
INDUSTRY OVERVIEW

The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public market research and other sources from independent suppliers, and from the independent industry report prepared by CIC. We engaged CIC to prepare the CIC Report, an independent industry report, in connection with the [REDACTED]. The information from official government sources has not been independently verified by us, the [REDACTED], [REDACTED], Sole Sponsor, [REDACTED], [REDACTED], [REDACTED], any of the [REDACTED], any of their respective directors and advisers, or any other persons or parties involved in the [REDACTED], and no representation is given as to its accuracy. Accordingly the information from official government sources contained herein may not be accurate and should not be unduly relied upon.

RAPID DEVELOPMENT OF ARTIFICIAL INTELLIGENCE INDUSTRY

Artificial intelligence is reaching its tipping point of large scale adoption

Artificial intelligence (“AI”) represents a wide-ranging technology that reshapes how human beings integrate information, analyze data, and derive insights to improve efficiency and optimize decision-making with the help from machines. After years of development and field tests, AI has turned into an increasingly adopted technology empowering a variety of sectors, restructuring certain industry landscapes as a new infrastructure.

AI penetration in the overall economy has been growing but still largely underdeveloped, mainly due to deterrents such as insufficient data, relatively high cost of adoption, system security and governance concerns, as well as deployment challenges. In recent years, however, the market and the society as a whole have been gradually recognizing the transformative effect of AI. In particular, the below technological and societal progresses have expedited AI’s commercial applications.

Data accumulation

The world today is substantially digitized and interconnected, resulting in an explosion of data. 99 zettabytes of data were created, captured, copied and consumed globally in 2022, which has grown nearly 30 times in the last decade, and will further grow to 264 zettabytes by 2027, according to CIC. Such sheer amount of data give rise to massive opportunities to uncover the significant insights embedded therein for every organization, yet such amount of data also present unprecedented challenges for data analysis, which has been increasingly difficult and costly for human labor to handle. The accumulation of data therefore catalyzed the adoption of AI. Meanwhile, learning, training and developing from the enriched data, AI keeps growing smarter and capable of solving real-world problems in a more efficient way.

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Advancement of both computational and algorithmic infrastructure

- *Surging computing power:* Computing power is closely related to the development of chips. Most chip firms have their AI chip lineups vastly improved on the computing power compared to prior generations. According to the CIC Report, the computing power of newly developed generation of AI chips by major chip firms is improved to as high as ten times that of the previous generation of the same lineup.
- *Reduced time and cost of model training:* New algorithms and frameworks have emerged to boost the efficiency of AI training and industrial deployment. For example, with transfer learning technology, the insights gained by one trained AI model are transferrable and reproducible; with automated machine learning (AutoML), all developers and business line users are enabled to develop and optimize machine-learning models, reducing heavy reliance on machine-learning experts.

Improved awareness of deploying AI applications across all sectors

AI continues to transform industries across the globe, and decision makers of all kinds are taking notice, and making their investments in AI. According to the CIC Report, in 2022, the global AI spending reached US\$199.7 billion, representing a CAGR of 29.4% from US\$71.3 billion in 2018, and is expected to expand to US\$562.9 billion in 2027 with a CAGR of 23.0%. It is estimated that more than 15% of the global GDP would be driven by AI by 2030, according to the CIC Report.

China is pioneering the development of global AI industry

Among the forerunners that are embracing AI with open arms, China is home to a vibrant market that is now pioneering the global AI industry with transcending boundaries and surging AI innovations. In terms of the demand side, AI is believed to be an accessible and easy-to-use instrument that leads to operational efficiency and business success in the digital era for entities of all sizes in China. China’s significant economic scale and considerable social activity level bring about a rich variety of application scenarios that are AI-penetrable. There exists huge demand in China for AI solutions that are tailored for diverse and dynamic scenarios and real-world tasks, encouraging innovation in both technology and business model. In terms of the supply side, AI providers in China benefit from large and growing amount of data derived from the economic scale and social activity level, strong talent pool, advanced research capabilities and vibrant AI domain players. Moreover, Chinese government’s supporting policies and regulations, which promote the development of AI technologies, the education of AI talents and the application of AI solutions, are expected to further drive the rapid development of China’s AI industry. As a result, China is leading the innovation and commercialization of AI globally.

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According to the CIC Report, China’s AI spending reached RMB225.5 billion in 2022, and is estimated to grow to RMB691.0 billion in 2027 with a CAGR of 25.1%. China is a major AI market with increasing global influences, evidenced by the following facts according to the CIC Report and “Artificial Intelligence Index Report 2022” by Stanford Institute for Human-Centered Artificial Intelligence (HAI):

- China was the second largest AI market globally in terms of AI spending in 2022, capturing approximately 18% of global AI spending.
- With surging demand for AI, the growth of China’s AI spending is expected to reach a CAGR of 25.1% from 2022 to 2027, outpacing the growth of global AI spending over the same period.
- China has consistently been the largest market globally in terms of the number of AI patent application since 2016, with one of the largest talent pools of top-tiered AI researchers.
- China has consistently been the largest market globally in terms of both the number of AI journal publications and AI journal citations since 2016.

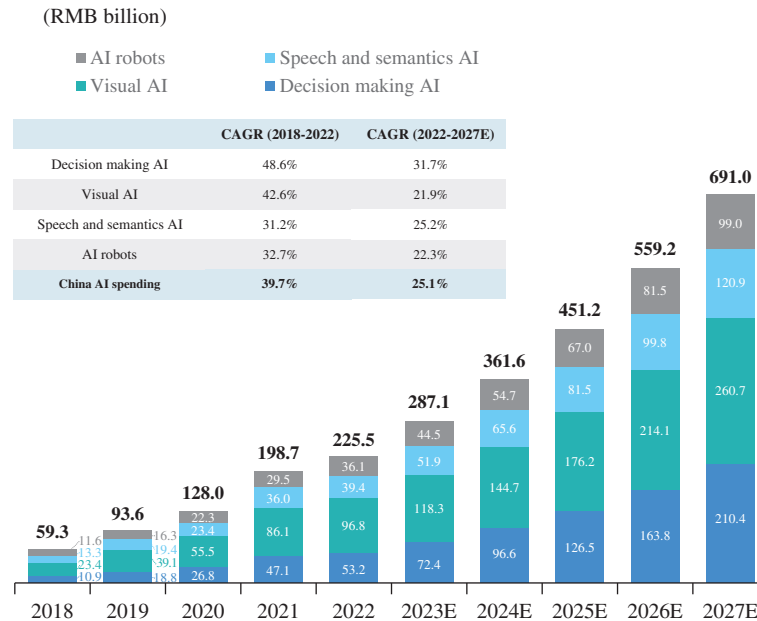
China’s AI industry can be categorized into four major segments in terms of fields of application: decision-making AI, visual AI, speech and semantics AI and AI robots. The following sets forth the definition and typical application scenarios for each of the four categories:

- *Decision-making AI* recognizes patterns hidden in data, guides decision-making process on data insights, and addresses issues that are most pertinent to core business operations. Typical applications include, but are not limited to, smart sales and marketing, risk management, and supply chain management.
- *Visual AI* identifies, tracks and measures objects based on visual data, and translates such information into insights and judgments. Typical applications include, but are not limited to, smart access control, public safety surveillance, optical character recognition (“OCR”).
- *Speech and semantics AI* aims to recognize, generate and exchange voices, texts and other language information with human beings to save human labor in certain repetitive communication scenarios. Typical applications include, but are not limited to, smart customer service, intelligent transcription, interactive voice response.
- *AI robots* are designed to replace human beings in performing certain repetitive or dangerous tasks. Typical AI robots include, but are not limited to, industrial drones, automated guided vehicles (“AGVs”), surgical robots.

Among the above segments, decision-making AI is expected to be the fastest-growing one according to the CIC Report. The size of China’s decision-making AI market in terms of AI spending reached RMB53.2 billion in 2022 and is estimated to grow to RMB210.4 billion in 2027, with a CAGR of 31.7%.

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Market Size Breakdown of China AI Industry by Segment, 2018A-2027E



Source: CIC Report

Note: The market size was determined and calculated based on (i) the primary and secondary research performed by CIC on the status quo and future trends of China’s AI industry, (ii) with references to relevant downstream vertical industry data publicly released by National Bureau of Statistics and other official organizations and associations, such as China Banking and Insurance Regulatory Commission and China Association of Automobile Manufacturers.

DECISION-MAKING AI MARKET IN CHINA

Significant value unleashed by machines in facilitating decision-making

To fully utilize the value contained in data, many organizations have adopted a data-driven approach to support decision-making in their daily operations. With regard to distilling insights from massive and ever growing data, it makes a difference if the data processor is machine instead of human.

Prior to the development of AI and its eventual commercial application, even with enough data inputs, organizations have had to rely on human perception, experience, judgment and sometimes even intuition to make decisions. We are currently living in an ever-changing world where common sense and accumulated experiences can no longer anticipate the risks involved in making a critical decision, nor can we bear the consequences of making wrong decisions. Meanwhile, it becomes more and more difficult, costly and ultimately impractical to process and analyze massive data in the digital era manually.

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The AI-driven decision-making model, without human beings’ limits such as fixed throughput and cognitive bias, is now automating and augmenting the workforce, and in some cases even freeing human force from the tradition mode of workflow to improve the reliability and efficiency of decision-making. With increasingly diverse scenarios penetrated, decision-making AI can optimize almost all building blocks of enterprise operation from top to bottom, including, but not limited to, expanding business scale, improving sales and marketing efficiencies, enhancing operating leverage. For example, in the context of smart sales and marketing, AI-driven solutions, by increasing the accuracy of targeted marketing, can support revenue growth for e-commerce companies. AI-driven decision-making is also transforming risk management in the banking and finance industry. For instance, using AI-based credit risk models could reduce default rates significantly. More and more industries are embracing the great impact of the advanced decision-making AI technology.

Distinguished from other AI solution segments, which are primarily focused on perception and cognition of data patterns, decision-making AI provides predicative analysis and recommendations to support and guide business actions. It is applied in various real-world scenarios such as targeted marketing, risk management and day-to-day operations optimization. The spending on decision-making AI in China is estimated to enjoy significant growth and to take up a higher proportion in the overall AI spending in the coming five years, according to CIC.

The platform-centric approach to scale up application of decision-making AI

Despite the favorable market environment of advancing decision-making AI in China, organizations are often faced with certain key challenges that make it difficult to self-develop and adopt AI applications:

Shortage of AI experts: The shortage of experienced AI experts and data scientists, has long been a critical deterrent for organizations to establish in-house AI talent team that can develop and operate AI infrastructures. For many organizations, shortage of talents is a major hurdle to develop AI in-house.

High TCO (total cost of ownership) and uncertain ROI (return on investment): Building a proprietary AI system, or assembling multiple point-solution AI software applications can be very costly for most enterprises. For example, CIC estimates that it typically costs a company an upfront investment of approximately RMB500 million to internally develop a full set of enterprise-level AI system, which, coupled with costs of continuous maintenance at approximately RMB50 million per annum, results in a much higher TCO compared to an annual spending of approximately RMB50 million to RMB100 million, should the company build an AI system with the same standard through external procurement. Moreover, due to lack of AI expertise and model training, such internally developed AI systems may consume even greater investments and cause longer time to value on an ongoing basis, and the effectiveness and efficiency gain from such systems could still be unsatisfactory, resulting in highly uncertain ROI.

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Deployment issues: Given the technology- and capital-intensive nature, it could take significant resources for companies to deploy AI solutions at scale for developing their customized applications that automate the internal processes such as decision-making. In most cases companies need to adopt a “trial and error” approach for developing and implementing in-house developed AI applications or purchased point solutions in order to find the optimal application portfolio that best suits their business practices. The deployment process takes a long time. As estimated by CIC, it takes approximately three years on average for enterprises to establish large-scale AI infrastructure and AI capabilities internally with their current AI team setup.

Data and system incompatibility: Adoption of outsourced point-solution AI applications poses the risk of incompatibility between the point solution applications and/or between the point solution applications and in-house developed AI applications. Moreover, organizations’ increased awareness of data security, data privacy protection and centralized data and system management adds to the complexity of deploying different point solutions and digesting multiple data sources.

The rapid emergence of platform-centric AI solutions in China recognized and well addressed the aforesaid challenges. Unlike point solutions, platform-centric decision-making AI solutions provide end users with an AI development platform in addition to AI applications and underlying computing infrastructure. Such an AI development platform provides end users with uniform development standards, high compatibility as well as flexible expansion of applications per actual demands. With the plug-and-play feature and infrastructure for further developing and operating use-case-specific solutions, decision-making AI platforms allow for much greater flexibility, scalability, compatibility and easier management.

Comparison between decision-making AI platform and point solution approach

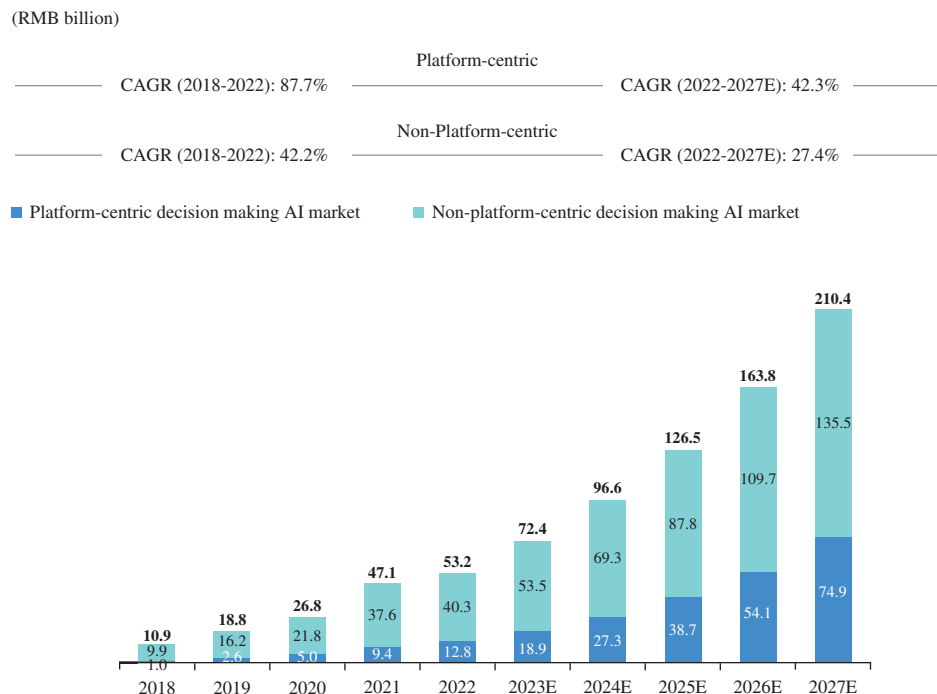
Metrics	Decision making AI platform	Point Solution Approach
Flexibility and scalability	<ul style="list-style-type: none"> • Allows for flexible, on-demand AI development • Modules and applications are transferrable and reproducible for similar/adjacent scenarios 	<ul style="list-style-type: none"> • Point solutions are mostly fixed, one-off deliverables • Difficult to meet extra customized demands that need to be expanded on the original solution
Compatibility of data and AI applications	<ul style="list-style-type: none"> • Different sources of data can be integrated and uniformly defined on the platform, which eliminates data inconsistency and information silos • Applications are compatible with the development environment and rules 	<ul style="list-style-type: none"> • Each specific workflow is usually provided by different vendors and involve only part of the users’ whole datasets – might create new data silos within an already fragmented data landscape • Need to be stitched together in order to interoperate, and applications could vary in the basic framework, data standard, processing rules, etc.
Management of AI applications	<ul style="list-style-type: none"> • Features that enable fast and convenient AI application management are usually provided upfront • A uniform security model for all datasets and applications is pre built-in 	<ul style="list-style-type: none"> • Extra function to manage AI applications is needed • Deploying an extra security model that functions effectively across different individual applications can be much more costly

Source: CIC Report

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Within the decision-making AI market, the platform-centric decision-making AI market in China is a vastly expanding subsegment. The size of platform-centric decision-making AI market reached RMB12.8 billion in 2022 in terms of AI spending and is estimated to grow at a CAGR of 42.3% to RMB74.9 billion in 2027, outgrowing the decision-making AI industry as a whole. The key difference between non-platform-centric and platform-centric decision making AI solutions lies in their potential for AI development and deployment to meet changing demands, namely the expansibility of more AI applications in other use case scenarios and the compatibility of those AI applications. Non-platform-centric decision-making AI applications are mostly fixed and one-off deliverables and can hardly adapt to users’ extra demands that require expansions on the original solution, primarily because AI applications designed for different workflows could also differ in their basic frameworks, underlying data governance infrastructure, or processing rules, leading to incompatibility of AI systems. In contrast, the decision-making AI platform underlying platform-centric decision making AI solutions provide operating environment and tools that allow for flexible AI development with transferrable and reproducible modules and applications for similar or adjacent scenarios. It also unifies the development environment and rules of all applications built on top. This unification saves the translation costs in integrating non-platform-centric decision-making AI applications that were independently developed, and it allows the AI systems to be perfectly compatible with each other. In this regard, platform-centric decision-making AI solutions leave more room for enterprises’ smooth and integrated AI development and deployment in the future.

Market Size of Decision Making AI Market in China, 2018A-2027E



Source: CIC Report

Note: The market size was determined and calculated based on further primary and secondary research performed by CIC on top of China’s AI industry market breakdown presented above.

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Competitive landscape

The following table sets forth the top five players in the platform-centric decision-making AI market in China by revenue in 2022, according to CIC. The top five players represented a combined market share of approximately 56.1%, as measured by relevant revenue in 2022. According to the CIC report, we were the largest platform-centric decision-making AI provider in China in terms of revenue in 2022.

Ranking	Company	Platform-centric decision-making AI revenue, 2022 (RMB billion)	Market share, 2022 (%)
1	4Paradigm	2.9	22.6
2	Company A ⁽¹⁾	1.6	12.3
3	Company B ⁽²⁾	1.1	8.9
4	Company C ⁽³⁾	0.9	6.8
5	Company D ⁽⁴⁾	0.7	5.6
Top five in total		7.2	56.1

Source: CIC Report

Note: The revenues of 4Paradigm’s competitors presented above were based on the primary research performed by CIC as there is no publicly available information regarding their platform-centric decision-making AI revenue.

Notes:

- (1) Company A, founded in 2000 and headquartered in Beijing, is a leading internet platform specializing in internet-related services and AI solutions, such as AI cloud services and solutions, mobile applications and services, and intelligent driving. Company A is listed on the Stock Exchange and the NASDAQ.
- (2) Company B, founded in 1999 and headquartered in Hangzhou, is a leading technology company focusing on retail, consumer services and technology solutions. Company B operates e-commerce platforms consumer service platforms, cloud services and solutions such as cloud computing, big data and AI, and other business such as digital media and entertainment. Company B is listed on the Stock Exchange and New York Stock Exchange.
- (3) Company C, founded in 1987 and headquartered in Shenzhen, is a leading technology company which primarily designs, develops and sells telecommunication solutions (such as telecommunication base stations) and consumer electronics (such as mobile phones and laptops). Company C is a private company with a registered capital of approximately RMB40 billion.
- (4) Company D, founded in 1998 and headquartered in Shenzhen, is a leading technology company that provides internet-related services and solutions for both consumers and enterprises. Its business include communications and social media, digital content, entertainment, AI, cloud services, among others. Company D is listed on the Stock Exchange.

We believe 4Paradigm differentiates itself from competitors in many ways, at the core of which is that its business solely focuses on providing pure-play AI solutions.

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According to the CIC Report, 4Paradigm’s major competitors are internet conglomerates that typically offer AI solutions merely to complement their diversified business portfolios, and AI solutions account for only a portion of their expansive business scope. For details of the competitive strengths that contribute to 4Paradigm’s success and differentiate it from its competitors, see “Business – Competitive Strengths.”

Besides, regarding the nature of AI solutions provided, 4Paradigm focuses on decision-making with a platform-centric approach, whereas its major competitors show a blended solution portfolio with a considerable proportion of AI-related revenues generated from visual and speech and semantics AI solutions, as well as AI applications provided independently of a platform. This distinction gives rise to 4Paradigm’s reputation for “professionalism” when it comes to demands for platform-centric decision-making AI solutions.

KEY SUCCESS FACTORS FOR AI SOLUTION PROVIDERS IN CHINA

Value creation for customers

In order to break into a market for any industry or vertical, AI solution providers normally seek to land on selective customers as a starting point, particularly on industry leaders. They first establish deep trust and obtain cooperative relationship with these selective customers that are recognized as “lighthouses” in the respective sectors and verticals. After helping these lighthouse users identify critical issues, provide solutions and achieve the objectives of business improvement, AI solution providers typically identify incremental demands and thus expand their scale of deployment. The AI-empowered improvement of the lighthouse users will then serve as proof points to keep attracting potential customers in the respective industries and verticals. Therefore, the ability to create value and help customers achieve continuous success is of vital importance for decision-making AI firms to pioneer in the industry.

First-mover advantage

Upon helping the lighthouse users achieve business improvement, decision-making AI providers then can leverage their industry know-how and practical experiences to attract and serve other customers in the targeted industries. First-mover advantage is a vital factor of the success in the AI industry. First-movers benefit from training AI for rich application scenarios, frequently engaging with their lighthouse users, and accumulating industry know-how that in turn helps them quickly expand their user base, formulating a virtuous cycle. They are therefore able to iterate smarter AI and to quickly adapt AI solutions to evolving user needs effectively.

Advanced technology and innovation

Technology capability is crucial for the prosperity of AI solutions providers. In light of the rapidly evolving nature of the AI industry, the ability to continuously adopt advanced technologies and to roll out innovative solution and service offerings is essential to maintaining competitive advantages.

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Talent acquisition and retention

Demand for AI talents has grown rapidly in the past few years. As the industry rapidly evolves and as AI solutions come to be widely deployed, companies at every level of AI sophistication become conscious of skill gaps and aim to fill them. The technology-intensive nature of the AI business also requires experienced and skilled talents. Therefore, the ability to continue attracting and retaining talents has become a major success factor.

RECENT INDUSTRY DEVELOPMENT

Large language models (“LLMs” for short), as a general AI model, have become a prominent topic in the AI industry in recent years as they have shown remarkable capabilities in natural language understanding and generation. Particularly, LLMs have received huge public attention since the end of 2022 with the launch of several ground-breaking LLM-based products.

According to CIC, instead of being dominated by a general AI model, the future AI technologies will likely be more diversified, with general AI models (such as LLMs) and specialized AI systems (such as decision making AI models) co-existing for different purposes. LLMs are fundamentally different from decision-making AI models in terms of underlying technologies and usage scenarios, and therefore, value propositions, which make them more complementary than competitive in real-world application. The table below demonstrates a detailed comparison between LLMs and decision making AI models.

Comparison items	LLMs	Decision making AI models
Value propositions	<ul style="list-style-type: none">• Provide plausible answers to generic topics	<ul style="list-style-type: none">• Provide predictive analysis and guide business decision making in specified scenarios
Underlying technology	<ul style="list-style-type: none">• Generative model	<ul style="list-style-type: none">• Distinctive model
Usage scenarios	<ul style="list-style-type: none">• Generation of answers based on retrospection of massive historical data on generic topics	<ul style="list-style-type: none">• Prediction of future status based on summarizing patterns of historical data on specific events and real-time input
Data requirements and TCO	<ul style="list-style-type: none">• Extremely large data scope, typically of largely diverse and generic topics• High TCO due to high training cost of such massive data	<ul style="list-style-type: none">• Adequate data scope, typically related to specific business tasks• Affordable TCO thanks to training of only the most relevant data

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Furthermore, products based on a general AI model now are usually accessible on the public cloud, which could be a potential concern for end users in certain industry verticals that pay particular attention to data security and privacy, such as public institutions and financial institutions. Specialized AI systems, however, could be optionally deployed on private cloud or on premise, which makes them more acceptable to such end users.

SOURCES OF INFORMATION

We commissioned China Insights Consultancy, an independent market research and consulting firm, to provide an analysis of, and to produce a report (the “CIC Report”) on China’s AI market. China Insights Consultancy, founded in Hong Kong, provides professional services including, among others, industry consulting, commercial due diligence and strategic consulting. We have agreed to pay a fee of RMB1,640,060 to China Insights Consultancy in connection with the preparation of the CIC Report. The report was prepared independent of the influence of us and other interested parties. We have extracted certain information from the CIC Report in this section, as well as elsewhere in this Document, to provide our potential [REDACTED] with a more comprehensive presentation of the industry in which we operate.

During the preparation of the CIC Report, China Insights Consultancy performed both primary and secondary research, and obtained knowledge, statistics, information on and industry insights into China’s AI market. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources.

The market projections in the CIC report are based on the following assumptions: (i) the overall social, economic, and political environment in China is expected to remain stable during the forecast period; (ii) relevant key drivers are likely to drive the continued growth of China’s AI market throughout the forecast period; and (iii) there is no extreme force majeure or unforeseen industry regulation in which the industry may be affected in either a dramatic or fundamental way. All forecasts in relation to market size are based on the general economic conditions as of the Latest Practicable Date.