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UNLEASHING THE ECONOMIC POTENTIAL OF DATA IN KAZAKHSTAN

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Executive summary

In the modern world, data is becoming a **strategically important resource**, forming a **new model of economic development** based on their active use. Countries around the world are steadily investing in the data economy and reaping tangible benefits through the implementation of advanced analytics solutions, artificial intelligence (AI) technologies, and new business models.

The example of **China** is illustrative, where **data** is officially recognized as a **full-fledged factor of production** along with labor, capital, land, knowledge and technology. This step accelerated their integration into the economy and gave impetus to the development of monetization mechanisms.

Kazakhstan, having a high level of digitalization and actively developing digital services, accumulates significant amounts of data. This creates the preconditions for the country's inclusion in the **global data economy**. However, today only a small portion of this data is used for exchange and creation of data products.

Effective use of data is **hindered by a number of factors**: the lack of clear legislative mechanisms for exchange and monetization, limited access to data, as well as unresolved issues of security, confidentiality and ethics of data usage.

As part of the **Data for Common Purpose Initiative**¹, the **World Economic Forum** emphasizes the need to create **transparent** and **regulated platforms** for the exchange and monetization of data, the so-called **data exchanges**. These platforms provide a balance between commercial value and protection of the rights of data subjects, allowing businesses and the government to maximize economic benefits.

International experience shows that data exchanges are becoming an important part of the new digital infrastructure. The United States, China, and Japan have already begun to form such platforms, which has given additional impetus to the development of the data economy. There are precedents for **innovative forms of monetization**: from using data as additional collateral to licensing them for training AI models. These processes contribute to the formation of the institutional framework necessary for the recognition of data as a full-fledged economic asset.

In order to unleash the economic potential of data in Kazakhstan, it is planned to create **national data exchanges**, regulated platforms that ensure the secure and controlled exchange of verified data and data products between market participants. **The main functions** of such exchanges include: formation of a mechanism for fair pricing and valuation of data; legal protection of ownership rights and control over data use; ensuring security and confidentiality standards; implementation of digital contracts and licensing; expansion of access to data for the development of AI and digital services.

This document provides an overview of international experience, possible operational models of the exchange, approaches to regulation and security. The development of the data market requires the participation of various stakeholders and the building of an open public dialogue, which became the basis for the preparation and publication of this material.

1. Introduction

1.1 Data as an asset

The rapid growth of data volumes worldwide is having an increasingly significant impact on the economy, technology, and society. According to Statista, the total amount of data created, recorded, copied, and consumed globally is projected to reach **182 zettabytes by 2025** – almost **three times** the level of 2020².

Against this backdrop, data is increasingly becoming a source of economic benefit and turning into a full-fledged strategic asset.

Global experience demonstrates a **variety of data monetization models** depending on the type of data, business model, and industry. In general, the practices of monetization and analytical use of data can be divided into two main categories: **internal** and **external**.

Internal data monetization involves using an organization's own data to assess internal processes, identify cost-saving opportunities, optimize workflows, and develop new business models.

External data monetization refers to generating revenue by selling data to third parties, providing data-driven services, or creating data-based products such as analytics tools and platforms.

Additionally, data can be used as **collateral** to secure financing, thereby increasing the market value of companies. While the use of data as a financial asset remains relatively rare, such cases set important precedents, opening new investment opportunities particularly for tech startups and data-rich enterprises.

For instance, during the COVID-19 pandemic, several major U.S. airlines leveraged their loyalty program data (e.g., AAdvantage, SkyMiles, MileagePlus) as collateral to secure loans. Namely, United Airlines raised \$6.8 billion, Delta Airlines - \$9 billion, and Spirit Airlines - \$0.9 billion³.

In China, where data is considered as a new type of factor of production, temporary accounting standards for corporate information resources were introduced in 2024. As a result, as of September 2025, more than **5000** Chinese enterprises have included information assets in their balance sheets, and their total recognized value has exceeded **200 billion yuan**. The volume of collateral financing of information assets has reached **80 billion yuan**, and innovative tools such as **data trust management** and **data securitization** are being piloted in certain zones⁴.

For example, Shanghai Data Exchange has implemented the "**Data Easy Loan**" mechanism, which allows technology companies to use data as collateral for loans. Thus, for example, Shanghai Xinhuaheyun Data Technology Co., Ltd., a company working in the field of big data for the chemical industry, was able to receive 1.5 million yuan⁵.

In order to reflect the value of data in 2025, the System of National Accounts, jointly developed by the European Commission, the IMF, OECD, UN and World Bank, officially classified the "**information content of digital data**" as a new category within the "produced fixed assets", expanding the boundaries of assets.



These examples demonstrate the growing importance of data as a **new class of asset**, while pointing to the need for further development of mechanisms for its assessment, legal protection, and standardized exchange.

1.2 Data as a fuel for artificial intelligence

The development of **artificial intelligence** (AI) technologies has given a powerful impetus to the **monetization of data**, making it a **key factor of competitiveness** not only for companies, but also for states. According to McKinsey AI can add between **\$2.6 trillion** and **\$4.4 trillion** per year to **global GDP** by increasing productivity and creating new markets⁶.

One of the main factors for the effectiveness of AI systems is the **availability and quality of data**. The effectiveness of models is directly proportional to the amount and variety of data on which they are trained. At the same time, according to IBM, **about 80-90%** of all global data remains **unstructured**⁷, which limits their practical application. Modern AI algorithms allow us to partially solve this problem: to structure chaotic arrays, extract valuable information from them and involve them in economic turnover.

However, experts predict **a shortage of open and learnable data over the next five years**. A significant part of the valuable sets remains unavailable due to legal restrictions, confidentiality requirements, and commercial secrecy. For example, the **General Data Protection Regulation** (GDPR)⁸, adopted as the basis in a number of countries, imposes strict requirements on the processing of personal information, thereby narrowing the possibilities for using large amounts of data in AI projects.

Amid growing demand, major providers have begun entering into **licensing agreements with AI companies** for the commercial use of content for training models. Such deals reach hundreds of millions of dollars. In particular, the five-year agreement between OpenAI and News Corp is estimated at more than **\$250 million**⁹. On the one hand, it opens up new horizons of monetization for copyright holders. On the other hand, the high cost of contracts is becoming a serious barrier for small companies and startups, especially in the absence of uniform and transparent pricing mechanisms.

As an alternative, **synthetic data** is increasingly being used - artificially generated sets that repeat patterns of real data. They make it possible to compensate for the lack of open sources and circumvent restrictions associated with the processing of personal data. However, synthetic data are inferior to real data in terms of effectiveness: they are limited in variability, poorly reproduce rare scenarios, and can implicitly reinforce systematic errors.

Against this background, the formation of a **sustainable, transparent and balanced ecosystem of data exchange and use**, which would take into account the **interests of all participants** - consumers, providers and data subjects, becomes especially relevant. The development of such mechanisms is becoming a prerequisite for the large-scale implementation of AI and the disclosure of its economic potential.

1.3 Conditions for unleashing the potential of data

The World Economic Forum's report, "Data-driven Economies: Foundations for Our Common Future"¹⁰, outlines five key requirements for data ecosystems that must be met to unleash their full potential:

- 
- 1. Simplified interaction between data providers and data consumers.** Mechanisms should be in place to enable companies, government agencies, and research organizations to easily discover, request, and exchange data, thereby enhancing its utilization efficiency.
 - 2. Combining data sources to create new value while maintaining ethical and legal standards.** Integrating data from various industries and platforms can yield deeper insights but requires strict regulation of access and usage.
 - 3. Enabling multiple-use scenarios for data.** Data should be applicable across a range of use cases, from business analytics and forecasting to public sector initiatives and governance optimization.
 - 4. Ensuring fair distribution of risks and rewards.** Equitable models must be developed to ensure that all ecosystem participants benefit fairly from data exchange while minimizing risks of misuse.
 - 5. Adopting Privacy-Enhancing Technologies (PETs)¹¹.** Technologies such as confidential computing and federated learning allow data to be analyzed without exposing sensitive personal information, reducing privacy risks.

These principles can be implemented through the creation of **data exchange platforms (data exchanges)**, which ensure secure and regulated access to information, as well as transparent conditions for data usage and monetization.

A stylized map of Kazakhstan is shown in the background, overlaid with a network of white dots and lines. The map is light blue and yellow. The network is a complex web of white dots connected by thin white lines, creating a mesh-like pattern across the entire page. The background has a gradient from light blue to light yellow.

02

DATA ECOSYSTEM IN KAZAKHSTAN

2. Data ecosystem in Kazakhstan

2.1 Current situation

The significant growth of data volumes in **Kazakhstan** contributes to the development of the data economy, while simultaneously creating **new institutional** and **technological challenges**, as well as **growth points for the national digital agenda**.

In recent years, there has been a substantial increase in the use of digital services across the country. From 2020 to 2023, the share of cashless transactions grew from **68% to 86%**¹², the share of e-commerce in retail trade increased from **4.1% to 12.7%**¹³, and the share of the population with internet access rose from **88.2% to 94.7%**¹⁴. As a result, large volumes of data are being accumulated, driving the development of digital solutions based on this data.

According to International Data Corporation (IDC) estimates, the data market in Kazakhstan has been growing at **double-digit rates** in recent years, reaching **€556 million** in 2023¹⁵. The **financial** sector is the largest industry in this market, with a volume of **€109 million** (20%). The key market players are retail, marketplaces, service and product aggregators, telecom operators, as well as the public sector, industry, and professional services.

A key factor in the development of the data market in Kazakhstan at the current stage is **internal monetization**, which allows organizations to increase operational efficiency, reduce costs and accelerate the development of new digital solutions.

There is also a developing practice of **external data monetization** – trading **data products**, including analytical services. In particular, data transactions are carried out in order to identify the **target audience** and **target advertising**, **analyze competitors** and **search for customers**, improve **credit scoring** processes, as well as make decisions within **compliance procedures**. Subscription-based platforms and services are widely used to provide counterparty and procurement analysis based on open government data sources.

Additionally, **geolocation data** from GIS services and telecom operators are being integrated into economic activities. Information about locations and movements is used both in the commercial sector and in public administration, including tourism and migration flow monitoring.

Data from public utilities is beginning to play an important role - information on electricity, water, gas consumption and data on the removal of solid household waste. Their use contributes to improving the efficiency of urban management, optimizing utility costs, and creating conditions for the development of «smart city» solutions.

There are examples of **cross-industry data usage**, where companies from different sectors combine their information resources to achieve a synergistic effect. In particular, telecom operators and retailers are integrating data to build more accurate target audience profiles. This allows for more effective marketing campaigns and optimized logistics and supply chains.

An additional impetus to the **development of integrated solutions** was given by the placement of public services on external private digital platforms. The COVID-19 pandemic accelerated this process by facilitating the integration of government services into the online services of second-tier

banks and other private providers. This provided citizens with convenient access to key services under restrictions and demonstrated the effectiveness of the distributed delivery model for government functions.

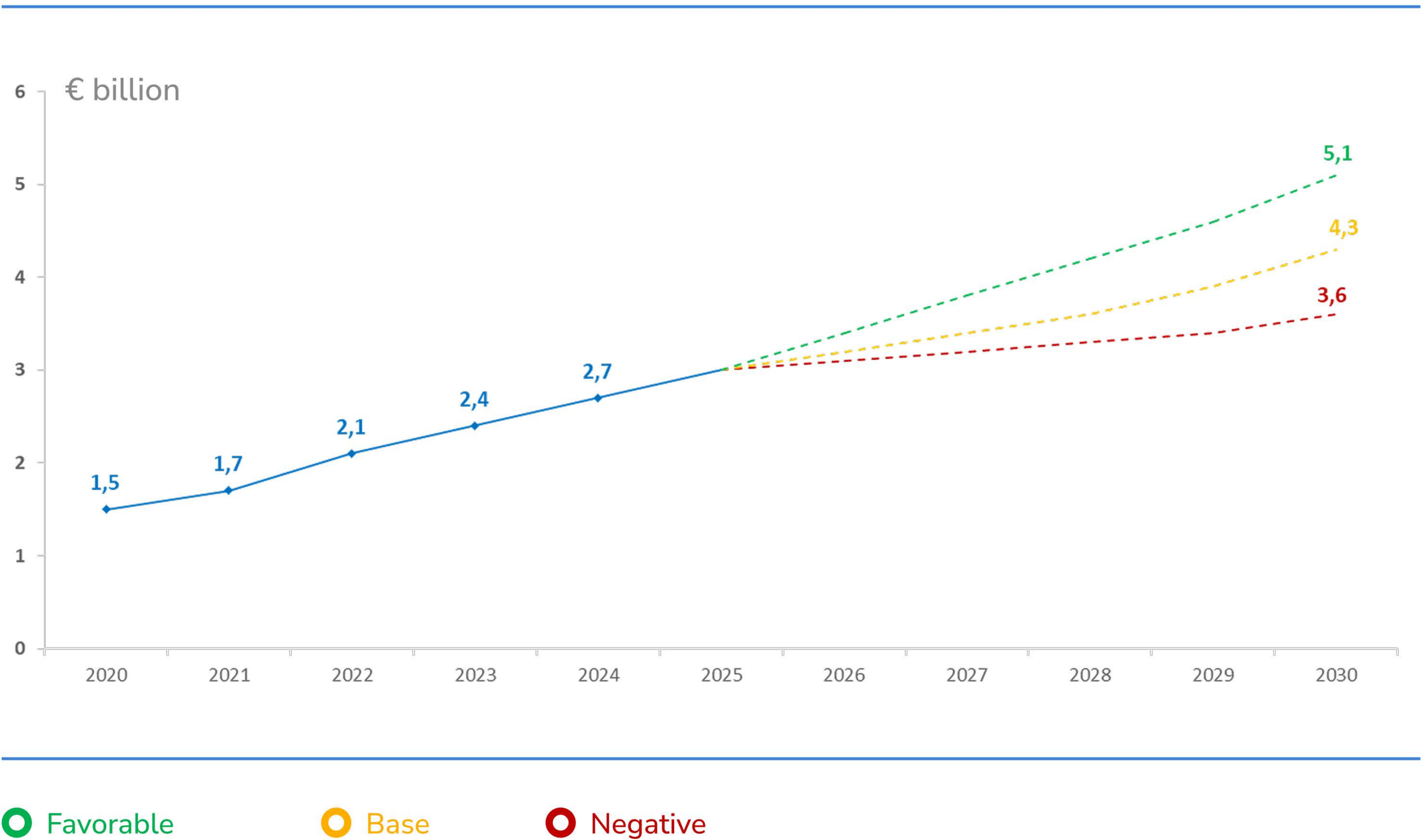
The experience of such cases shows that expanding the access of private companies with a wide customer base to government data not only simplifies the interaction of citizens with government agencies, but also significantly increases the scale and speed of the introduction of digital public services in the market.

Thus, despite the fragmented nature of the data market, **key players** and **successful cases** have emerged, demonstrating the growing demand for data and its active use across industries. The development of commercial monetization models in Kazakhstan demonstrates an increase in trust in data and its value as an economic asset.

Along with direct monetization, the use of data has a **multiplier effect on the economy**, stimulating **overall growth** and contributing to the formation of a **full-fledged data economy**. According to IDC estimates, the volume of the data economy in Kazakhstan in 2024 amounted to **€2.7 billion**. According to the **baseline scenario**, by 2030 it will increase 1.6 times and exceed **€4.3 billion**. If the **high growth scenario** is implemented, it will increase by 1.9 times to **€5.1 billion**.

At the same time, IDC research also indicates that, compared to EU countries, Kazakhstan's data market is still in its **early stages**. Whilst the share of data economy in GDP of Kazakhstan comprised **1.3%** in 2023, the share of this indicator in EU reached **5%** of GDP. Moreover, unlike the EU, Kazakhstani companies **rarely export** data and data products. This presents a potential growth area, considering the maturity of Kazakhstan's IT market¹⁵.

Prospects for Kazakhstan's Data Economy



Differences between the data market and the data economy

According to IDC, **the data market** is defined as a market where digital data is exchanged as "**products**" or "**services**" resulting from the processing of raw data. It is measured as the **total value of the demand for digital data and the value of data sold or exchanged in the market**. The size of the data market includes imports (data products and services purchased from global digital market suppliers outside Kazakhstan) but does not account for exports of Kazakhstani data-processing companies.

In contrast, **the data economy** encompasses the overall impact of the data market on the economy. It includes data generation, collection, storage, processing, distribution, analysis, development, delivery, and utilization, all enabled by digital technologies. The data economy incorporates the data market as its direct economic impact, while also consisting of indirect and induced effects that the data market has on the broader economy.

To further develop Kazakhstan's data market, an institutional and legal framework is being established. Legislative initiatives are being implemented to regulate digital data, including the development of regulatory standards in **personal data protection, cybersecurity, and the digital economy**. In particular, the **Law on Personal Data and Their Protection** is in force, which governs the collection, storage, and use of information and establishes liability measures for violations. Additionally, **Data Management Requirements** have been adopted, aimed at creating a unified data management system within government agencies and other organizations, representing a key step in the country's digital transformation.

The new edition of the Law on State Statistics, adopted in July 2024, provides for the use of **alternative data** (data from private providers) in the formation of statistical and analytical information. A **data quality controllers institute** has been introduced to assess the quality of data from administrative sources¹⁶. Additionally, Data Quality Assessment Rules have been approved, establishing the following criteria: accuracy, completeness, consistency, integrity, relevance, uniqueness, reliability, and timeliness.

Alongside the development of the data ecosystem, Kazakhstan is implementing systemic measures to advance **artificial intelligence**. The **Committee on Artificial Intelligence** has been established, the **Concept for AI Development** for the next five years has been adopted, and a draft Law on **Artificial Intelligence** is currently under development. Kazakhstan has also launched a supercomputer cluster to support the development of a large language model in the Kazakh language **KazLLM** and to create AI-based products using this model and industry-specific datasets.

2.2 Barriers and challenges

At the same time, several barriers limit the unleashing of the economic potential of data.

1) Legal framework

The data market in Kazakhstan remains largely **unregulated**. Current regulations primarily cover the protection of personal data and digital assets, while rules for the exchange and monetization of data between organizations, as well as requirements for the activities of data providers, have not yet been developed.

2) Information security and ethics

The lack of a clear legal framework in the context of accelerated digitalization leads to an **increase in unregulated data transactions**. This carries risks of leakage of personal and corporate information, as well as exacerbates issues of ethics and data ownership. In practice, personal data is often used outside of the original purposes of collection, without informing their owners, which requires a legislative and institutional response.

3) Data quality

Despite the centralized collection of government data, only a small part of it is used due to the **low quality** caused by the inconsistency of existing business processes with data management standards.

The assessments carried out by the Bureau of National Statistics as part of the mandate to verify administrative data confirm the existence of systemic problems¹⁶. The identified violations included duplicate and abnormal values, empty fields, incorrect BINs, and the use of inconsistent classifiers. As a result, despite significant volumes of accumulated data, only a limited amount of information is used for analysis and decision-making.

At the same time, data from alternative (private) providers remains out of sight due to limited access and the lack of mechanisms to verify their quality and reliability.

Overcoming these barriers requires an integrated approach: the introduction of modern data protection and management technologies, the creation of a transparent regulatory framework and the formation of a sustainable ecosystem of interaction between all market participants. Data exchanges - regulated platforms that ensure safe and controlled exchange of reliable information, can become an effective tool capable of systematizing work with data.

03

DATA EXCHANGE AS A
PLATFORM FOR UNLEASHING
THE POTENTIAL

3. Data exchange as a platform for unleashing the potential

3.1 What is a data exchange?

Data exchange platforms can be categorized into three main types based on their purpose, functionality and participants: **corporate data exchange platform**, **data marketplace** and **data exchange**. Corporate platform offers the exchange of data within or between organizations, the marketplace provides a platform for the purchase and sale of data. In turn, the **data exchange** offers a **wider range of services** that precede and follow the actual data exchange, including listing data products, assessing their quality and value, conducting compliance, and providing financial instruments, including using data as collateral.

Comparison table of data exchange platform types

Criteria	Corporate data exchange platform	Data marketplace	Data exchange
Goals	Data exchange within or between organizations	Selling or buying data	Data monetization through trading, licensing, and collaterals
Monetization model	Internal use	One-time purchase and sale of data, possible subscriptions	One-time purchase and sale of data, subscriptions, licensing, collaterals
Regulation	Minimal	Simplified	Comprehensive (audit, compliance, data provenance verification)
Functionality	Data exchange	Data exchange and monetization	Data exchange and monetization, quality assessment, valuation, development of financial instruments, compliance checks
Pricing	Free	Fixed (at the discretion of the data provider with possible price inflation)	Dynamic (the more buyers and transactions, the lower the price)
Participants	Internal users	Data providers and data consumers	Data providers and data consumers, quality and value assessors, compliance experts, brokers

It is important to note that terminology in this field is still evolving. Various terms and definitions are used depending on the context, and there is no single approved terminology.

According to **WEF**¹⁷, a data exchange is a platform for managing the circulation of data between various economic stakeholders, both within and outside organizations, across industries and borders, with the goal of obtaining direct or indirect benefits, while ensuring a high level of trust, security, and compliance with rules and regulations.

For the purposes of this document, using the following broader definition is proposed: *a data exchange is a regulated platform that enables secure and controlled exchange of verified data and data products among various market participants.*

Similarities and differences between data exchanges and stock exchanges

The similarities and differences between data exchanges and traditional financial exchanges such as NYSE и Nasdaq¹⁸ play a crucial role in understanding their operation. Both platforms enable the exchange of valuable assets and require trust to operate optimally, with financial exchanges focusing on transparency and regulation, while data exchanges focus on data authentication and verification.

However, data and financial assets have fundamental differences: data is replicable and can be used by multiple parties simultaneously, whereas stocks and other financial instruments are transferred from one owner to another. This means that data exchanges must address issues of data authenticity and integrity through technologies such as blockchain and strong authentication protocols, while financial exchanges are strictly regulated to ensure the exclusivity of ownership. As a result, data exchanges require specific regulatory frameworks and technologies to ensure security and trust, distinguishing them from traditional financial exchanges.

3.2 Data exchange models

In international practice, **several models** exist for the development of data exchanges:

Government model

The government model of data exchange involves government agencies establishing a company that operates a platform for the exchange and use of data, regulating its collection, processing, and access. In this model, the government ensures equal access to important data for businesses, research organizations, and citizens, while establishing rules for its safe use, protecting personal data, and ensuring compliance with the law.

Example of a state model

There are approximately **50 regional** data exchanges in China, with platforms created under provincial administrations. The administrative data forms the foundation, which is then supplemented by data from “partners”. The list of “partners” includes large companies such as Tencent Cloud, JD, and other private companies in the fields of technology, retail, and more. Each data exchange is tailored to the specifics of its region and may include unique datasets aligned with local needs¹⁹.

The key platform is the **Shanghai Data Exchange (SDE)**, established in 2021. It offers centralized access to data, enabling oversight and regulation of financial transactions. One of the first transactions on the exchange involved the Shanghai branch of the Industrial and Commercial Bank of China, which signed a data usage agreement with Shanghai Electric Power Company to enhance its financial products. SDE offers a range of services, including data compliance consultation, data quality assessment, and data product valuation. Since its launch in November 2021, SDE has registered over 2,700 data products, and its transaction volume in 2023 exceeded 1.16 billion yuan.

Private model

The private data exchange model assumes that the data exchange platform is managed by private companies. In this model, access to data, its collection, processing, and use are regulated by internal company rules as well as market mechanisms. Private data exchanges may aim to monetize data by providing access to valuable data for a fee or through a subscription, which facilitates the creation of new business solutions and products.

Japan Data Exchange (JDEX) was established through a strategic partnership between the private trading organization Kanematsu Corporation and Dawex. The service was launched in late 2020, with Japanese corporations from various industries (energy, insurance, retail, etc.) as the main participants on the platform. The goal of JDEX is to contribute to the promotion of a cross-industry and cross-border data exchange environment, fostering the development of a data-driven economy²⁰.

Examples of private model

***AWS Data Exchange** is a service provided by Amazon Web Services (AWS) in the United States that allows data consumers to discover, subscribe to, and use third-party data in the AWS Cloud. It simplifies the process of data integration, enabling data consumers to quickly access valuable datasets from multiple data providers. Data consumers can easily discover and subscribe to more than 3,000 products from 250 data providers, making it one of the largest marketplaces for third-party datasets²¹.*

***Datarade**, a German platform founded in 2018 in Berlin, is designed to simplify the process of finding, comparing, and accessing data products from different providers. It enables Data consumers to discover over 1,500 data providers across more than 80 categories. Data providers can host their datasets on the platform, allowing them to monetize their information assets. Datarade also supports “exchange as a service” models, where data consumers can share their data with other participants²².*

Data exchanges are forming a qualitatively new approach to treating data as an asset. For example, in China, transactions have been recorded for the sale of data on the use of electricity, urban infrastructure and environmental parameters.

A data exchange facilitates the trading of not only datasets but also a wide range of data-related products and services. This includes data products, complex analytics solutions and services, algorithmic tools, services, and access to computing power²³.

Cases of monetization on data exchanges

Cases	Data	Examples
Smart city	urban digital infrastructure data	Deqing city’s comprehensive data was listed on the Shanghai Data Exchange with a valuation of around USD 26 Million
Electric power industry	electricity usage data	China's Ningbo Bank has approved a loan for an electronics maker based on electricity consumption data obtained through the Shenzhen Data Exchange

Cases of monetization on data exchanges

Cases	Data	Examples
ESG	environmental sensor data	Environmental sensor data was sold to companies on the Beijing exchange for compliance monitoring and sustainability reporting purposes.
Logistics	route data	COSCO Group lists shipping routes and freight rates on the exchange, which are purchased by e-commerce companies to optimize costs.
Cross-border data	unstructured data from news agencies	A foreign hedge fund has purchased SmarTag, a product that converts unstructured Chinese-language news into machine-readable metadata, on the Shenzhen exchange

3.3 Roles

Participants in data exchanges may include various groups and organizations that are interested in exchange, sale, analysis and use of data.

	Data providers	Public or private sector organizations (government, business, non-profit organizations, or individuals) that create, provide, update, protect, and store data
	Data consumers	Individuals and legal entities interested in acquiring data for various purposes, such as analysis, business improvement, forecasting, or scientific research
	Data exchange service providers	An organization that provides data exchange services by operating a data exchange platform
	Data quality assessors	Individuals or organizations that evaluate datasets and data products against quality criteria
	Compliance assessors of data provenance	Professionals or organizations that review data for compliance with security, privacy, and monetization criteria
	Brokers	Professionals or organizations that provide mediation between data providers and data consumers

3.4 Assessing the value of data products

Assessing the value of data is a complex and multi-layered process that takes into account both its economic value and the unique characteristics that distinguish data from traditional assets. Unlike physical resources, data are **inexhaustible**, multiply **reproducible**, and can be **scaled** without loss of quality. However, these features make it difficult to determine their exact value in the market.

According to PWC report «Putting a value on data», there are three main approaches to data valuation: **the cost-, market-, and income-based**²⁴.

- **The cost-based method** estimates the value of data based on the costs associated with collecting, processing, storing, and securing it. While this approach is suitable for technical evaluation, it does not account for the potential profit that can be derived from the data.
- **The market-based method** determines data value by comparing it with similar datasets that have already been traded on open markets. This approach requires a developed data trading infrastructure and transparent pricing mechanisms.
- **The income-based method** evaluates data based on its ability to generate future economic benefits. For example, data can be used to optimize business processes, develop new products, or improve decision-making, enabling the calculation of its value based on discounted cash flow.

Objectively determining the value of data remains a complex task and **challenge** in data valuation. Currently, pricing on data exchanges is primarily negotiated and lacks a **systematic solution**.

The absence of generally accepted data valuation standards may result in **unjustifiably low** or **high** asset prices. introduction potential solution is the implementation of methodologies based on international experience and established practices of data exchanges.

3.5 Technological basis of data exchanges

Ensuring the **trust** of data providers and consumers is a priority in the development of data exchanges. The sustainability of the data exchange ecosystem directly depends on the availability of technological and institutional mechanisms that guarantee the protection of the interests of all participants.

Today, technological solutions already exist that allow us to ensure a balance between privacy and data usefulness. Depending on the level of sensitivity and openness, **different exchange models** are used. For example, when working with **open** and **ready-made datasets**, API services are used to provide automated and standardized access to information.

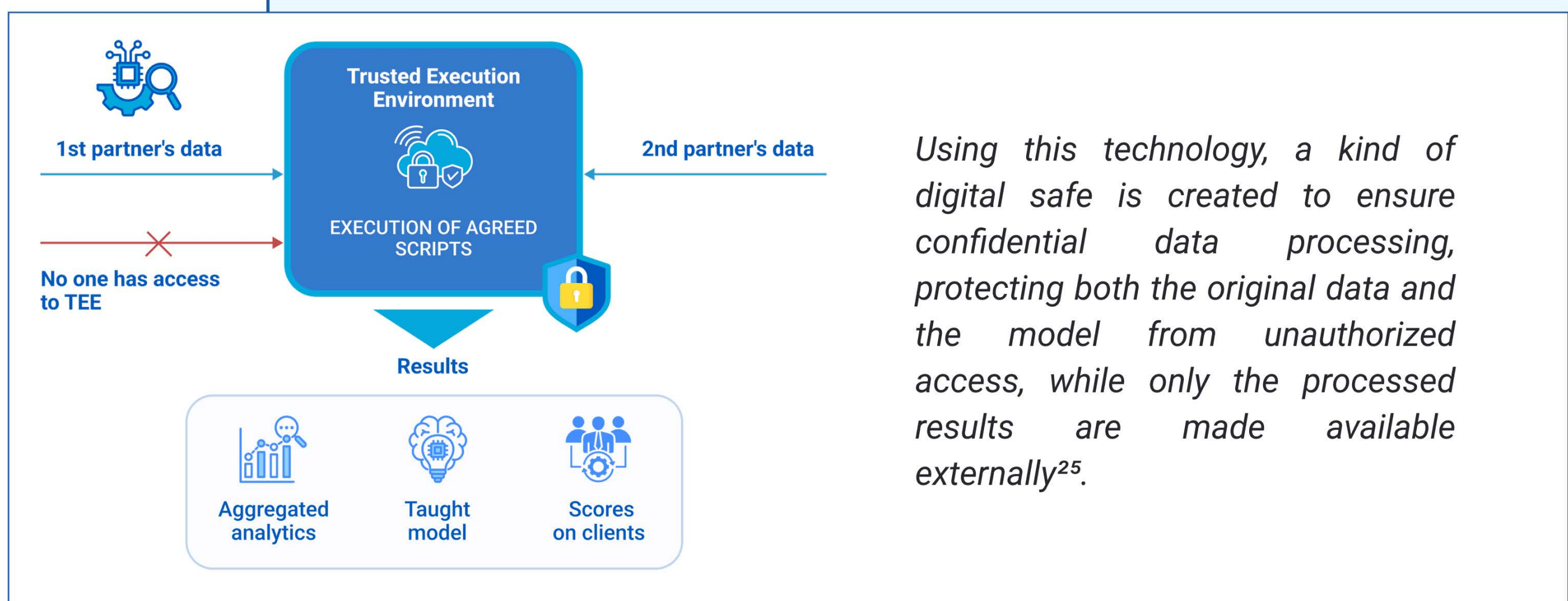
Sensitive or limited accessible data is processed using confidential computing technologies (Privacy-Enhancing Technologies, PETs), that provide a high level of protection. As noted in the UN report UN Guide on Privacy-Enhancing Technologies, these technologies are critically important for the sustainable development of global ecosystems of data exchange¹¹.

The key feature of **confidential computing** is that the object of exchange is not the provider's data set itself, but the **aggregated result of their processing**. Thus, buyers on the exchange do not get access to the data itself, but to products based on it, for example, analytical models, indexes or predictive

estimates. This allows you to maintain control over the source data, minimize the risks of leakage and at the same time use their economic value.

Confidential computation

Confidential computation refers to a set of techniques that enables multiple participants to perform a computation based on each other's confidential inputs in such a way that no participant can access any information about the others' confidential inputs.



Confidential computing is widely applied in various fields, including

- *Financial services:* Banks can assess customers' creditworthiness without accessing their full financial information from other institutions.
- *Medical research:* Enables the analysis of patient data without revealing personal information, which is critical for maintaining privacy.

04

ESTABLISHING DATA EXCHANGES IN KAZAKHSTAN

4. Establishing of data exchanges in Kazakhstan

4.1 Main objectives and functions of data exchanges

The creation of data exchanges in Kazakhstan will form the institutional framework for the legitimate and secure handling of data, ensuring their accessibility while unconditionally respecting the rights of owners and the protection of personal data.

Objectives of data exchanges:

- Establishing a legal framework for regulating the Big Data industry;
- Enabling data monetization for market participants;
- Providing data to improve the efficiency of public administration, the private sector, and emergency services;
- Ensuring the security and privacy in the operation of the data exchange platform.

Functions of data exchanges:

- Providing a platform for secure data exchange;
- Certification of datasets for compliance with data quality criteria;
- Generating analytical insights based on combined data sources;
- Developing a regulatory framework for pricing, recognizing data as a digital asset, and other monetization issues.

Principles of data exchanges



Openness

Ensuring accessibility, transparency, and free exchange of data between all ecosystem participants.



Licensability

Having clear rules and conditions for data use, including the transition from transfer to licensing, mechanisms for monitoring violations, resolving disputes, and managing data subject consent.



Security

Protection against unauthorized access and leaks through depersonalization, anonymization, and the use of confidential computing technologies.



Value

Access to high-quality and value-rich data that can be transformed into monetizable data products, used for direct sale or act as a collateral asset.

4.2 Model

Based on the analysis of international experience and the current level of maturity of Kazakhstan's data industry, it is proposed to use a **hybrid model for the development of data exchange platforms** with the participation of both the government and the private sector.

Within the framework of this model, the **government** forms the "**rules of the game**" through the development of standards, regulatory norms and mechanisms for the protection of personal data, while **private partners** play a key role in creating an effective and trust-based data exchange infrastructure.

In order to involve data in economic turnover, it is planned to develop a decentralized data exchange infrastructure based on international experience, including China.

This approach aims to create a flexible and competitive environment that stimulates the development of innovative business models and maximizes the economic potential of data across various sectors. Based on common standards, transparent regulatory rules and data management requirements, a data trading market will be created – **a market for data exchanges**, where data and products derived from them can be considered as a full-fledged economic asset.

One of the key missions of data exchanges will be to increase the **availability of data** to a wide audience, which involves the introduction of incentive measures and the formation of special jurisdictions that encourage legitimate, secure and transparent data exchange.

This is expected to lead to an **increase in data quality** in both the public and private sectors. As part of this task, data exchanges will perform the functions of evaluating the quality and certifying datasets **for compliance with established criteria** such as accuracy, completeness, relevance and reliability.

Government data will be **subject to mandatory** quality control and certification, while for the **private sector** such a procedure will remain **voluntary**. At the same time, private companies will be offered incentive mechanisms that motivate them to verify and certify their data.

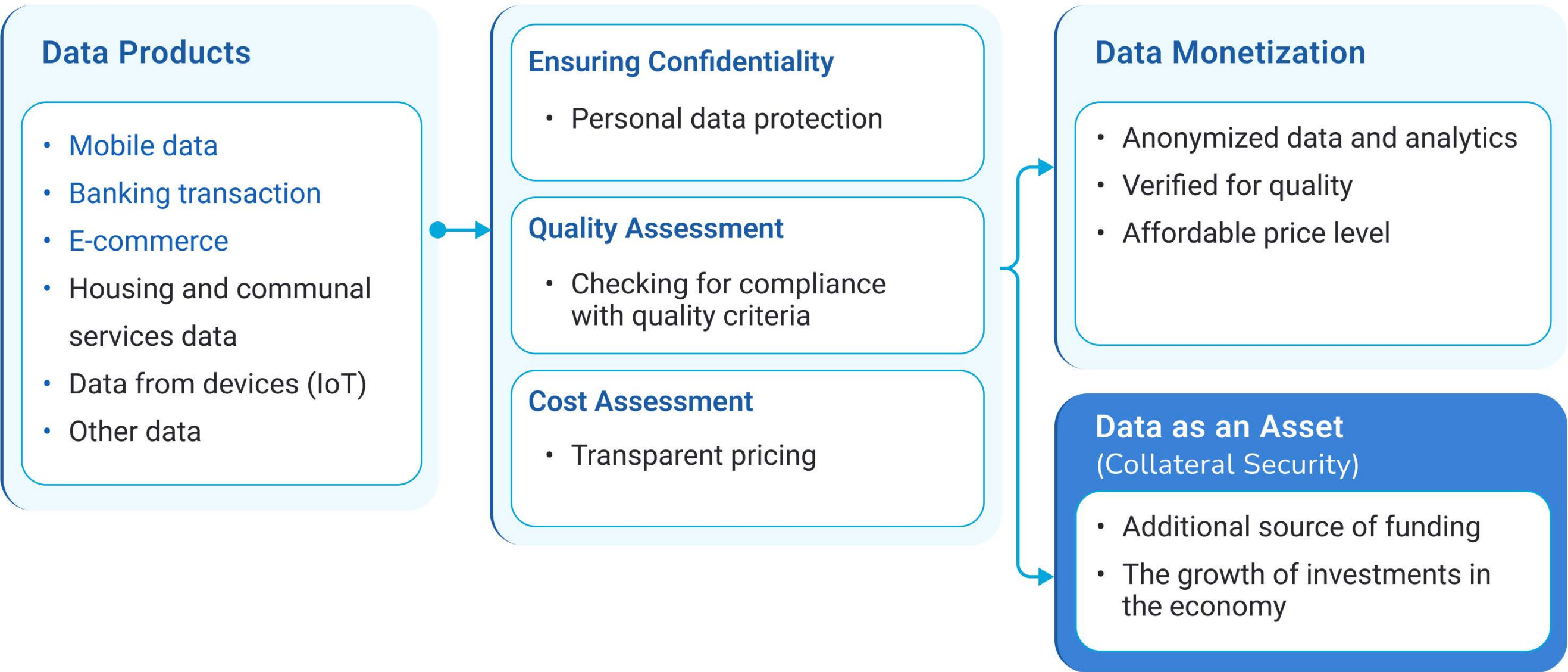
By doing so, data consumers, including startups, will have access to **validated** and **quality-assessed** datasets, while data providers will be able to extract added value from their datasets.

Thus, the establishment of data exchanges will become a key element of the institutional infrastructure of the data economy, facilitating the recognition of data as a **valuable asset**. This will create conditions for responsible data usage and monetization, including quality verification, legal provenance checks, and valuation assessments.

The concept of data exchange functioning in Kazakhstan

Data providers

Data Exchange



To attract long-term financing, an **Endowment Fund** can be created at data exchanges aimed at supporting promising and innovative projects in the field of data economics. The Fund will provide financing for experimental and low-budget (baby-CAPEX) initiatives with high potential that do not have stable sources of support.

Raising funds for the Endowment Fund:	Principles of Endowment Fund operation:
• Contributions of new participants of the data exchange • Income (commission) from successfully funded projects • Corporate financing, grants, and targeted donations from foundations, international organizations, and corporations	• Financing pilot projects for the development and testing of new data products • Structuring and supporting projects to achieve economic sustainability and profitability • Reinvesting income in expanding the infrastructure and ecosystem of the data exchange

4.3 Types of services on exchanges

As part of the operation of data exchanges, it is planned to provide a wide range of services reflecting modern approaches to the commercialization and economic use of data. The key models are the following:

Data as a product

Within the framework of this model, data is a commercially significant product available for purchase in a standardized and structured form. Consumers are given the opportunity to receive ready-made datasets adapted to various application tasks.

The data can be implemented according to various schemes — from a one-time sale to provision by subscription or on an individual request, depending on the format, volume and conditions of use.

Data as a service

This model provides remote access to data and derived analytical products without the need for physical transfer. Consumers have the opportunity to interact with data in real time or on request, within the established access level and contractual terms.

To ensure data security and privacy, **confidential computing technology** is used, which allows data to be processed in a **secure environment** without disclosing its contents. The processing results are provided to users through a confidential computing mechanism, which guarantees the **safety** and **security** of the source data at all stages.

This model helps to reduce barriers to data use, expand the range of consumers, and integrate data into operational processes without the need for ownership.

Data as collateral

This model assumes the use of data as an intangible asset that can act as collateral for attracting financing.

To this end, exchanges can implement a mechanism for listing data products with a preliminary assessment of their market value and legal registration of rights to the asset. Based on the results of the listing, a **certificate is issued confirming the market value of the asset**, which can be used as part of financial instruments, including when interacting with partner financial institutions.

This approach promotes the recognition of data as a full-fledged element of economic value, expands participants' access to financial resources, and creates conditions for the development of the intangible asset market.

Thus, the data exchange will serve not only as an exchange platform, but also as an **infrastructure operator** that ensures the **standardization, trust, security** and **legal validity** of all data transactions. This will create the prerequisites for the formation of a full-fledged data market as a **strategic** segment of the digital economy.

4.4 Legal framework

Regulation of data exchanges

The creation of data exchanges is planned within the framework of special legal and regulatory conditions based on English law. This reflects the commitment to fostering innovative financial technologies and data-driven digital solutions. The special international legal framework offers a stable regulatory environment for businesses, including digital platforms, ensuring a high degree of transparency, reliability, and predictability for data exchanges participants.

In the future, if necessary, a number of amendments will be made to the regulatory legal acts of the Republic of Kazakhstan aimed at regulating the protection of personal and confidential data, their dissemination, data quality assurance, cybersecurity and other aspects, including but not limited to legislative acts in the field of entrepreneurship, state statistics and informatization.

In this regard, work is underway to prepare proposals for the draft Digital Code of the Republic of Kazakhstan aimed at forming legal mechanisms for regulating data, including issues of their commercialization and use within the framework of data exchanges. These initiatives provide for the regulatory consolidation of the legal basis for data monetization, as well as the definition of the rights and obligations of participants, which will ensure legal certainty and protection of the interests of all parties in the process of data exchange and use in the digital economy.

Incentivizing data exchange

An important aspect is encouraging market participants to exchange data on data exchanges. To this end, the proposed legal framework will include special tax incentives for platform participants, creating attractive conditions for investors and promoting the development of new data-driven business models.

Additionally, innovative **financial instruments** based on data-backed collaterals will be introduced. This will allow companies and startups to secure financing by using digital assets as economically significant resources. This approach will create incentives for the development of the Data Exchange and monetization ecosystem, attracting both emerging entrepreneurs and large market players. As a result, this will enhance the **sector's investment appeal**, drive technological advancements, and increase the competitiveness of the economy in the context of digital transformation.

4.5 International cooperation

The development of data exchanges in Kazakhstan requires active international cooperation aimed at integrating into the global digital economy and establishing institutional ties with **leading global players** in the data sector. The platforms are focused on building partnerships with international organizations, government agencies, specialized institutions, as well as private companies with experience in creating and regulating data markets.

A key focus is the exchange of knowledge and best practices in building digital infrastructure, ensuring cross-border data flow, and developing unified standards for data processing, protection, and commercialization. Such cooperation will ensure the compatibility of **legal regimes**, synchronize approaches to **cybersecurity, privacy** and **ethics of data processing**, as well as strengthen **trust** between participants in the international market.

As part of international cooperation, collaboration is underway with the Shanghai data exchange, and opportunities for sharing experiences are being explored. It is planned to build sustainable cooperation aimed at developing tools for regulating and commercializing data, as well as mechanisms for the cross-border exchange of digital assets²⁷.

Particular attention is paid to the prospects for scaling these approaches to Central Asian countries, which will expand the influence and integration of the Kazakhstani ecosystem in the regional context.



05

EXPECTED RESULTS

The creation of data exchange platforms is not just a technological project, but a **strategic initiative** capable of transforming the economy of Kazakhstan. Similar to China, where data policies have driven **rapid industry growth** (42% growth in data transactions in 2022), Kazakhstan also has the opportunity to unleash the potential of the data economy. According to OECD estimates²⁶, the widespread exchange and use of data could potentially increase GDP by **2.5%**, transforming entire markets and companies.

Data exchange platforms have the potential to become **regional data exchange and monetization centers**, expanding access to international markets. This will create a multiplier effect by combining data and cross-border information flows, fostering digital economy growth and international cooperation.

The creation of data exchange platforms will open up new opportunities for all participants in the digital ecosystem, contributing to the development of the digital economy, improving data management and increasing transparency. **Data providers** will be able to monetize their data and increase its value through availability on the exchange, while **data consumers** will have convenient access to high-quality and diverse data to make more informed decisions and create new business models.

Data exchange is a new economic driver for Kazakhstan



For the government

- Improving the **quality of public administration** through Data Analytics
- **Optimize** reporting and **reduce** administrative costs
- Possibility to **respond quickly** in crisis situations



For business

- Access to **quality** industry data
- Possibility of own data **monetization**
- Raising **funding** through data collateral



For people

- **Improvement** of digital services
- Increased **protection of personal data**
- Opening **new jobs** in the Data Economy

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