*The information contained in this section, unless otherwise indicated, has been derived from various official government publications and other publications and the market research report prepared by Frost & Sullivan which we commissioned. We have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is false or misleading in any material respect or that any fact has been omitted that would render such information false or misleading in any material respect. None of our Company, the Sole Sponsor, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, the* [**REDACTED**]*, any of the* [**REDACTED**]*, or any of their respective directors, officers or representatives or any other parties involved in the* [**REDACTED**]*, has independently verified the information in the various official government publications nor give any representation as to the accuracy or completeness of such information.*

## SOURCE OF INFORMATION

We have commissioned Frost & Sullivan, an independent market research and consulting company, to conduct an analysis of and to prepare a report on the API-enabled service market, the API-enabled data exchange service market, and the data management solution market in China. The report prepared by Frost & Sullivan for us is referred to in this document as the F&S Report. We agreed to pay Frost & Sullivan a fee of RMB400,000, which we believe reflects market rates for reports of this type.

Founded in 1961, Frost & Sullivan has nearly 50 offices with more than 3,000 industry consultants, market research analysts, technology analysts and economists globally. Frost & Sullivan's services include technology research, independent market research, economic research, corporate best practices advising, training, client research, competitive intelligence and corporate strategy.

We have included certain information from the F&S Report in this document because we believe this information facilitates an understanding of the digital economy, API-enabled service market, the API-enabled data exchange service market, and the data management solution market in China for prospective investors. Frost & Sullivan's independent research consists of both primary and secondary research obtained from various sources. Primary research involved in-depth interviews with leading industry participants and industry experts. Secondary research involved reviewing company reports, independent research reports and data based on Frost & Sullivan's own research database. Projected data were obtained from historical data analysis plotted against macroeconomic data with reference to specific industry-related factors. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the F&S Report, various official government publications and other publications. In compiling and preparing the research, Frost & Sullivan assumed that the social, economic and political environments in the relevant markets are likely to remain stable in the forecast period.

The Directors confirm that, to the best of their knowledge and belief, there has been no material adverse change in the market information since the date of the Frost & Sullivan Report which may materially qualify, contradict, or limit or adversely affect the information of this section.

## OVERVIEW OF THE DIGITAL ECONOMY IN CHINA

### Development of the Digital Economy in China

The digital economy integrates digital technology and the real economy, and includes digital knowledge and information as key factors of production, digital technology as the core driving force, and modern digital network as an important information platform.

The development of China's digital economy is characterized by the following:

- ***Momentum for economic growth.*** The size of the digital economy reached RMB50.2 trillion in 2022 with a year-on-year growth of 10.3%, providing momentum for the overall economy as government and corporate organizations at all stages of development underwent digital transformation.

- ***Demand for external technology services.*** Government and corporate organizations have demand for external technology services as they procure and utilize commercially tested technology services, including API technology, to link with external data sources or services to reduce cost and maximize efficiency.

- ***Favorable government policies.*** In recent years, the PRC government has introduced favorable policies and industry standards that propose to accelerate the development of digital economy through closer integration of digital economy and the real economy to form a globally competitive digital cluster, driving modernization and growth of China's economy.

- ***Demand for high concurrency.*** Demand for high concurrency has risen significantly as high concurrency is essential for allowing a large number of customers to use services simultaneously without encountering any unexpected issues. High concurrency is a particularly important feature in systems for government organizations and corporate organizations in the internet and financial service industries.

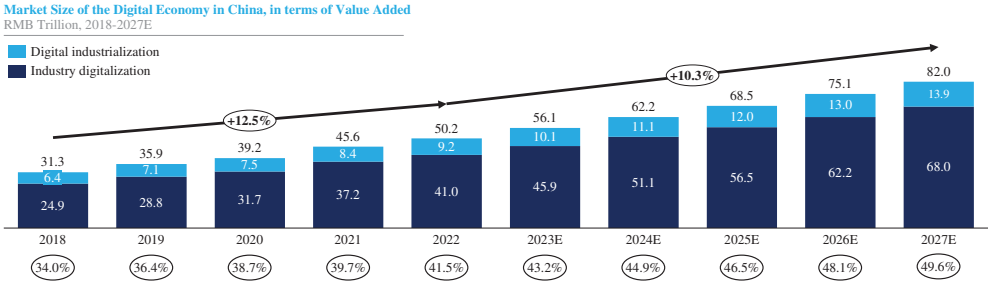
The following pain points have also arisen during the development of China's digital economy: (i) differences in database architectures result in data silos, which are collections of data held by one group that are not easily or fully accessible to other groups. Data silos prevent full access to and utilization of data assets, thus hampering the development of the digital economy; (ii) stakeholders are increasingly concerned about data security and privacy, especially data leakage, data misuse and cross-border data transmission; and (iii) industry standards have yet to be further optimized for certain aspects of the digital economy, such as the determination of ownership and pricing of data.

In the digital economy, all government and corporate organizations as well as individuals generate data and, therefore, participate as data providers. Data exchange and data management service providers collect, cleanse, process, analyze and share data through API and other technologies, such as big data technology and blockchain technology, to unlock the economic value of data and make data available to other participants. API is a set of rules and protocols that allow data to be exchanged from systems to systems, acting as an intermediary among systems. Big data technology is adopted to collect, cleanse, process, and derive insights from vast amount of different types of structured, semi-structured and unstructured data from different data sources. Blockchain is a distributed and immutable ledger that facilitates a secure processing of information transmitted in a network. As a result of the nationwide participation of enterprises and individuals, China's digital economy experienced steady growth at a CAGR of 12.5% from 2018 to 2022. In 2022, The market size of China's digital economy, calculated as the value added, reached RMB50.2 trillion, representing approximately 41.5% of GDP compared to approximately 34.0% in 2018. In comparison, the market size of digital economy of the United States, calculated as the value added, reached approximately US$17.0 trillion in 2022, representing over 65.0% of the total U.S. GDP, China's digital economy still has strong growth potential. China's digital economy is expected to reach RMB82.0 trillion in 2027 at a CAGR of 10.3% from 2022 to 2027, representing approximately 49.6% of China's expected total GDP in 2027.

The market size of digital economy comprises the contribution of digital industrialization and industry digitalization in terms of value added to the overall GDP in China. Digital industrialization represents economic activities which provide direct digital technologies, while industry digitalization represents the provision of final products or services enabled by digital technologies in traditional industries such as transportation, financial services and manufacturing. Value-added is calculated as output of an industry or sector subtracting its respective intermediate consumptions (the goods and services used to produce the output).

Digital industrialization comprises contributions from information technology service and non-information technology service. Information technology service refers to provision of technical service to meet users' demand for information technology, and non-information technology services include telecommunication service, electronics manufacturing service and Internet service. Economic activities of providing technology service such as API, big data and blockchain, together with others, fall within the information technology services industry. The contribution of API, big data and blockchain, in terms of value added to GDP, reached RMB21.2 billion, RMB76.2 billion and RMB4.2 billion in 2022, respectively.

The table below provides the actual and estimated market size of the digital economy in China from 2018 to 2027, calculated based on the value added to the overall GDP:




| Breakdown of the market size of digital industrialization, in terms of value added | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (RMB Billion) | **2018** | **2019** | **2020** | **2021** | **2022** | **2023E** | **2024E** | **2025E** | **2026E** | **2027E** |
| Digital industrialization | 6,400.0 | 7,100.0 | 7,500.0 | 8,400.0 | 9,200.0 | 10,127.7 | 11,061.7 | 12,001.3 | 12,973.5 | 13,936.6 |
| Information technology service | 542.8 | 1,179.6 | 1,453.2 | 1,768.4 | 2,050.5 | 2,406.4 | 2,836.2 | 3,315.7 | 3,913.2 | 4,594.9 |
| API | 10.6 | 13.6 | 17.7 | 19.2 | 21.1 | 23.0 | 25.3 | 27.9 | 31.0 | 34.5 |
| Big Data | 23.0 | 23.9 | 30.0 | 56.6 | 76.2 | 95.6 | 119.9 | 148.7 | 185.6 | 229.7 |
| Blockchain | 0.6 | 1.0 | 1.6 | 2.7 | 4.2 | 6.4 | 9.0 | 12.6 | 17.0 | 24.7 |
| Others | 508.6 | 1,141.1 | 1,403.9 | 1,689.9 | 1,949.0 | 2,281.4 | 2,682.0 | 3,126.5 | 3,679.6 | 4,306.0 |
| Non-information technology service | 5,857.2 | 5,920.4 | 6,046.8 | 6,631.6 | 7,149.5 | 7,721.3 | 8,225.5 | 8,685.6 | 9,060.3 | 9,341.7 |

*Source: CAICT, Frost & Sullivan*

## OVERVIEW OF THE API-ENABLED SERVICE MARKET IN CHINA

### Development of the API-Enabled Service Market in China

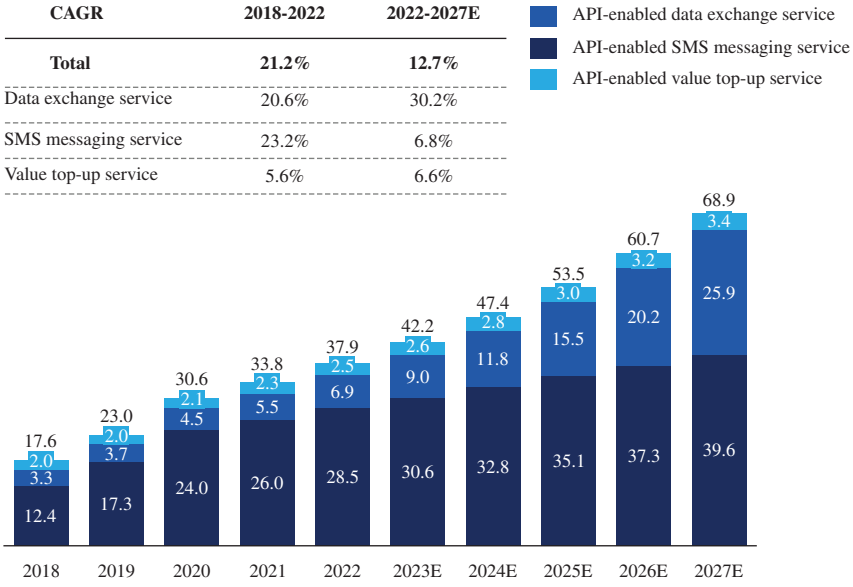
API-enabled services utilize API technology to provide services that enable optimization and standardization of data interactions across different organizations, including: (i) API-enabled data exchange service; (ii) API-enabled SMS messaging; and (iii) API-enabled value top-up service. Juhe Data is involved in all three of the aforementioned services.

The API-enabled service market grew from RMB17.6 billion in 2018 to RMB37.9 billion in 2022 at a CAGR of 21.2%. API-enabled SMS messaging service, which refers to the provision of text messaging services to allow government or corporate organizations to easily engage target audiences for various service types such as sending verification codes and resetting passwords, remained the largest market segment at RMB28.5 billion in 2022. API-enabled data exchange service, which refers to the provision of a centralized data exchange platform or marketplace to enable authorized organizations to easily search for, locate and retrieve third-party authorized data on various subjects, such as identity authentication, weather forecasts, news, and IP address inspections, was the second largest market segment with a size of RMB6.9 billion in 2022. API-enabled value top-up service, which refers to the provision of interfaces for enterprises to conduct sales and delivery of virtual goods and services, such as phone credits, leisure and entertainment virtual goods, and utility payments, reached a market size of RMB2.5 billion in 2022. The API-enabled service market is expected to reach RMB68.9 billion in 2027, growing at a CAGR of 12.7% from 2022 to 2027, of which the API-enabled data exchange service segment is expected to reach RMB25.9 billion by 2027.

The table below shows the actual and estimated size of China's API-enabled service market from 2018 to 2027:

**Market size of the API Enabled Service Market in China**
RMB Billion, 2018-2027E

| CAGR | 2018-2022 | 2022-2027E |
|---|---|---|
| **Total** | **21.2%** | **12.7%** |
| Data exchange service | 20.6% | 30.2% |
| SMS messaging service | 23.2% | 6.8% |
| Value top-up service | 5.6% | 6.6% |




## Competitive Landscape of the API Enabled Service Market in China

In 2022, Juhe Data had a market share of less than 1% in China's API-enabled service market as measured by revenue.

The table below sets forth the ranking of integrated API-enabled service providers in China by revenue and market share:

**Ranking of API Enabled Service Providers in China, by Revenue**

| Ranking | Company | Revenue (RMB Billion, 2022) | Market Share (%, 2022) |
|---|---|---|---|
| 1 | Company A | 3.3 | 8.7% |
| 2 | Company B | 2.0 | 5.2% |
| 3 | Company C | 1.2 | 3.2% |
| 4 | Company D | 0.5 | 1.4% |
| 5 | Company E | 0.3 | 1.0% |

(1). Company A is an enterprise cloud communication service provider in China that was founded in Shenzhen in 2001 and is listed on the Shenzhen Stock Exchange with a registered capital of RMB200 million and over 1,000 employees as of December 31, 2022.

(2). Company B is an enterprise mobile information solution provider that was founded in Beijing in 2007 with a registered capital of RMB100 million.

(3). Company C is an enterprise mobile information solution provider that was founded in Wuxi in 2012 and is listed on the Shenzhen Stock Exchange with a registered capital of RMB80 million.

(4). Company D is an enterprise mobile information solution provider that was founded in Beijing in 2001 with a registered capital of RMB200 million.

(5). Company E is a leading third-party virtual goods and services platform operator in China that was founded in Wuhan in 2009 and is now listed on the Hong Kong Stock Exchange with a registered capital of RMB20 million and less than 1,000 employees as of December 31, 2022.

## OVERVIEW OF THE API-ENABLED DATA EXCHANGE SERVICE MARKET IN CHINA

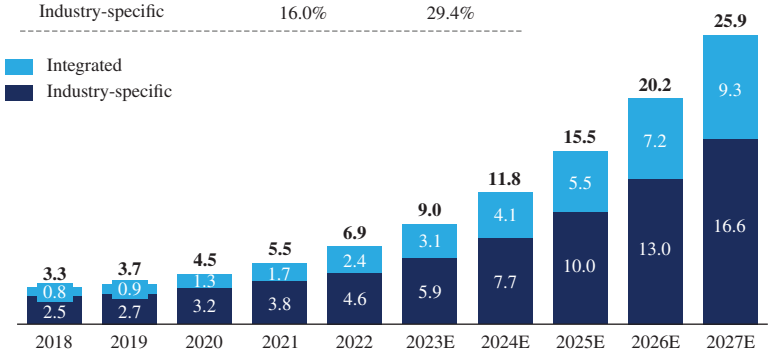
### Development of the API-Enabled Data Exchange Service Market in China

There are two types of participants in the API-enabled data exchange service market in China: (i) integrated API-enabled data exchange service providers; and (ii) industry-specific API-enabled data exchange service providers. Integrated API-enabled data exchange service providers provide comprehensive API-enabled data exchange services with a wide spectrum of data source and supply, such as "three-factor" authentication, transportation, weather, and others. Industry-specific API-enabled data exchange service providers focus on providing API-enabled data exchange service with specific types of data such as corporate registration information. The API-enabled data exchange service market grew at a CAGR of 20.6% from RMB3.3 billion in 2018 to RMB6.9 billion in 2022, of which the integrated API-enabled data exchange service segment accounted for RMB2.4 billion in 2022, representing a CAGR of 33.2% from 2018 to 2022. The market size of the industry-specific API-enabled data exchange service segment was RMB4.6 billion in 2022. The API-enabled data exchange service market is expected to reach RMB25.9 billion in 2027, representing a CAGR of 30.2% from 2022 to 2027, of which the integrated API-enabled data exchange service segment is expected to reach RMB9.3 billion in 2027, representing a CAGR of 31.5% from 2022 to 2027. The rapid market growth reflects strong demand for API-enabled data services from government and corporate organizations as they continue undergoing digital transformation to improve cost control and optimize efficiency.

The table below shows the actual and estimated size of China's API-enabled data exchange service market from 2018 to 2027:

**Market size of the API-enabled Data Exchange Service Market in China**
RMB Billion, 2018-2027E

| CAGR | 2018-2022 | 2022-2027E |
|---|---|---|
| **Total** | **20.6%** | **30.2%** |
| Integrated | 33.1% | 31.6% |
| Industry-specific | 16.0% | 29.4% |



## Drivers of the API-Enabled Data Exchange Service Market in China

### *Increased significance of data in China's economic development plan*

The PRC government has placed strong emphasis on data in China's economic development plan by introducing a series of favorable policies. In 2020, the PRC government named data as a new factor of production in the Opinions of the CPC Central Committee and the State Council on Improving the Systems and Mechanisms for Market-based Allocation of Factors of Production (中共中央、國務院關於構建更加完善的要素市場化配置體制機制的意見), and proposed to accelerate the development of data market by promoting sharing of public institution data, increasing the value of market-oriented data, strengthening integration of data as a resource and improving data security. The proposal was followed by a series of favorable policies in the following years. The PRC government also launched data exchanges to promote exchange-based data sharing in China. As the PRC government placed increasing emphasis on developing China's digital economy, state-owned data exchanges saw spike in number. From 2014 to 2023, 57 state-owned data exchanges were established, including Shanghai Data Exchange (上海數據交易所), Beijing International Data Exchange (北京國際大數據交易所), and Shenzhen Data Exchange (深圳數據交易所). On March 7, 2023, the State Councilannounced its plan to establish the National Data Bureau (國家數據局), which will be responsible for advancing the development of data-related institutions and coordinating the integration, sharing, development and application of data resources. Strong government support has helped to create a favorable environment for the development of China's overall digital economy and, by extension, the API-enabled data exchange service market.

### *Development of state-owned data exchanges*

A state-owned data exchange refers to a centralized data exchange that is established with government participation and operated primarily by corporate enterprises with the goal to promote the exchange of data through an exchange-based system. Government organizations, state-owned enterprises, and corporate enterprises all invest in a state-owned data exchange at its inception. The government generally provides guidance on the strategic development plans of state-owned data exchanges, while corporate enterprises provide services and solutions to aid the operations of the data exchanges, including the establishment of data exchange platforms that connect upstream data service suppliers and downstream data requesters.

### *Expansion of access to public institution data*

The PRC government has made more public institution data available to the general public in recent years. Public institution data is defined as data generated by public institutions and state-owned enterprises in the course of performing public services or duties. The listing and exchanging of more public institution data are expected to drive the growth of the state-owned data exchange market. As the exchange-based data exchange system develops and more public institution data becomes accessible to the general public, the total addressable market of state-owned data exchange reached RMB60.0 billion in 2022, and is expected to reach RMB327.5 billion in 2027.

***Safer data exchange environment supported by innovative technologies***

Innovative technologies such as privacy-preserving computation and blockchain help to prevent data leakage and misuse, providing a safer data exchange environment that further promotes the growth of the data exchange market. Privacy-preserving computation provides stronger data protection through technologies such as federated learning, secure multi-party computation, homomorphic encryption, and zero-knowledge proof. It allows data to be shared freely and without disruption while ensuring that data with verified ownership would be properly used in multi-party modeling scenarios. Blockchain technologies offer decentralization and other high-security features and can be used to write a digital digest that reflects the ownership of data used in privacy-preserving computation. Empowered by the development of innovative privacy-preserving computation technologies, the API-enabled data exchange service market is expected to continue growing steadily.

## Competitive Landscape of the Integrated API-Enabled Data Exchange Service Market in China

Integrated API-enabled data exchange service providers are important participants in the API-enabled data exchange service market as they provide customers with comprehensive services in a wide variety of scenarios across different industries. In 2022, Juhe Data had a market share of 6.1% in the integrated API-enabled data exchange service market in China as measured by revenue. For the same year, Juhe Data had a market share of 2.1% in the overall API enabled data exchange service market as measured by revenue. Integrated API-enabled data exchange service providers enjoy competitive advantages of having extensive and diversified data sources and service coverage across different industries. Industry-specific API-enabled data exchange service providers are not expected to have material negative impact on Juhe Data's ability to compete for customer demand because Juhe Data could continually cooperate with different data sources to expand its products and services. Juhe Data is expected to further leverage its leading position in the market to expand its business scale through cooperating with different data sources and participating in the establishment and operation of state-owned data exchanges.

The table below sets forth the ranking of integrated API-enabled data exchange service providers in China by revenue and market share:

| Ranking | Company | Revenue (RMB Million, 2022) | Market Share (%, 2022) |
|---|---|---|---|
| 1 | Juhe Data | 145 | 6.1% |
| 2 | Company F[1] | 126 | 5.3% |
| 3 | Company G[2] | 80 | 3.4% |
| 4 | Company H[3] | 65 | 2.7% |
| 5 | Company I[4] | 60 | 2.5% |

(1). Company F is a leading public AI company listed on both the Stock Exchange and NASDAQ. It was founded in 2000 with a search engine business enabling web browsing. It has invested in AI since 2010. Company A had approximately 42,000 employees as of the December 31, 2022.

(2). Company G is a Chinese multinational technology company listed on the Stock Exchange and the New York Stock Exchange. It was founded in 1999 as an e-commerce platform. Its current business includes e-commerce, cloud computing, digital media and entertainment and other innovation initiatives. Company B had approximately 229,000 employees as of June 30, 2023.

(3). Company H is an API-enabled data exchange company that specializes in providing an API-enabled data exchange platform. It was founded in 2016 and is based in Guiyang, Guizhou province, China with a registered capital of RMB13.5 million. Company C has invested and participated in the operation of the Jiangsu Big Data Exchange.

(4). Company I is an API-enabled data exchange company that specializes in providing an API-enabled data exchange platform. It was founded in 2016 and is based in Hangzhou, Zhejiang province, China with a registered capital of RMB10 million and had fewer than 100 employees by the December 31, 2022.

## Entry Barriers to the API-Enabled Data Exchange Service Market in China

- ***Extensive data sources.*** Well-established service providers have already accumulated extensive data sources across different industries and scenarios. New entrants may face difficulties in accumulating such extensive sources within a short time to compete against existing players. In most cases, data-exchange service providers do not enjoy exclusive relationships with data supply sources. In selecting their customers, data supply sources consider the following important factors: (i) the number of data sources which an API-enabled data exchange service provider can provide; (ii) the respective data security and privacy policies of the data exchange service provider; and (iii) the availability of protocols and reliability of technologies.

- ***Established industry reputation.*** Customers frequently choose to work with reputable market players with proven technology and service capabilities. Without an established reputation, new entrants may find it challenging to attract customers.

- ***Strong technology capabilities.*** Service providers must continuously maintain, optimize and upgrade their technologies as unexpected incidents may adversely affect customers' businesses and lead to customer distrust. New entrants may not be able to match the technology capabilities of existing players due to lack of experience and expertise.

## Future Trends of the API-Enabled Data Exchange Service Market in China

### *Data opening initiatives and increased data application scenarios are expected to further promote data exchange*

In several recent policies, the PRC government has addressed data opening initiatives, which grant public access to non-sensitive data. For example, the General Plan for the Pilot Program of the Comprehensive Reform of the Market-based Allocation of Factors of Production (要素市場化配置綜合改革試點總體方案) proposed to form a sound and effective mechanism to share public institution data, to build a data platform for public institution data, and to prioritize public access to high value data of regulation on corporate registration, public health, transportation and weather, among others. Such initiatives are expected to promote data exchange.

In addition, application scenarios for data are expected to increase, further advancing the growth of the API-enabled data exchange service market. The Opinions of the CPC Central Committee and the State Council on Improving the Systems and Mechanisms for Market-based Allocation of Factors of Production (關於構建更加完善的要素市場化配置體制機制的意見), published in March 2020, proposed to standardize data application scenarios in agriculture, manufacturing, transportation, education, urban management, public resource trading in order to increase the value of market-oriented data. As a growing number of scenarios require data application, the demand for data is expected to continue rising.

### *Government policies are expected to create clearer industry standards and elevate entry barriers*

Relevant policies are expected to provide clearer industry standards for API-enabled data exchange services. With the introduction of additional government policies, regulations and standards, the API-enabled data exchange service market is expected to further mature, resulting in additional entry barriers. In particular, with the growing emphasis on protecting data security and privacy while facilitating data exchange, existing service providers are expected to be equipped with more advanced security and privacy-preserving technologies. Examples of such policies include: (i) the Opinions of the CPC Central Committee and the State Council on Building a Fundamental Data System to Better Leverage the Role of Data Elements (關於構建數據基礎制度更好發揮數據要素作用的意見), published in December 2022, which proposed establishing a credible data exchange system to enhance the availability, credibility, exchangeable attributes and traceability of data with an improved governance system developed in a safe manner; and (ii) the General Plan for the Pilot Program of the Comprehensive Reform of the Market-based Allocation of Factors of Production (要素市場化配置綜合改革試點總體方案), which also proposed the improvement of data sharing mechanisms.

***Integration of API interfaces on a centralized management platform***

As APIs become the backbone of communication among corporate organizations, demand for the integration of different API interfaces on a centralized management platform is expected to increase, which better enables enterprises to easily and efficiently manage and track the performance of API interfaces from different business functions simultaneously.

***Diversified product offerings as a new growth engine***

Leading service providers are enriching and further diversifying available data within the same industry or across different industries, and are expected to extend services along the API-technology value chain to provide other API-related services, such as API management and API testing, creating additional cross-selling and upselling opportunities. In the near future, increasingly diversified product offerings are expected to drive market growth and expand the business operations of market participants.

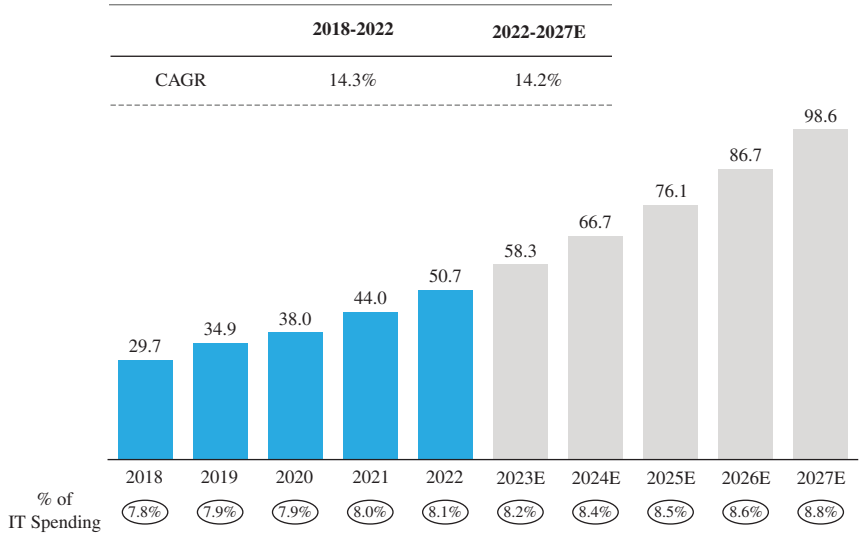
## OVERVIEW OF THE DATA MANAGEMENT SOLUTION MARKET IN CHINA

### Development of the Data Management Solution Market in China

Data management solution refers to the provision of comprehensive solutions that help government and corporate organizations collect, cleanse and analyze data accumulated throughout the data lifecycle, converting data assets into forms that can be easily used by different business departments. Data management solution includes the provision of software used to manage data assets and services including implementation, consultation, and maintenance provided by data management solution providers to end-users. In general, data management solutions include the following three key steps: (i) data collection and integration, which is the process of collecting and integrating multi-source heterogeneous data on a centralized platform by extracting data from external and internal sources using API technology; (ii) data cleansing and processing, which is the process of removing repetitive or invalid data before transforming it into a unified and standardized format that can be more easily processed and analyzed, followed by the repair of damaged data to ensure greater analytical accuracy; and (iii) data analytics and visualization, which is the process of identifying patterns and providing analyses on vast amounts of data through visual presentations.

The data management solution market in China grew from RMB29.7 billion in 2018 to RMB50.7 billion in 2022 at a CAGR of 14.3%. The data management solution market is expected to reach RMB98.6 billion in 2027, representing a CAGR of 14.2% from 2022 to 2027.

Set forth below is a table showing the actual and estimated size of China's data management solution market from 2018 to 2027, calculated based on the revenue generated from providing data software and data services in China:




(1) IT spending here excludes spending on hardware and network services.

**Competitive Landscape of the Data Management Solution Market in China**

Juhe Data's data management solutions compete in the data management solution market against other market participants' solutions. In 2022, Juhe Data enjoyed a market share of 0.2% in the data management solution market in China, as measured by revenue. There were over two thousand market players in the data management solution market with the top five players accounting for approximately 20% of market share in 2022.

There are three types of participants in this market: traditional IT infrastructure providers, internet giant-affiliated service providers and data management service providers. Traditional IT infrastructure providers are those who provide hardware such as storages, servers, network infrastructure products, and others used in IT solutions, and software is usually packed in integrated solutions for customers. Their competitive advantages are that they are experienced in providing hardware products to enterprises including SOEs in the financial service industry, telecommunications industry as well as public institutions, and have gradually expanded to providing data management solutions. Internet giant-affiliated service providers are those that provide cloud-centric service including cloud-based software, cloud-based platforms, and cloud-based infrastructure across wide categories of services such as big data and AI, IoT, DevOps, security solutions and others. Their competitive advantages are that they enjoy a strong reputation in providing data management services including cloud-based data application services, and are strong in providing data management services and digital transformation services to varied types of enterprises and public institutions depending on each provider. Data management service providers are those who are specialized in providing data management service with specialties in certain industries as well as certain modularized functions. Their competitive advantages are that they are specialized in providing service to

public institutions and enterprises in certain industries and occasionally serve as subcontractors to internet giant-affiliated service providers. Juhe Data is a data management service provider. Even though the competition in data management solution market is fierce, Juhe Data is expected to continue to satisfy customers' demand in data management solutions with its specialties in API technology and compete with existing top players or cooperate with them in certain large data management projects.

**Entry Barriers to the Data Management Solution Market in China**

- ***Established industry reputation.*** Established service providers have accumulated extensive project experience across different industries and built strong market reputation. Leading players also participate in establishing industry standards. Without an established reputation and lacking experience, new entrants typically find it difficult to compete with existing players in the short term.

- ***Strong technology capabilities.*** To remain competitive in the market, existing players typically invest heavily in technological research and development. New entrants may find it hard to match the technological capabilities of well-seasoned players within a short time.

- ***Strong capabilities to integrate resources.*** Developing data management solutions requires a substantial commitment of labor, time and various resources. Existing players typically have stronger capabilities to obtain and integrate different resources due to their experience, larger scale of business and established commercial relationships, which new entrants lack.

- ***Extensive sales channels.*** Existing players typically have extensive sales channels and well-established customer bases, while new entrants may find it challenging to build similarly extensive sales channels or commercial relationships in the short term.

**Drivers of the Data Management Solution Market in China**

***Demand for data management solutions from government and corporate organizations***

In order to accelerate their digital transformation, government and corporate organizations have demand for four types of data management solutions, including: (i) extracting external data onto internal centralized data platforms; (ii) internally sharing data across different business units and departments; (iii) externally sharing data with authorized organizations; and (iv) commercializing data platforms as services accessible by others. Government and corporate organizations have demand primarily for the first two services.

***Supply of innovative digital infrastructure driven by the increasing volume and complexity of data***

Due to the digital transformation of government and corporate organizations throughout China, the volume and complexity of data from mobile devices and various IoT devices have increased significantly. There exist many pain points such as data silos, idle resources and high operational and maintenance costs under the traditional IT architecture and data management systems. These developments have led to the supply of more advanced digital infrastructure, including 5G and IoT networks, cloud computing and large-scale data centers, which enable more efficient real-time data transmission, processing and storage and help optimize data management efficiency.

***Favorable government policies***

Policies introduced in recent years have provided a more positive environment for the development of China's digital economy and data management solution market. Key favorable policies include the Guidance of the State Council on Strengthening the Construction of Digital Government (國務院關於加強數字政府建設的指導意見), the 14th Five-Year Plan for the Development of the Digital Economy ("十四五"數字經濟發展規劃), and the 14th Five-Year Plan for the Development of the Big Data Industry ("十四五"大數據產業發展規劃).

**Future Trends of the Data Management Solution Market in China**

***Further expansion of vertical service capabilities for different industries and service types***

Data management solution providers are expected to continue enhancing their service offerings and expanding their service capabilities. For government organizations, data management solutions are expected to help them effectively integrate different data on a centralized platform, breaking down barriers arising from heterogeneous data and promoting efficiency in governance. For corporate organizations, service providers are expected to continue leveraging technologies such as RPA, blockchain, and federated learning to tailor their solutions to the needs of individual customers, helping corporations increase efficiency and enabling them to make better-informed decisions based on data analysis. Data management solution providers are also expected to expand their service offering to cover an increasing number of industries and service types, including the digital transformation of SOEs and industrial enterprises. The enhanced solutions are expected to attract more customers, in turn accelerating the nationwide digital transformation of government and corporate enterprises, and driving the growth of the data management solution market.

***Continued emphasis on data management in the development of China's digital economy***

The PRC government is expected to continue fostering the expansion of China's digital economy through favorable policies in the next five-year plan. Government and corporate organizations are expected to continue utilizing data management solutions to facilitate their digital transformation, driving the expansion of the overall digital economy and the data management solution market.

***Technological advancement is expected to improve the efficiency of data management***

Data management is expected to become more efficient as a result of advancement in technologies using artificial intelligence, RPA, and blockchain among others, to automatically identify and verify data rules and discover relationship between data in a more visualized way, improving the efficiency of data management.

***Adoption of low-code data management tools is expected to lower data application threshold***

Low-code data management tools allow government and corporate organizations to utilize data management platforms more easily, as they enable customers to quickly and intuitively complete configuration of applications through modularized ways. The use of such tools is becoming a trend in the market and is expected to encourage organizations to increase their use of data management solutions.