program for chief AI architect of AICA to provide a platform for development and communication. In addition, Baidu has set up free AI skill improvement courses on the platform of PaddlePaddle AI Studio and invites Baidu experts and industry professionals to share their professional knowledge and skills daily.

Baidu has established university-level strategic collaboration and college-level deep collaboration with more than **100** universities



◆ Charitable Donations

Relying on our own technology and resources, we established Baidu Public Welfare Platform, helped public welfare organizations to promote projects free of charge and set up online fund-raising channels to encourage the public to participate in charitable activities. By the end of 2021, the platform had served a total of 379 public welfare organizations, driving more than 740,000 people to pay attention to donations, with fundraising amount exceeding RMB 23.56 million.

"Hello World" is a public welfare project initiated by Baidu employees. In 2021, Baidu employees donated more than RMB 450,000 and 11,478 books to society.

In 2021, Baidu's charitable donations totaled RMB 198.045 million, including RMB 90 million for affected areas by flood in Henan, RMB 50 million for those in Shanxi, and RMB 58.045 million for others. The total amount of material donations of Baidu reached RMB 23.8902 million, including 200 fundus cameras and 10 sets of "Assistance to Doctors" primary medical solutions of Lingyi Zhihui.

In 2021, Baidu's charitable donations

totaled RMB **198.045** million



The total amount of material donations

reached RMB **23.8902** million

¹ Baidu PaddlePaddle AI Studio platform is a premium venue for over 5,000 courses with a duration of over 600 hours and more than 140,000 open class users. Website: <https://aistudio.baidu.com/aistudio/course>

² Baidu Apollo Developer Center offers 25 autopilot-related courses from entry level to practice level for university and college students. Website: <https://aistudio.baidu.com/aistudio/course?lang=en>

³ Baidu SuperChain Platform offers a total of 16 class-hour blockchain related courses for colleges and universities. Website: <https://developer.apollo.auto/developer.html>

AI for Social Good

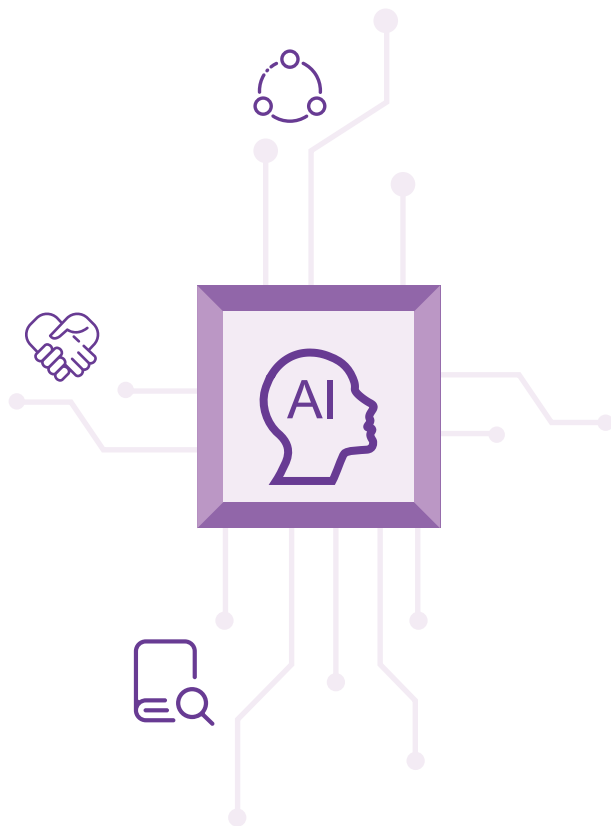
◇ AI Ecological Construction

Baidu, adhering to the “Four Principles of AI Ethics” (see page 44 of the *Baidu 2020 Environmental, Social and Governance (ESG) Report*⁴ for further details), is committed to building an open and inclusive AI ecology, and partnering with industry players, scientific research institutions, social organizations, as well as other stakeholders to jointly promote the AI ecological construction.

Baidu, adhering to the “human-centered” AI ethical principle, actively participates in and improves the standard formulation of AI ethics, participates in the Artificial Intelligence for Sustainable Development Goals (AI4SDGs) public welfare research plans and international cooperation networks while funding their research projects. In 2021, Baidu received certificate granted by the AI Governance and Trust Committee

of Artificial Intelligence Industry Alliance (AIIA) to jointly build a healthy and credible AI ecology together with industry peers.

With the concept of “Everyone Can AI”, Baidu open-sourced AI-related technology tools and has launched several open-source platforms such as PaddlePaddle, a deep learning open-source platform, and Apollo autonomous driving platform. At the same time, Baidu has developed open-source institutional documents to open-source internal projects and ensures open-source compliance and respects intellectual property rights of third-parties. Baidu has developed and opened source the industry’s first FaceShifter detection tool, which effectively cracks down on deep synthesis technology with deep learning convolutional neural network, providing recognition accuracy up to 99% as well as strong technical support for blocking telecom network fraud and other crimes.



The recognition accuracy of AI FaceShifter detection tool hit

99%



Baidu has built a sustainable AI data service ecology relying on Baidu Data Crowdsourcing Platform, empowering regional digital economic system construction and promoting equal employment. At present, after the successful construction of Baidu (Shanxi) Artificial Intelligence Data Annotation Center, Baidu has cooperated with Zhangqiu (Shandong province), Fengjie (Chongqing municipality), Linfen (Shanxi province) and Dazhou (Sichuan province) to build bases, providing more than 25,000 full-time jobs.

Baidu Artificial Intelligence Data Annotation Center provided more than

25,000 full-time jobs



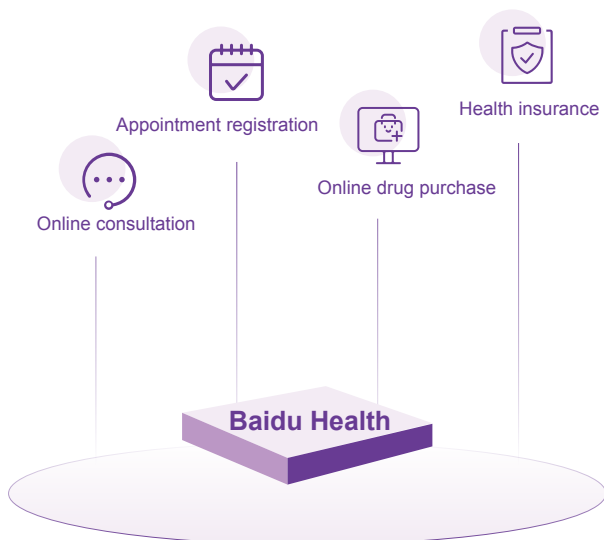
⁴ https://esg.baidu.com/en/article/Baidu_2020_Environmental_Social_and_Governance_Report

◆ AI for Better Life

Baidu constantly applies new technologies to social scenarios in order to benefit the public in response to the pain points of social needs. We launched the “Baidu Stars Plan”, and actively promoted the application and implementation of AI and other important technologies in the field of social responsibility through the technical capability sharing, huge traffic sharing, ecological resources sharing and financial support.

Baidu continues to build a benchmark for smart elderly care through the Baidu Wufu AI Senior Care Platform⁵. This, utilizing the data management and centralized control analysis, connects the elderly with the community, and forms a closed-loop service system with the offline courier community to meet the needs of the elderly. We also developed the “Care Version” of Baidu Maps⁶, the first independent map App dedicated to the elderly. It addresses problems of elderly users when they have poor sight, difficulty in using Chinese Pinyin and typing by handwriting on the basis of retaining the core functions of the map.

Baidu is also changing everyone's lifestyle through products such as Baidu APP Intelligent Searching, Baidu Health Medical Code and Xiaodu intelligent terminals. Baidu, with medical professional problems of higher level in mind, has built “Baidu Health”. This is a one-stop health management platform that partners with top medical resources at home and abroad to jointly build an authoritative medical content ecology. The platform integrates online consultation, appointment registration, online drug purchase, health insurance and other services, so that users can easily obtain reliable knowledge and services.



In addition to providing users and families with inclusive convenient and intelligent life experience, Baidu also continues to empower the environment and social sustainable development with AI. Tapping into original and constantly exploring new application fields, with fruitful contributions made in fighting against COVID-19. Baidu promotes autonomous driving and inclusive medical care. The Company also applies AI technology to cultural inheritance, biodiversity protection, addressing daily difficulties for the disabled, analysis assistance and training adjustment.

For example

- » Under the empowerment of NLP tools of Baidu PaddlePaddle, we have completed the automatic generation of dictionary for endangered languages of ethnic minorities⁷, and cooperated with ICOMOS CHINA to create an intelligent model to assist the heritage conservation team in monitoring and maintaining heritage sites.
- » We built a special image recognition model based on PaddlePaddle with the International Fund for Animal Welfare to block the illegal trade of wild animals via network channel⁸, and solved the problem of planting and maintenance of psammophytes in complex desert scenarios with PaddlePaddle deep learning image technology.
- » The ScanScan App supported by iOCR technology of Baidu made AI become the eyes of the visually impaired.
- » We created a “3D+AI” auxiliary diving training system for diving teams, which presents the complex movements in figures upon big data analysis, intelligently marks the movements, and feeds back the scores to the coaches and the athletes⁹.

In terms of promoting industrial intelligence, we have deeply cooperated with enterprises in water, electric power, manufacturing, agriculture, regional economy, finance, city, and port industries via “Kaiwu”, an industrial Internet brand released by Baidu AI Cloud. We explore more possibilities to empower intelligent energy efficiency management with AI to help enterprises enhance competitiveness through cost reduction and efficiency improvement.

⁵Focusing on Baidu World 2021, the Company built a benchmark for smart elder care through the Baidu Wufu AI Senior Care Platform. <http://www.iheima.com/article-321021.html>

⁶The “Care Version” of Baidu Maps is formally released, which has been optimized the contents and features to provide senior users with convenience. <https://www.dsb.cn/162691.html>

⁷Generating a dictionary for endangered languages of ethnic minorities with PaddlePaddle. <https://mp.weixin.qq.com/s/ZhDPKUS65Q5-Cuyrw6V0Kq>

⁸AI to protect the world. <https://mp.weixin.qq.com/s/Qq0IV3SKQpALWC41KC9m8g>

⁹Chinese Diving Team, the greatest of all time! Baidu AI Cloud supporting the dream pursuers! <https://mp.weixin.qq.com/s/pKRZPPieFIA9mwLDPFGadQ>

「Case」

Baidu Promoting AI Education in Primary and Secondary Schools

In the AR and VR era, Baidu is committed to providing high-quality digital education to the younger generation and cultivating future-oriented AI talents. To this end, Baidu Pinecore Academy takes into account the characteristics of the K12 population and fully promotes the popularization of AI education for teenagers with a method focused on cultivating interests and supplemented by AI related competitions.

Compilation of AI Textbooks for Primary and Secondary School Students

By developing AI textbooks for primary and secondary school students, Baidu aims to explore more AI technological stars. Learning AI with Monkey King, the first AI textbook Baidu has compiled for the young, combined with EasyDL, Baidu's AI development Platform for beginners, serves as an online AI education platform for young people to acquire

knowledge about AI. The two extra-curricular reading materials developed by Baidu - *Enthusiastic Learners* "AI Guide and *Jiang Ziya* Practicing AI were published at the end of 2021 successively. They are expected to be included in the recommended reading list for the "Adolescent AI Application and Innovation Ability Evaluation" organized by the China Software Industry Association.

AI Courses for Primary and Secondary School Students

In addition to online education, Baidu also promotes offline AI education in schools. In 2021, together with the Beijing Municipal Education Commission and Beijing Fendou Primary School, Baidu offered a comprehensive AI Literacy course at primary schools. A total of 65 *primary school students from third to sixth grade attended the course. The Baidu Foundation*, together with the United Nations Development Programme

(UNDP), Beijing Normal University and curriculum experts from the International Baccalaureate (IB) jointly launched a public welfare project for youth leadership in the AI era - "Baidu Foundation Youth AI Education Project", that aims to improve AI awareness and literacy amongst young people aged between 12 to 25 years old. The project was first implemented in Beijing Shangdi Experimental School on September 13, 2021.

Baidu Star - Little Star

In order to stimulate the enthusiasm to learning of young AI talent, Baidu created the "Little Star Award" for students in secondary school and the Baidu Star Programming Contest 2021. In the semi-finals and finals, we specifically set up a dedicated channel for young adolescents with lower entry requirements to provide them a chance to show off their skills.



Enlightenment AI Textbooks for Primary and Secondary School Students



Little Star Competition

「 Case 」

Baidu Empowering College Teachers

AI is a major part of new infrastructure. With society currently facing a shortage of AI talents, Baidu uses industrial advantages to actively empower AI teachers in colleges by providing them with more knowledge about digital technology.

To this end, Baidu compiled AI books such as the *Introduction to Application of Deep Learning*, *Autonomous Driving Technology Series*, *Machine Learning Practice*, *Natural Language Processing Practice* and *Computer Vision Practice*.

Baidu has cooperated with colleges to carry out a series of trainings, including the Baidu Deep Learning Teacher Training, Baidu Cloud Intelligence Education Teacher Training and Apollo Teacher Training to enable college teachers to enhance their AI teaching capabilities. Baidu shared the most cutting-edge enterprise AI technology application cases during the sessions according to the needs of the teachers. This aided them in improving the practical ability of AI technology.

As of December 31, 2021, **Baidu held a total of 26 sessions of Deep Learning Teacher Training, training more than 3,000 AI-related professional teachers from more than 700 universities for free. Baidu also held 13 sessions of the Apollo Intelligent Connected Vehicle (ICV) Teacher Training, training more than 1,000 teachers for over 370 universities.**



The Apollo Teacher Training



The Cloud Intelligence Education Teacher Training

「Case」

Baidu Organizing Learning Communities in Colleges

The advance of technology would be an illusion without the continuous supply of AI talents. Over the years, Baidu has been popularizing knowledge about digital technology and cooperating with colleges to cultivate AI talents that are needed in the future.

Baidu Campus Elite Club is an AI learning organization specially established for college students. **As of now, the club has attracted over 700 students with a technology background and its core members**

are from 79 universities in China, 55 out of which were selected in the list of Double First-Class initiative. Since 2016, Baidu and Xi'an Jiaotong University have jointly established an elite class for colleges and universities to cultivate future talent in big data and AI applications. **As of the end of 2021, the elite class had been held for five consecutive sessions, attracting more than 700 students to sign up and enrolled a total of 233 students.**

Baidu has also launched a number of

AI talent training programs. In 2015, Baidu and the University of Science and Technology of China jointly launched a college student innovation and entrepreneurship training program to help student teams realize their entrepreneurial dreams. In the program, Baidu invited experts from enterprises and colleges to coach students and also provided funding for student teams. At present, the program has been successfully held for six sessions, with thousands of college students participated. It has become a “dream booster” for college students.



Entrepreneur Growth Plan for National College Students

「 Case 」

Public Welfare Activities Initiated by Baidu Employees

As a responsible enterprise, Baidu is committed to fostering a favorable environment for employees to engage in public welfare activities. Through the “Hello World” public welfare program, Baidu employees donated a library for children from ethnic minorities in the Garze Tibetan Autonomous Prefecture, Sichuan Province in 2021. The library was named “Cloud over Mountains”. They also donated 11,478 books to

children from ethnic minorities in Sichuan and Qinghai.

Baidu has set up a dedicated section, Hello World, for every employee to make donations. Every employee can contribute to Hello World in their own way. The library donated by Baidu gets its name, Cloud Over Mountains, from the brainstorm among over 30,000 Baidu employees. Cloud Over Mountains,

inspired by the name of the training classroom of Baidu building, conveys our wish that the children from ethnic minorities can change their future by immersing themselves in reading and exploring the unknown world.

Donated **11,478**
books to children from ethnic
minorities in Sichuan and Qinghai



Sign of the Cloud over Mountains Library

[Case]

Baidu Providing Disaster Relief and Helping Post-Disaster Reconstruction

Baidu cares about social concerns and is dedicated to public welfare activities. Facing sudden disasters, Baidu reacts quickly and sends supplies to affected areas as soon as possible.

Baidu Contributing to Henan's Fight against Floods

Henan suffered a once-in-a-century flood disaster in July 2021. Baidu immediately pulled together resources and supported Henan to navigate through the disaster. On July 21, Baidu Foundation donated a total of RMB 90 million to provide disaster relief materials such as daily necessities to the disaster-stricken areas in Henan with the aim of ensuring that the basic living needs of the victims were met. Baidu, in response to the idea of experts at the China Association for Disaster & Emergency Rescue Medicine that "with a severe disaster comes a major plague", donated disinfectants and free medical supplies to the medical rescue teams, disinfection medical staff and volunteers. Baidu also launched an "Assistance in Henan Floods" emergency channel on products, including Baidu APP, Baidu Tieba, Baidu Health Medical Dictionary, Haokan Video and Baidu Maps, to accurately connect information for help and assistance resources.

By leveraging the advanced AI technology, Baidu contributed to the reconstruction of the disaster-stricken areas. Following the development of a special reconstruction plan, Baidu worked with the China Internet Development Foundation and other organizations to upgrade areas such as healthcare, smart transportation and

intelligent industries in the disaster-hit areas according to the concept of providing a digital platform for people's livelihood and three specialized digital training classes for talents. The efforts, on one hand, have helped the disaster-stricken areas to speed up the process of resuming work and production, and on the other hand, provided a digital talent pool for the sustainable development of Henan.

Baidu Foundation donated

RMB **90** million
to affected areas
by flood in Shanxi



Baidu Sending Donations to Henan

Baidu Contributing to Shanxi's Fight against Floods

In October 2021, Baidu Foundation made an emergency donation of RMB 50 million to help Shanxi navigate through severe flooding, 15 million of which was donated

to the five most severely affected cities: Taiyuan, Jinzhong, Linfen, Yangquan, and Yuncheng to help the local governments and residents fight the disaster. In addition to donating money, Baidu also donated cotton-padded clothes, quilts, blankets and other materials to meet the basic needs of victims. When the disaster-hit areas were to be rebuilt, Baidu Foundation donated RMB 45 million for the reconstruction of roads, houses and historic buildings in 18 severely affected cities and counties including Yangquan, Linfen, Jincheng and Zhongyang, helping the people affected to resume normal production and life as soon as possible.

Baidu Foundation made an emergency donation of

RMB **50** million to affected
areas by flood in Shanxi

Baidu Foundation donated RMB 45 million for the reconstruction of roads, houses and historic buildings in 18 severely affected cities and counties including Yangquan, Linfen, Jincheng and Zhongyang

RMB **45** million

18 severely
affected cities and counties



Appendix

◇ HKEX ESG Index

ESG Indicator		Location
Environmental		
Aspect A1: Emissions	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer	Promoting Green Ideas 04,07
	A1.1 The types of emissions and respective emissions data.	Promoting Green Ideas 04
	A1.2 Direct (Scope 1) and energy indirect (Scope 2) greenhouse gas emissions (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	Promoting Green Ideas 04
	A1.3 Total hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	Promoting Green Ideas 04, 08
	A1.4 Total non-hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	Promoting Green Ideas 04, 08
	A1.5 Description of emissions target(s) set and steps taken to achieve them.	Promoting Green Ideas 03, 05-07
	A1.6 Description of how hazardous and non-hazardous wastes are handled, and a description of reduction target(s) set and steps taken to achieve them.	Promoting Green Ideas 08
Aspect A2: Use of Resources	General Disclosure Policies on the efficient use of resources, including energy, water and other raw materials.	Promoting Green Ideas 04, 07
	A2.1 Direct and/or indirect energy consumption by type (e.g. electricity, gas or oil) in total (kWh in '000s) and intensity (e.g. per unit of production volume, per facility).	Promoting Green Ideas 04
	A2.2 Water consumption in total and intensity (e.g. per unit of production volume, per facility).	Promoting Green Ideas 04
	A2.3 Description of energy use efficiency target(s) set and steps taken to achieve them.	Promoting Green Ideas 03, 05-07
	A2.4 Description of whether there is any issue in sourcing water that is fit for purpose, water efficiency target(s) set and steps taken to achieve them.	Promoting Green Ideas 06-08
	A2.5 Total packaging material used for finished products (in tonnes) and, if applicable, with reference to per unit produced.	Not applicable
Aspect A3: The Environment and Natural Resources	General Disclosure Policies on minimising the issuer's significant impacts on the environment and natural resources.	Promoting Green Ideas 04, 07
	A3.1 Description of the significant impacts of activities on the environment and natural resources and the actions taken to manage them.	Promoting Green Ideas 05-16
Aspect A4: Climate Change	General Disclosure Policies on identification and mitigation of significant climate-related issues which have impacted, and those which may impact, the issuer.	Promoting Green Ideas 01
	A4.1 Description of the significant climate-related issues which have impacted, and those which may impact, the issuer, and the actions taken to manage them.	Promoting Green Ideas 01-03
Social		
Aspect B1: Employment	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to compensation and dismissal, recruitment and promotion, working hours, rest periods, equal opportunity, diversity, anti-discrimination, and other benefits and welfare	Nurturing Talents 01,03-04
	B1.1 Total workforce by gender, employment type (for example, full- or part-time), age group and geographical region.	Nurturing Talents 02-03
	B1.2 Employee turnover rate by gender, age group and geographical region.	Nurturing Talents 02
Aspect B2: Health and Safety	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to providing a safe working environment and protecting employees from occupational hazards.	Nurturing Talents 04
	B2.1 Number and rate of work-related fatalities occurred in each of the past three years including the reporting year.	Nurturing Talents 04
	B2.2 Lost days due to work injury.	/
	B2.3 Description of occupational health and safety measures adopted, and how they are implemented and monitored.	Nurturing Talents 04

ESG Indicator		Location
Environmental		
Aspect B3: Development and Training	General Disclosure Policies on improving employees' knowledge and skills for discharging duties at work. Description of training activities.	Nurturing Talents 05
	B3.1 The percentage of employees trained by gender and employee category (e.g. senior management, middle management).	Nurturing Talents 05
	B3.2 The average training hours completed per employee by gender and employee category.	Nurturing Talents 05
Aspect B4: Labour Standards	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to preventing child and forced labour.	Nurturing Talents 01
	B4.1 Description of measures to review employment practices to avoid child and forced labour.	Nurturing Talents 01
	B4.2 Description of steps taken to eliminate such practices when discovered.	Nurturing Talents 01
Aspect B5: Supply Chain Management	General Disclosure Policies on managing environmental and social risks of the supply chain.	Enhancing Corporate Governance 04
	B5.1 Number of suppliers by geographical region.	Enhancing Corporate Governance 04
	B5.2 Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, and how they are implemented and monitored.	Enhancing Corporate Governance 04
	B5.3 Description of practices used to identify environmental and social risks along the supply chain, and how they are implemented and monitored.	Enhancing Corporate Governance 04
	B5.4 Description of practices used to promote environmentally preferable products and services when selecting suppliers, and how they are implemented and monitored.	Enhancing Corporate Governance 04
Aspect B6: Product Responsibility	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to health and safety, advertising, labelling and privacy matters relating to products and services provided and methods of redress.	Improving Services 01-03
	B6.1 Percentage of total products sold or shipped subject to recalls for safety and health reasons.	Not applicable
	B6.2 Number of products and service-related complaints received and how they are dealt with.	Improving Services 04
	B6.3 Description of practices relating to observing and protecting intellectual property rights.	Improving Services 05-06
	B6.4 Description of quality assurance process and recall procedures.	Improving Services 01-03
	B6.5 Description of consumer data protection and privacy policies, and how they are implemented and monitored.	Building Trust 06-10
Aspect B7: Anti-corruption	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to bribery, extortion, fraud and money laundering. ¹	Enhancing Corporate Governance 02-04, Nurturing Talents 06
	B7.1 Number of concluded legal cases regarding corrupt practices brought against the issuer or its employees during the reporting period and the outcomes of the cases.	Nurturing Talents 06
	B7.2 Description of preventive measures and whistle-blowing procedures, and how they are implemented and monitored.	Enhancing Corporate Governance 02-04, Nurturing Talents 06
	B7.3 Description of anti-corruption training provided to directors and staff.	Nurturing Talents 06
Aspect B8: Community Investment	General Disclosure Policies on community engagement to understand the needs of the communities where the issuer operates and to ensure its activities take into consideration the communities' interests.	Contributing to Society 01-04
	B8.1 Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport).	Contributing to Society 01-04
	B8.2 Resources contributed (e.g. money or time) to the focus area.	Contributing to Society 02

◇ GRI Standard Index

Disclosure	Description	Chapters	Pages
GRI 101: Foundation			
GRI 102: General Disclosures			
Organizational Profile			
102-1	Name of the organization	About Baidu	About Baidu 03
102-2	Activities, brands, products, and services	About Baidu	About Baidu 03
102-3	Location of headquarters	About Baidu	About Baidu 03
102-4	Location of operations	About Baidu	About Baidu 03
102-6	Markets served	About Baidu	About Baidu 03
102-7	Scale of the organization	About Baidu	About Baidu 03
102-8	Information on employees and other workers	Talent First	Nurturing Talents 01
102-9	Supply chain	Compliant Operations	Enhancing Corporate Governance 04
102-11	Precautionary Principle or approach	Compliant Operations	Enhancing Corporate Governance 03
102-12	External initiatives	About This Report	About This Report 01
102-13	Membership of associations	Cybersecurity	Building Trust 04
Strategy			
102-14	Statement from senior decision-maker	Company Statement	Company Statement 02
102-15	Key impacts, risks, and opportunities	Company Statement	Company Statement 02
Ethics and Integrity			
102-16	Values, principles, standards, and norms of behavior	Compliant Operations	Enhancing Corporate Governance 03
102-17	Mechanisms for advice and concerns about ethics	Compliant Operations	Enhancing Corporate Governance 03
Governance			
102-18	Governance structure	ESG Management	Enhancing Corporate Governance 01
102-19	Delegating authority	ESG Management	Enhancing Corporate Governance 01
102-20	Executive-level responsibility for economic, environmental, and social topics	ESG Management	Enhancing Corporate Governance 01
102-21	Consulting stakeholders on economic, environmental, and social topics	Communicating with Stakeholders	Communicating with Stakeholders 07
102-22	Composition of the highest governance body and its committees	Compliant Operations	Enhancing Corporate Governance 02
102-23	Chair of the highest governance body	Compliant Operations	Enhancing Corporate Governance 02
102-24	Nominating and selecting the highest governance body	Compliant Operations	Enhancing Corporate Governance 02
102-25	Conflicts of interest	Compliant Operations	Enhancing Corporate Governance 02
102-26	Role of highest governance body in setting purpose, values, and strategy	Compliant Operations	Enhancing Corporate Governance 01-02
102-27	Collective knowledge of highest governance body	Compliant Operations	Enhancing Corporate Governance 02
102-28	Evaluating the highest governance body's performance	Compliant Operations	Enhancing Corporate Governance 01
102-29	Identifying and managing economic, environmental, and social impacts	ESG Management	Enhancing Corporate Governance 01

Disclosure	Description	Chapters	Pages
102-30	Effectiveness of risk management processes	Compliant Operations	Enhancing Corporate Governance 03
102-31	Review of economic, environmental, and social topics	ESG Management	Enhancing Corporate Governance 01
102-32	Highest governance body's role in sustainability reporting	ESG Management	Enhancing Corporate Governance 01
102-33	Communicating critical concerns	Communicating with Stakeholders	Communicating with Stakeholders 07
102-34	Nature and total number of critical concerns	Materiality Assessment	Materiality Assessment 08
102-35	Remuneration policies	Talent First	Nurturing Talents 04
Stakeholder Engagement			
102-40	List of stakeholder groups	Communicating with Stakeholders	Communicating with Stakeholders 07
102-41	Collective bargaining agreements	Communicating with Stakeholders	Communicating with Stakeholders 07
102-42	Identifying and selecting stakeholders	Communicating with Stakeholders	Communicating with Stakeholders 07
102-43	Approach to stakeholder engagement	Communicating with Stakeholders	Communicating with Stakeholders 07
102-44	Key topics and concerns raised	Communicating with Stakeholders	Communicating with Stakeholders 07
Reporting Practice			
102-45	Entities included in the consolidated financial statements	About This Report	About This Report 01
102-46	Defining report content and topic Boundaries	About This Report	About This Report 01
102-47	List of material topics	Materiality Assessment	Materiality Assessment 08
102-48	Restatements of information	About This Report	About This Report 01
102-49	Changes in reporting	About This Report	About This Report 01
102-50	Reporting period	About This Report	About This Report 01
102-51	Date of most recent report	About This Report	About This Report 01
102-52	Reporting cycle	About This Report	About This Report 01
102-53	Contact point for questions regarding the report	About This Report	About This Report 01
102-54	Claims of reporting in accordance with the GRI Standards	About This Report	About This Report 01
102-55	GRI content index	Appendix	Appendix 03-08
102-56	External assurance	Appendix	Appendix 13
GRI 103: Management Approach 2016			
General requirements for reporting the management approach			
103-1	Explanation of the material topic and its Boundary	Materiality Assessment	Materiality Assessment 08
103-2	The management approach and its components	Materiality Assessment	Materiality Assessment 08
103-3	Evaluation of the management approach	Materiality Assessment	Materiality Assessment 08

Disclosure	Description	Chapters	Pages
Topic-Specific Disclosures			
Economic			
GRI 204: Procurement Practices			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Compliant Operations	Enhancing Corporate Governance 04
	103-2 The management approach and its components	Compliant Operations	Enhancing Corporate Governance 04
	103-3 Evaluation of the management approach	Compliant Operations	Enhancing Corporate Governance 04
GRI 205: Anti-corruption			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Compliant Operations	Enhancing Corporate Governance 03
	103-2 The management approach and its components	Compliant Operations	Enhancing Corporate Governance 03
	103-3 Evaluation of the management approach	Compliant Operations	Enhancing Corporate Governance 03
205-1	Operations assessed for risks related to corruption	Compliant Operations	Enhancing Corporate Governance 04
205-2	Communication and training about anti-corruption policies and procedures	Professional Ethics	Enhancing Corporate Governance 03-04, Nurturing Talents 06
205-3	GRI 103: Management Approach 2016	Professional Ethics	Nurturing Talents 06
GRI 206: Anti-competitive Behavior			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Compliant Operations	Enhancing Corporate Governance 03
	103-2 The management approach and its components	Compliant Operations	Enhancing Corporate Governance 03
	103-3 Evaluation of the management approach	Compliant Operations	Enhancing Corporate Governance 03
Environmental			
GRI 302: Energy			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Green Operations	Promoting Green Ideas 04
	103-2 The management approach and its components	Green Operations	Promoting Green Ideas 04-07
	103-3 Evaluation of the management approach	Green Operations	Promoting Green Ideas 04
302-1	Energy consumption within the organization	Green Operations	Promoting Green Ideas 04
302-2	Energy consumption outside of the organization	Green Operations	Promoting Green Ideas 04
302-3	Energy intensity	Green Operations	Promoting Green Ideas 04
302-4	Reduction of energy consumption	Green Operations	Promoting Green Ideas 05-07
302-5	Reduction in energy requirements of products and services	Green Products and Services	Promoting Green Ideas 05-12
GRI 303: Water			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Green Operations	Promoting Green Ideas 04
	103-2 The management approach and its components	Green Operations	Promoting Green Ideas 04-08
	103-3 Evaluation of the management approach	Green Operations	Promoting Green Ideas 04
303-1	Water withdrawal by source	Green Operations	Promoting Green Ideas 04
303-3	Water recycled and reused	Green Operations	Promoting Green Ideas 06,08

Disclosure	Description	Chapters	Pages
GRI 305: Emissions			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Green Operations	Promoting Green Ideas 03-04
	103-2 The management approach and its components	Green Operations	Promoting Green Ideas 03-07
	103-3 Evaluation of the management approach	Green Operations	Promoting Green Ideas 03-04
305-1	Direct (Scope 1) GHG emissions	Green Operations	Promoting Green Ideas 04
305-2	Energy indirect (Scope 2) GHG emissions	Green Operations	Promoting Green Ideas 04
305-3	Other indirect (Scope 3) GHG emissions	Green Operations	Promoting Green Ideas 04
305-4	GHG emissions intensity	Green Operations	Promoting Green Ideas 04
305-5	Reduction of GHG emissions	Green Operations	Promoting Green Ideas 06-07
GRI 306: Effluents and Waste			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Green Operations	Promoting Green Ideas 04,07
	103-2 The management approach and its components	Green Operations	Promoting Green Ideas 04,07
	103-3 Evaluation of the management approach	Green Operations	Promoting Green Ideas 04,07
306-1	Water discharge by quality and destination	Green Operations	Promoting Green Ideas 04
306-2	Waste by type and disposal method	Green Operations	Promoting Green Ideas 04
306-3	Significant spills	Green Operations	None
306-4	Transport of hazardous waste	Green Operations	Promoting Green Ideas 08
GRI 307: Environmental Compliance			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Green Operations	Promoting Green Ideas 04
	103-2 The management approach and its components	Green Operations	Promoting Green Ideas 04,07
	103-3 Evaluation of the management approach	Green Operations	Promoting Green Ideas 04
307-1	Non-compliance with environmental laws and regulations	Green Operations	None
GRI 308: Supplier Environmental Assessment			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Compliant Operations	Enhancing Corporate Governance 04
	103-2 The management approach and its components	Compliant Operations	Enhancing Corporate Governance 04
	103-3 Evaluation of the management approach	Compliant Operations, Professional Ethics	Enhancing Corporate Governance 04
308-1	New suppliers that were screened using environmental criteria	Compliant Operations	Enhancing Corporate Governance 04
308-2	Negative environmental impacts in the supply chain and actions taken	Professional Ethics	Enhancing Corporate Governance 04
Social			
GRI 401: Employment			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 01,03-04
	103-2 The management approach and its components	Talent First	Nurturing Talents 01,03-04
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 01,03-04
401-1	New employee hires and employee turnover	Talent First	Nurturing Talents 01-02
401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	Talent First	Nurturing Talents 04
401-3	Parental leave	Talent First	Nurturing Talents 04

Disclosure	Description	Chapters	Pages
GRI 403: Occupational Health and Safety			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 04
	103-2 The management approach and its components	Talent First	Nurturing Talents 04
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 04
403-2	Types of injury and rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities	Talent First	Nurturing Talents 04
GRI 404: Training and Education			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 05
	103-2 The management approach and its components	Talent First	Nurturing Talents 05
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 05
404-1	Average hours of training per year per employee	Talent First	Nurturing Talents 05
404-2	Programs for upgrading employee skills and transition assistance programs	Talent First	Nurturing Talents 05
404-3	Percentage of employees receiving regular performance and career development reviews	Talent First	Nurturing Talents 04
GRI 405: Diversity and Equal Opportunity			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 03
	103-2 The management approach and its components	Talent First	Nurturing Talents 03
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 03
405-1	Diversity of governance bodies and employees	Talent First	Nurturing Talents 03
GRI 406: Non-discrimination			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 03
	103-2 The management approach and its components	Talent First	Nurturing Talents 03
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 03
406-1	Incidents of discrimination and corrective actions taken	Talent First	Nurturing Talents 03
GRI 408: Child Labor			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 01
	103-2 The management approach and its components	Talent First	Nurturing Talents 01
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 01
408-1	Operations and suppliers at significant risk for incidents of child labor	Talent First	None
GRI 409: Forced or Compulsory Labor			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 01
	103-2 The management approach and its components	Talent First	Nurturing Talents 01
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 01
409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	Talent First	None
GRI 412: Human Rights Assessment			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Talent First	Nurturing Talents 03
	103-2 The management approach and its components	Talent First	Nurturing Talents 03
	103-3 Evaluation of the management approach	Talent First	Nurturing Talents 03
412-3	Significant investment agreements and contracts that include human rights clauses or that underwent human rights screening	Talent First	Nurturing Talents 03

Disclosure	Description	Chapters	Pages
GRI 413: Local Communities			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Philanthropy, AI for Social Good	Contributing to Society 01-04
	103-2 The management approach and its components	Philanthropy, AI for Social Good	Contributing to Society 01-04
	103-3 Evaluation of the management approach	Philanthropy, AI for Social Good	Contributing to Society 01-04
413-1	Operations with local community engagement, impact assessments, and development programs	Philanthropy, AI for Social Good	Contributing to Society 01-04
413-2	Operations with significant actual and potential negative impacts on local communities	Philanthropy, AI for Social Good	Contributing to Society 01-04
GRI 414: Supplier Social Assessment			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Compliant Operations	Enhancing Corporate Governance 04
	103-2 The management approach and its components	Compliant Operations	Enhancing Corporate Governance 04
	103-3 Evaluation of the management approach	Compliant Operations	Enhancing Corporate Governance 04
414-1	New suppliers that were screened using social criteria	Compliant Operations	Enhancing Corporate Governance 04
414-2	Negative social impacts in the supply chain and actions taken	Compliant Operations	Enhancing Corporate Governance 04
GRI 416: Customer Health and Safety			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Content Management	Improving Services 01
	103-2 The management approach and its components	Content Management	Improving Services 01-04
	103-3 Evaluation of the management approach	Content Management	Improving Services 01-04
416-1	Assessment of the health and safety impacts of product and service categories	Content Management	Improving Services 01-04
416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	Content Management	Improving Services 02-04
GRI 417: Marketing and Labeling			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Content Management	Improving Services 03
	103-2 The management approach and its components	Content Management	Improving Services 03
	103-3 Evaluation of the management approach	Content Management	Improving Services 03
417-1	Requirements for product and service information and labeling	Content Management	Improving Services 03
417-2	Incidents of non-compliance concerning product and service information and labeling	Content Management	Improving Services 03
417-3	Incidents of non-compliance concerning marketing communications	Content Management	Improving Services 03
GRI 418: Customer Privacy			
GRI 103: Management Approach 2016	103-1 Explanation of the material topic and its Boundary	Data Security	Building Trust 06
	103-2 The management approach and its components	Data Security	Building Trust 06-10
	103-3 Evaluation of the management approach	Data Security	Building Trust 06-07,10



◇ SASB Standard

Topic	Accounting Metric	Code	Location
Environmental Footprint of Hardware Infrastructure	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable	TC-SI-130a.1	Promoting Green Ideas 04
	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	TC-SI-130a.2	Promoting Green Ideas 04
	Discussion of the integration of environmental considerations into strategic planning for data center needs	TC-SI-130a.3	Promoting Green Ideas 05-06
Data Privacy & Freedom of Expression	Description of policies and practices relating to behavioral advertising and user privacy	TC-SI-220a.1	Improving Services 03, 07-08, Building Trust 06-10
Data Security	(1) Number of data breaches, (2) Percentage involving personally identifiable information (PII), (3) number of users affected	TC-SI-230a.1	Building Trust 02
	Description of approach to identifying and addressing data security risks, including use of third-party cybersecurity standards	TC-SI-230a.2	Building Trust 01-10
Recruiting & Managing a Global, Diverse & Skilled Workforce	Percentage of employees that are (1) foreign nationals and (2) located offshore	TC-SI-330a.1	Nurturing Talents 03
	Employee engagement as a percentage	TC-SI-330a.2	Nurturing Talents 04
	Percentage of gender and racial/ethnic group representation for (1) management, (2) technical staff, and (3) all other employees	TC-SI-330a.3	Nurturing Talents 02-03
Managing Systemic Risks from Technology Disruptions	Description of business continuity risks related to disruptions of operations	TC-SI-550a.2	Building Trust 02, Promoting Green Ideas 02

◇ Carbon Emission Accounting Methods

Scope of Emission	Source of Emission	Methodology	Emission Factor
Scope 1: Fossil fuel combustion	Natural gas consumption	The calculation is based on the natural gas consumption data and corresponding emission factors.	IPCC Guidelines for National Greenhouse Gas Inventories
	Diesel consumption	The calculation is based on the diesel consumption data and corresponding emission factors.	IPCC Guidelines for National Greenhouse Gas Inventories
	Gasoline consumption	The calculation is based on the gasoline consumption data and corresponding emission factors.	IPCC Guidelines for National Greenhouse Gas Inventories
Scope 1: Fugitive emission	Refrigerant consumption	The calculation is based on the refrigerant consumption data and the corresponding global warming potential.	According to the Appendix C to the Number Designation and Safety Classification of Refrigerants (GB7778-2008), which recommends the annual leakage ratio of refrigerants under normal conditions at 2% of the charged amount, and the IPCC Guidelines for National Greenhouse Gas Inventories, the annual leakage ratio of 4% is selected after comprehensive evaluation.
Scope 2	Purchased electricity consumption	The calculation is based on the purchased electricity data and corresponding emission factors.	Announcement on the Release of 2012 Baseline Emission Factors for China's Regional Power Grids
	Purchased heat/cold energy consumption	The calculation is based on the purchased heat/cold energy data and corresponding emission factors.	Accounting Methods and Reporting Guidance for Greenhouse Gas Emissions from Enterprises in Other Industrial Sectors (Trial)
Scope 3	Category 7: Consumption of electricity generated by charging piles for employee commuting	The calculation is based on the data of purchased electricity generated by charging piles and corresponding emission factors.	Announcement on the Release of 2012 Baseline Emission Factors for China's Regional Power Grids
	Category 8: Consumption of electricity purchased with upstream leased assets	The calculation is based on the purchased electricity data of Baidu's leased data centers and corresponding emission factors.	Announcement on the Release of 2012 Baseline Emission Factors for China's Regional Power Grids

◇ Independent Statement of Assurance

		
BUREAU VERITAS Certification		
Greenhouse Gases Verification Statement		
Is Awarded to Baidu, Inc.		
Verification Address :	Baidu Campus, NO.10 Shangdi 10th Street, Haidian District, Beijing, The People's Republic of China 100085 (HQ) Including 26 Office locations and 6 Baidu Operated Data Centers	
Organization boundaries:	Based On Operational Control HQ and 26 Office location and 6 Baidu Operated Data Centers	
Report boundaries :	Baidu, Inc. HQ and 26 Office locations and 6 Baidu Operated Data Center administration office, research and development, data center activities.	
Limitation conclusion :	Other non-significant indirect emission excluded. Emission from locations out of P. R. China excluded.	
Assurance Level:	Reasonable	
Bureau Veritas Certification had verified the quantity of Greenhouse Gas of the above organization and found to be in accordance with the requirements of the standard detailed below		
<hr/> ISO 14064-1:2018 <hr/>		
Verified Direct and Energy Indirect Greenhouse Gas Emission: 618147.2 ton CO₂e Other significant Indirect Greenhouse Gas Emission (Scope 3) : 1173460.6 ton CO₂e Scope 3 including below: - Rented data center - Outsourced commuter vehicle		
Verified from Jan. 1, 2021 to Dec. 31, 2021 Base Year : 2020		
<i>To check this certificate validity please call +8610-59683888</i> <i>Further clarifications regarding the scope of this certificate and the applicability of the standard may be obtained by consulting the organization</i>		
<hr/> Issue Date: 2022-02-27 Certificate Number: CN100185A		
<small>ISSUING OFFICE ADDRESS: Room 902-906, Tower W1, The Towers, Oriental Plaza, 1 East Chang An Ave, Dong Cheng District, Beijing</small>		
		

◇ SDGs Contributions

In 2021, based on the analysis of business characteristics, Baidu selected 10 of the most relevant SDGs to Baidu's sustainability and pledged to support and implement SDGs in corporate business strategies and operations, contributing due efforts to social sustainability.

Key SDG responded	Our Commitments and Main Actions	Location
	Launching smart medical products such as Baidu Health (a one-stop health management platform) and Baidu Lingyi Zhihui (an AI-powered healthcare brand) to empower healthcare with digital technology and improve inclusive healthcare.	AI for Social Good
	Establishing the Baidu Pinecone Academy to provide diverse AI learning resources for the public, alleviate the shortage of AI talents, and enhance the digital skills of the public.	Philanthropy
	Respecting females, removing the “ceilings” for female employees at the workplace, ensuring equal employment opportunities for females, and strictly adhering to equal pay for equal work.	Talent First
	Proactively introducing the photovoltaic power generation technology, increasing the use of renewable energy in office buildings and data centers, and launching self-driving vehicles powered by new energy to help achieve the “dual carbon” targets.	Promoting Green Ideas
	Providing employees with a competitive salary system, launching long-term equity incentive plans which cover nearly half of the staff, and caring for employees' work-life balance and physical and mental health.	Talent First
	With the concept of “Everyone Can AI”, promoting the open-source sharing of AI-related technical tools and ensuring every developer has access to the world's most advanced AI technologies; Establishing the AI data annotation industrial base, boosting regional economic development, and empowering the construction of a regional digital economic system.	Intellectual Property Rights Management AI for Social Good
	Using the intelligent connected vehicle technology to develop intelligent transportation products, and facilitating the design, construction, operation, and sustainable development of zero-carbon parks with digital and intelligent technologies.	Green Products and services
	Setting the targets for carbon neutrality by 2030, specifying emission reduction pathways in data centers, office buildings, carbon offsets, intelligent transportation, AI cloud, and supply chain; striving to help the society save energy and reduce emissions through technology while achieving the carbon neutrality targets at the operational level.	Addressing Climate Change
	Adhering to business ethics and legal compliance as the foundation of corporate governance, building a scientific and efficient corporate governance mechanism with clear responsibilities and rights, and maintaining the sustainable operation and development of Baidu.	ESG Management Compliant Operations Professional Ethics
	Proactively participating in the standard construction of cybersecurity, data security, and AI security industries, and actively cooperating with ecological partners to facilitate the ecological construction of the industries.	Cybersecurity Data Security AI for Social Good

Reader Feedback Form

Dear readers,

Thank you for reading our 2021 Environmental, Social and Governance Report. We sincerely welcome your valuable comments and suggestions, and look forward to your feedback through the mail, email, or online survey with the QR code below. Thank you!

1. As a stakeholder of Baidu, what is your relationship to Baidu?

- ☐ Shareholder ☐ Employee ☐ Supplier or Business Partner ☐ User ☐ Government ☐ Community ☐ Financial Institution
☐ Academic Institution ☐ Others (Please specify) _____

2. What is your overall comment on this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

3. What do you think about the clarity, accuracy and completeness of the information disclosed in this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

4. What do you think about the comprehensiveness of Baidu's economic responsibilities reflected in this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

5. What do you think about the comprehensiveness of Baidu's environmental responsibilities reflected in this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

6. What do you think about the comprehensiveness of Baidu's social responsibilities reflected in this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

7. What do you think about the design and layout of this Report?

- ☐ Excellent ☐ Good ☐ Average ☐ Below average

8. Which part of this Report do you think needs improvement?

- ☐ Enhancing Corporate Governance ☐ Building Trust ☐ Nurturing Talents
☐ Promoting Green Ideas ☐ Improving Services ☐ Contributing to Society

9. Content that you wish to know more about beyond this Report?

10. Your suggestions regarding the compilation of our ESG Report?

Contact us

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