DOCARE

DOCAREBlockchain-based Smart Health Data Platform

White Paper

Abstract

Health data plays an essential role in the future development of the healthcare industry that advances towards the paths of healthcare informatization, big data revolution and Internet healthcare, and yet the health data industry itself is severely isolated at data and technology levels. Nowadays, human beings are faced with an increasing number of problems threatening their health. Within this context, the healthcare industry expresses an ever-pressing need for the joint efforts from all walks of life to serve the cause of health care maintenance: many diseases expect to have higher cure rates through data and technology sharing among enterprises and institutions. Presently, there are fierce competitions in the healthcare industry. Despite the great efforts of the governments of different countries and the United Nations to reach an all-win situation, the accomplishments on collaboration between institutions and enterprises have so far been limited.

This is basically associated with the traditional business model of the industry, which becomes a serious drawback to business collaboration and data sharing between healthcare enterprises and institutions.

In the last few years, blockchain technology has achieved a roaring success. Thanks to its value network and decentralized consensus, each participant in the network has access to the entire blockchain and enjoys the economic benefits brought by the ecosystem, which prevents the formation of monopolies. Besides, it enables a number of industries to perfect their economic systems, business ecosystems and even technological innovations.

Against the backdrop of the blockchain prosperous era, the blockchain project DOCARE comes with the tide, which is a blockchain-based distributed platform for standardized health data management and healthcare service that employs smart contract to guarantee fairness and equality. Built on blockchain, health data and its usage scenarios become innovative manifestations of its openness, fairness and

Abstract

justness. DOCARE offers perfect solutions to the problems of the traditional health data industry, such as information asymmetry, licensing/vesting ambiguity and asymmetry between institutions and individuals and manages to protect the interests of all involved parties, thereby mitigating the silo effect in health data and healthcare service and creating a favorable environment where enterprises and institutions have healthy competitions and collaborations, share basic data and facilities, and establish technical and business cooperation.

DOCARE embraces enormous resources related to the health data industry and maintains friendly relationships with numerous medical institutions. Taking shape in the great success of Internet healthcare service companies, it has mature healthcare service applications and a large user base. Also, it is equipped with a renowned blockchain team in the health data industry. All this makes DOCARE a practical and feasible solution to combine blockchain technology and health data and healthcare services.

Based on the advantageous resources including a thriving market, a rising industry, a professional team and a large user base and the specific operation mode, the DOCARE team outlines a new vision for the health data industry. The operation mode, technical solution and development plan of the DOCARE project are set forth in this white paper.

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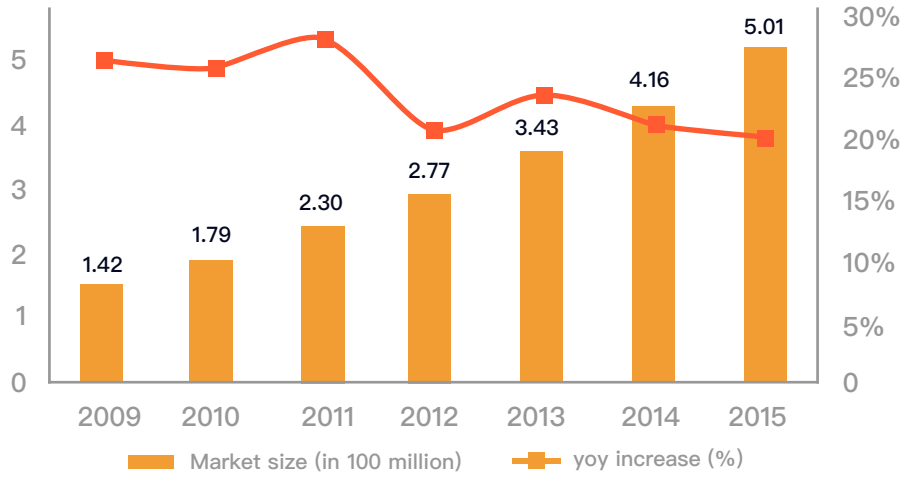
1. Why DOCARE?

1.1 Core of Internet Healthcare Ecosystem—Health Data

The healthcare industry, with a long history, has varying characteristics within different contexts of times and technology. With the rise of information technology and “Internet Plus”, the healthcare industry ushers in an era of multidimensional development.

First of all, it takes a shift towards healthcare informatization.

In the preliminary stage, hospitals achieved informatization based on hospital management information system (HMIS) and clinical information system (CIS); later, they advanced towards regional healthcare informatization that allowed hospitals to share information with each other and establish electronic archiving systems for resident health data; at present, they aim to make full use of the resident health data for remote medical treatment, mobile healthcare and health insurance/drug circulation. In 2017, the estimated worth of the Chinese healthcare informatization market was over USD 6 billion, which maintains an annual growth rate of 20% and expects to exceed USD 15 billion by 2021 (data source: IDC).

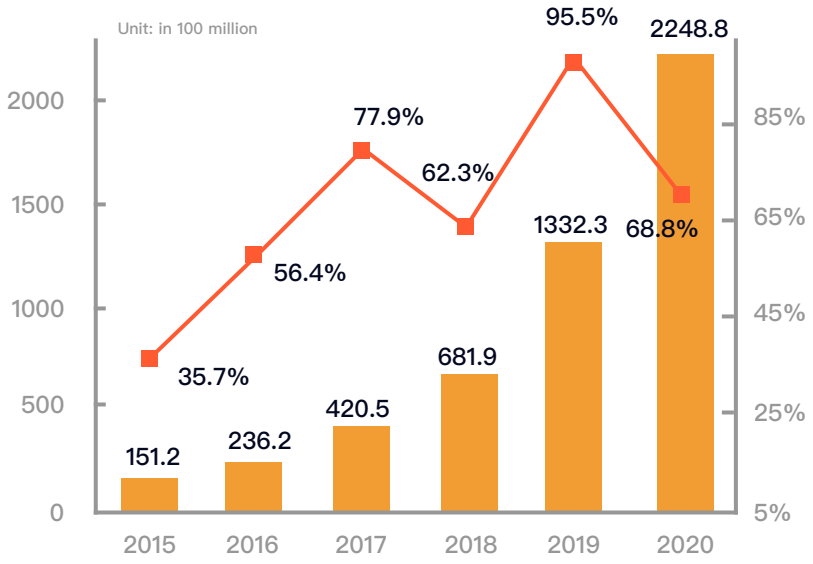


Chinese Healthcare Informatization Market Size (in USD 100 million, %)

1. Why DOCARE?

In the meantime, the healthcare industry reaches a new stage of big data revolution.

With healthcare informatization and biotechnology thriving for decades, various types of health data have come into being while the data size is growing at an unprecedented speed. Information explosion marks the beginning of the big data era of the medical and healthcare industry. Noticing the bright market outlook, governments come to vigorously promote the big data revolution in healthcare with favorable policies and substantial capital. Taking the United States for example, the big data revolution in the healthcare industry, guided by the five pathways (right living, right care, right provider, right value, right innovation), is estimated to account for USD 300–450 billion in reduced healthcare spend (data source: Mckinsey Report, 2013). Likewise, it is undergoing rapid development in China.

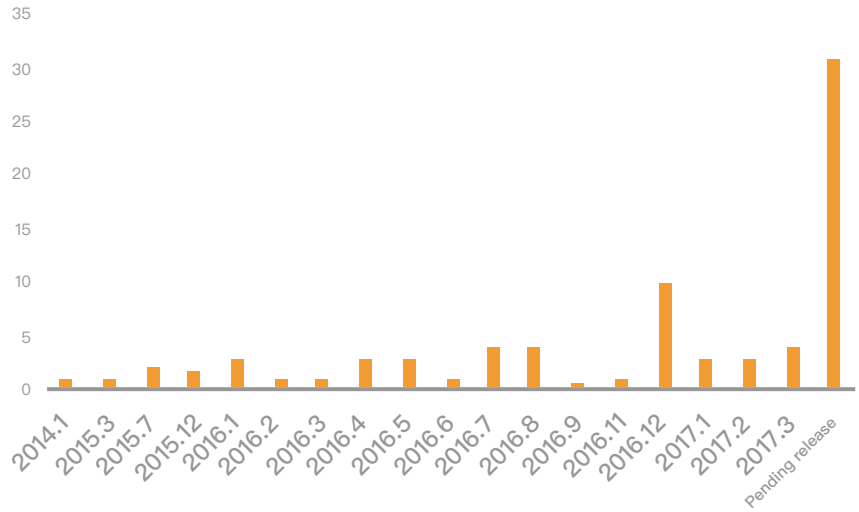


Chinese Healthcare Big Data Market Size (Mobile Informatization Researching Center, 2017)

1. Why DOCARE?

Going forward, the healthcare industry arrives at a new realm in building Internet hospitals.

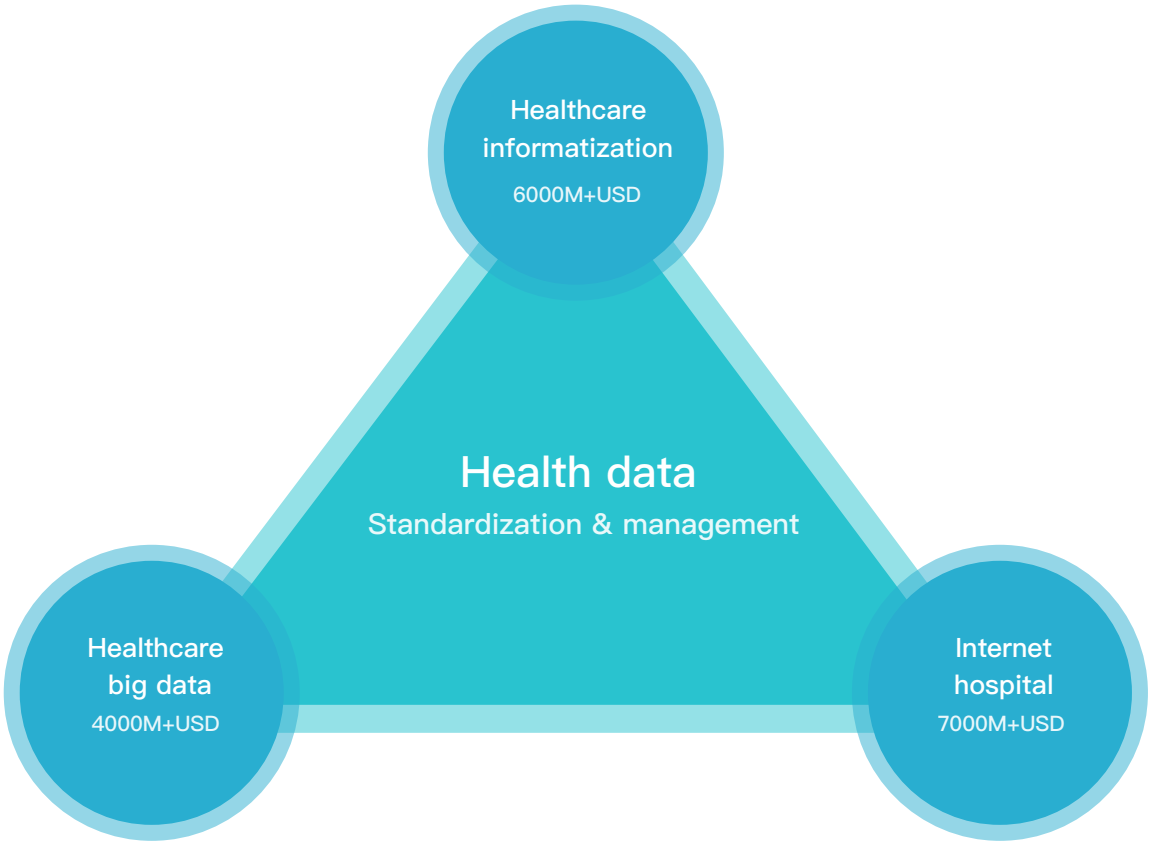
As the healthcare industry enriches its experience in healthcare informatization and big data practices, Internet hospitals are established to complete the “Internet Plus healthcare” blueprint. However, the Internet hospitals were not in smooth water since the healthcare industry was substantially affected by policies in the past few years. It is not until the implementation of relevant regulations on the Practice License of Medical Institution that Internet hospitals were officially permitted to provide healthcare service, such as diagnosis, prescription and examination. From then on, patients have been allowed to purchase prescription drugs from Internet hospitals with practice licenses. As an emerging innovation that provides healthcare service for users based on technology and data utilization, Internet hospitals have gained remarkable development. During the first half of 2017, there were over 50 Internet hospitals to be put into operation in China. (data source: Chinese Internet Hospital White Paper, 2017)



Number of Internet Hospitals in Operation in China

1. Why DOCARE?

As mentioned above, the Internet healthcare industry is developing in three directions and the new Internet healthcare ecosystem is taking shape. All this is to create tremendous economic value. Clearly, basic health data indeed plays as decisive a role as operational efficiency and user experience in the development of the Internet healthcare industry. Presently, health data utilization in the healthcare industry remains as a major problem. Health data acquisition and utilization involves a series of intricate and sensitive problems, such as ownership, range of application and supervision of data utilization. Solutions to these problems can lead the healthcare industry to the three development pathways and form the underpinning of the core industry ecosystem.



Healthcare Ecosystem

1.2 Existing Problems of Health Data Management

In the healthcare industry, hospitals, wearables and applications are major sources of basic health data. However, considering that mobile healthcare is still in its early development stage, patients' data collected by hospitals have greater value and significance.

Generally, hospitals sell or share basic data to big data companies that develop and commercialize data products through data consolidation and analysis and apply such products to the healthcare industry to improve its operational efficiency, as well as the accuracy of healthcare service.

Overall, the professional healthcare big data makes it relatively complex for application in the healthcare industry. Numerous enterprises that play different roles in the industry chain are involved in the health data acquisition and application processes. Meanwhile, health data creates rent-seeking space or overlapping regions that mainly bring about the corresponding problems in the following four aspects:

1.2.1 Information Silo

Internal and shared health data collected by medical institutions are stored in different systems whose manufacturers, periods of application and versions may differ. Moreover, except medical imaging data, these systems have no uniform data formats and standards, making it impossible to realize cross-system and inter-institutional data storage and exchange, let alone further utilization.

Example: John previously underwent a CT scan in a medical institution A. Now he intends to seek medical advice from a specialist of another medical institution B. Because A and B are not connected at the system level, he has to bring the CT scan provided by A to B and consult the specialist. If the CT scan that only contains imaging data selected and processed by A fails to meet the diagnostic requirements set forth by B's specialist, John will have to receive another CT scan in B.

1.2.2 Data Security

A large number of medical institutions choose to physically isolate their systems from the Internet, especially in the recent period when ransomware has been attacking the systems of medical institutions in China. For security purpose, domestic medical institutions therefore implement stricter data security policies to "seal up" their internal data (stored in hospitals, medical groups and regional healthcare systems). This makes it extremely difficult for other users (e.g., patients, experts for remote treatment, insurance companies, regulators) to access relevant data, not to mention data utilization.

Example: Ransomware no longer focuses on personal computers, but transfers its attention to hospitals and other establishments. Ransomware like Globe Imposter has set a "new trend" in the field. It is reported that two domestic hospitals have been attacked by ransomware viruses recently. On February 23, the system of a hospital in Hubei province was infected with a ransomware virus and therefore collapsed until the hospital management paid the ransom of about RMB 300,000 in Bitcoin as demanded by the hackers. On February 24, there occurred another attack. This time, the servers of a hospital in Hunan province were hacked, with all data documents being forcibly encrypted. In consequence, plenty of patients failed to promptly receive medical attention. This also happens to other medical institutions across the world. In May 2017, a ransomware attack of unprecedented scale was unleashed, with the National Health Service (NHS) in the UK being hit the hardest. Out of the 248 NHS Trusts in the UK, 48 were swallowed up by the attack. Many other hospitals were also affected by the ransomware outbreak and had to transfer some of their patients.

1.2.3 Data Licensing & Traceability

Essentially, patients are owners of their health data. However, they in fact do not own but only have partial access to the health data because the raw data are stored in the systems of institutions. As a result, users fail to seek permission and authorization from these "owners" when they find it necessary to retrieve relevant

data. To solve the problem, it is required that a third party (e.g., clinical researchers, administrative regulators) must obtain a series of administrative approval before data acquisition. The time-consuming and inefficient process has considerably increased the data utilization cost, impaired its quality, and constrained the further development of remote healthcare service based on big data and information technology. Besides, the administrative approval system is proved to be infeasible in sustaining the business models built on inter-institutional services, such as hierarchical diagnosis and treatment and remote consulting.

Case: John is taken into a medical institution A for treatment and he wants to transfer to another medical institution B. To avoid repetitive examinations and save time, he plans to bring the documents related to his stay in A to B. In this case, he has to collect and copy his files in A's medical record archives by himself and deliver the paper documents to B's specialists.

1.2.4 Data Authenticity & Mutual Acceptance

Since patients' data are stored by medical institutions, which can perform data alteration without leaving traces even if the digital signature technology is applied to their systems, it is likely to give rise to data redundancy, cross check, mistakes and omissions, and waste of data resources when regulators or insurance companies request data submission. Meanwhile, the data authenticity issue remains controversial.

Example: John was hospitalized for treatment in a medical institution A and he applies for an insurance claim with a company after discharge. According to A's operation mode, he has to line up with other patients at the medical record archives to pay for and print his medical record. A cannot provide a digital medical record for John, and even if it can, the insurance company will not accept medical records in digital format.

1.3 Solution—DOCARE

Through analysis on the existing problem of health data management, the DOCARE team views that a credible and secure health data utilization system can be developed by integrating the underlying blockchain technology and healthcare informatization with which data providers, owners and users can establish direct connections with each other for data grants and transactions. Moreover, all operations are traceable and tamper-proof, thereby ensuring comprehensive and effective data use in the legal and secure context and direct pooling of interest derived from such data utilization.

Bearing this goal, the DOCARE project aims to set up a healthcare data ecosystem (i.e., DOCARE ecosystem) built on blockchain technology, health information exchange (HIE) platform, IoT, smart contract and distributed data store (DDS), which comprises a health data standardization platform and an application service platform. The DOCARE project is expected to provide innovative solutions to health data management and application based on blockchain technology and hands-on experience in the healthcare industry.

2. What is DOCARE?

2.1 Overview

DOCARE is a credible and secure health data utilization system that integrates the underlying blockchain technology and healthcare informatization. The objective of the DOCARE project is to achieve direct data grants and transactions, traceable and tamper-resistant business processes, comprehensive and effective use of data within legal and secure contexts, and direct pooling of interest by establishing direct connections between data providers, owners and users.

Powered by blockchain technology, HIE platform, IoT, smart contract and DDS, the project consists of a health data standardization platform and an application service platform.

On the data platform, health data can be produced, linked to the blockchain, distributed and used for clearing and settlement. All transactions on the blockchain will be recorded and rewarded, thereby creating a globally shared medical and healthcare data platform with high security and credibility. Based on the data ecosystem, the project is to establish a medical and healthcare service application platform and the project team expects to make direct participation in the development and operation of applications to provide basic data exchange and corresponding services for all participants in the healthcare sector.

2. What is DOCARE?

To sum up, the DOCARE project has the following vision and mission:

Vision—DOCARE is in relentless pursuit of a better domestic healthcare service system with higher quality and greater user experience, lower user costs, health data value maximization and easy access to medical and healthcare service for every user to benefit the society.

Mission—The Healthcare Blockchain 3.0 was built to catch the tide of the general healthcare industry in China so that DOCARE can take the lead in solving the problems about data exchange, credibility and storage that hinder further development of the health data industry, and make contributions to healthcare informatization.

2.2 Blockchain Technology—Key to Challenges Facing Health Data Industry

2.2.1 Data Standardization—De-siloing

Powered by HIE and big data technology, DOCARE expects to standardize and de-silo medical and health data, and thereby enable uniform data storage, quick retrieval and location, and work towards effective solutions to subsequent problems of data utilization. On this basis, APIs of data utilization and relevant services will be provided for those with data grants to make effective use of blockchain data.

2.2.2 Data Encryption—Data Security

Asymmetric cryptography is applied to all data available on DOCARE. After encryption, the data are uploaded to distributed data stores on the blockchain. In other words, the mechanism ensures that users cannot read or use any data without permission. This also applies to the development team of the blockchain, that is, without data owners' permission, even the blockchain developers cannot access the corresponding data. The strict data encryption policy underpins the truly secure health data chain.

2.2.3 Smart Contract—Authority Delegation & Transaction Security

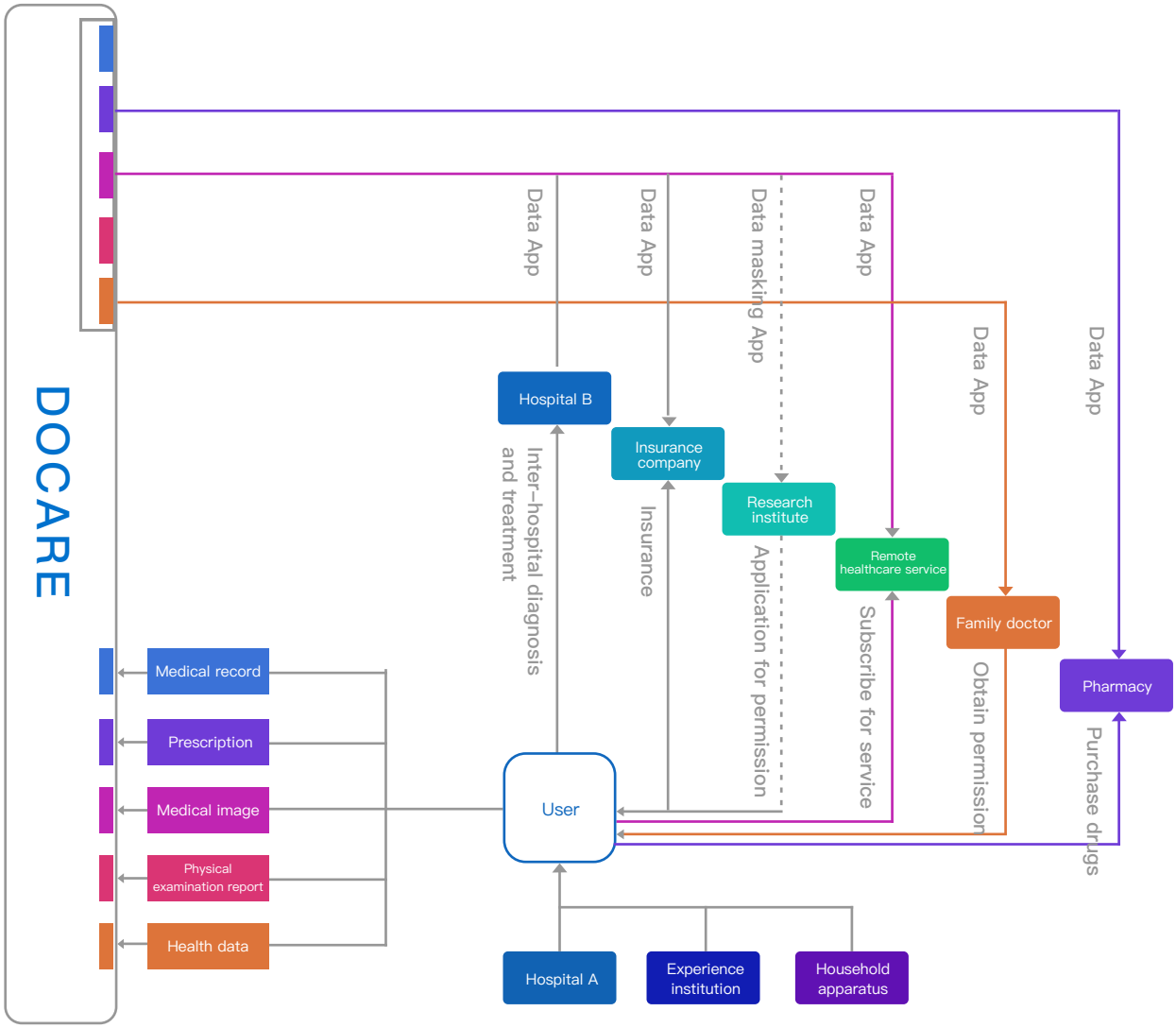
The smart contract of blockchain technology enables effective data grants and traceability on DOCARE where data providers and data users may carry out "transactions" in an open fashion. It ensures data legitimacy and timeliness, efficient data retrieval and utilization and a low management cost.

2.2.4 Distributed Data Store (DDS)—Higher Performance and Credibility

DOCARE is to adopt the blockchain-based multi-node data verification and distributed data storage (DDS) systems. On the premise of effective data security, it prevents data loss or tampering caused by offline behaviors of or attacks against any nodes on the blockchain. This provides a secure, encrypted and distributed data storage framework for healthcare purpose for service providers and data users who would have purchased numerous storage resources. With the framework, they may subscribe for relevant resources according to their data plans, which effectively reduces the cost of healthcare service and informatization.

2.3 Operation Mode

The DOCARE team has accumulated years of experience in the healthcare industry and obtained a profound understanding of the industry chain. On this basis, it combines blockchain and the health data industry and offers an alternative definition of the mode of interaction between the industry and its participants, which encourages the latter to join the DOCARE ecosystem where they can produce data and create value in a highly efficient and convenient way by engaging in paid services.



DOCARE Data Service and Medical Service Ecosystem

2.3.1 Individual/User/Patient

An individual/user/patient on the blockchain can be a data provider, data user and service user. Those who pay to get service and access data are deemed as service and data users. For example, patients may visit hospitals and third-party medical establishments that provide them with paid service, such as diagnosis and treatment via medical equipment or physicians; at the same time, these patients respectively become the owners of their health data generated from the paid service, and have the right to manage the health data of their own. Those who authorize any third parties to use their own data in a paid capacity are considered to be data providers. For instance, patients may sell their own medical records to insurance institutions and medical research institutes after data standardization via health data engines.

2.3.2 Medical Practitioner

A medical practitioner on the blockchain can be a service provider, data provider and data user. As a service provider, the medical practitioner may use the accessible data on the blockchain and services on the platform to provide users in the blockchain-based DOCARE ecosystem with diagnosis, treatment and other relevant healthcare services while health data are generated in the process and owned by the users individually. Being a data user, the medical practitioner pays data owners (patients/institutions) for permission to access and use their data on the blockchain when he/she finds it necessary to use such data for scientific research and analysis. However, it should be noted that the requested data are delivered to the medical practitioner after data masking.

2.3.3 Medical Institution

A medical institution on the blockchain can be a service and data provider. Meanwhile, it is a data provider when it offers patients, insurance institutions, regulators or research institutes access to any data on hand with permission. If the medical institution uses data for scientific research and analysis, it becomes a data

user. Also, it can be a service user. For example, if a hospital needs to purchase servers, storage and information systems at the same time to achieve institutional informatization, it will be a substantial investment for the hospital; otherwise, the follow-on maintenance and upgrading of the servers and systems will be a heavy financial burden for the hospital. In the future, a blockchain-based data security mechanism will be established, and by then institutions may subscribe for information service according to their own needs, such as registration, payment and clinical data entry; hardware and software upgrading will no longer be an issue; service charges will be subject to subscription; the blockchain will be equipped with an effective data security system; without permission of medical institutions, even service providers cannot access or use any data.

2.3.4 Social Security Administration & Insurance Institution

A social security administration or insurance institution on the blockchain can be a data user and service provider. With permission, the social security administration or insurance institution can access and use the data available on the blockchain to process relevant insurance claims, further tighten expenditure control and prevent waste and insurance fraud based on data authenticity and timeliness. Besides, service can be linked to the blockchain, making it easier for regular users to purchase relevant insurance products on the blockchain. Meanwhile, relevant transactions are traceable, which allows related parties to promptly check the record and information about the corresponding claims.

2.3.5 Medical Research Institute

A medical research institute on the blockchain can be a data user and service provider. With permission, the medical research institute can access and use the data available on the blockchain; however, it should be noted that the data are delivered to the medical research institute after data masking. Also, the medical research institute can be a service provider that launches relevant services on the blockchain and renders the corresponding services (e.g., DNA sequencing) by linking with medical institutions or individuals via transaction.

2.4 Advantageous Resources

2.4.1 Favorable Policies

So far, many countries across the world have come to realize the great value of big data in healthcare. Particularly, the government of China, considering it as part of China's strategic infrastructure plan, has launched a series of policies to promote the big data revolution in healthcare.

Issuing unit	Major policies
State Council	In 2015, the State Council released the Outline for Improving the Development of Big Data and specified the requirements of carrying forward the big data revolution in healthcare and developing integrated healthcare service Apps.
State Council	2In 2016, the Guiding Opinions on Promoting and Standardizing the Application and Development of Healthcare Big Data was issued by the General Office of the State Council, aiming at standardized healthcare big data sharing and utilization among different platforms.
National Health and Family Planning Commission	On February 21, 2017, the National Health and Family Planning Commission released the Circular on Issuing National Family Planning Career Development Plan During the 13th Five-year Plan and proposed its goals of 2017 and 2020.
Central Committee of CPC, State Council	In 2017, the Central Committee of the Communist Party of China and the State Council jointly issued the "Healthy China 2030" blueprint and addressed the importance of promoting the establishment of the healthcare big data application system, healthcare big data sharing, mining and utilization based on

Chinese Government's Policies on Driving Big Data Revolution in Healthcare
(Mobile Informatization Researching Center, 2017)

Blockchain has received ever-increasing attention from the governments of many countries since 2017. Despite different views on digital cryptocurrency, these countries have been pushing forward the domestic research, standardization rules and industrialization of blockchain technology. Statistics shows that as of the end of March 2018, supportive policies and relevant guidance were adopted by the administrative units situated in Beijing, Shanghai, Guangzhou, Chongqing, Shenzhen, Jiangsu, Zhenjiang, Guizhou, Shandong, Jiangxi and Guangxi to facilitate

2.4.2 APP Development Resources

The DOCARE project is undertaken by WeCare Information Technology Co., Ltd., which is equipped with a team of top-class healthcare IT professionals who have over ten years of experience in the R&D and operation of HIE platforms, imaging data, healthcare big data, hospital IT solutions, regional healthcare solutions, IoT and Internet Apps. The DOCARE team shows great strengths in schema design, App release and resources integration, which guarantees the successful implementation of the project. The company's core technology and strengths are as follows:

— **Professional Team Members:** Our team is formed by senior technicians of healthcare informatization who have over fifteen years of experience in providing large hospitals and regional medical institutions with consulting, planning, product development, operation and maintenance service.

— **Advanced Technology:** The company has introduced the globally cutting-edge health data exchange platform to China. It is the first and only domestic enterprise that productizes and applies the technology to hospitals and regional users. On this basis, it combines the health data exchange platform with big data and search engine technology to realize health data utilization and exchange in a more effective way.

— **Large Database:** The company is proficient at setting and running health data storage frameworks and familiar with healthcare service process. Specifically speaking, the health data storage systems in China, which are designed, erected and operated by our team, have a total capacity of over 5,000 TB, with the daily storage data for medical purpose (e.g., medical imaging, electronic medical record) exceeding 10 TB.

— **Invaluable Experience:** Our team has a wealth of successful experience in developing mobile Internet and IoT cloud solutions. Meanwhile, we have established a sound underlying code base to develop blockchain technology.

2.4.3 Core Technology

The technical implementation team in the DOCARE project is composed of a renowned blockchain team and a big data team. The blockchain technicians are skilled at public chain erection. As leaders in the industry, they have hands-on experience in running a lot of blockchain projects. The big data technicians are experienced in data management, operation and maintenance. In general, the project shows distinctive technical strengths in the following respects:

a) **HIE:** Combined with search engine, big data and IoT technology, HIE provides effective solutions for medical institutions to standardize and de-silo health data from different sources and subject to different standards, and realize uniform storage, exchange and utilization of disparate data (i.e., data from different sources and subject to different standards).

b) **Encryption:** A health data encryption system, which is indeed a DDS and data content encryption system based on asymmetric cryptography and data grants, is established to lay a secure, tamper-resistant and traceable foundation for smart contract execution and user data storage.

c) **Storage:** The project is also provided with a DDS system, which is in fact an IPFS-based framework that applies to the big data capacity and throughput of the health data industry. In the near future, storage equipment distributed in medical institutions will be shared among blockchain participants by secure and transparent means.

d) **Smart Contract:** An EOS-based smart contract clearing and settlement system is designed to combine token money and the rigid demand for traditional healthcare according to the demand for healthcare service. It encompasses the healthcare participant smart contract system involved in the business process.

2.5 Implementation Plan

Our team started medical information technology and IoT hardware R&D since the

end of 2016. During this period, we have invested over RMB 6 million in the field. Also, we have participated in the R&D of IoT hardware, which so far has been launched in relevant markets to acquire users' medical imaging data files and create business value through the trial run. The proposed development pathway of the DOCARE project is given below:

Time	Event
01/2017	Build a healthcare informatization team
06/2017	Start R&D projects on hardware and service platform of medical imaging self-service machines
12/2017	Preliminarily demonstrate the technical feasibility of combining HIE and blockchain technology
02/2018	Form a professional blockchain team
03/2018	Test the alpha prototype of the basic DOCARE blockchain (data service)
06/2018	Complete the first digital asset replacement and apply for entry to relevant exchanges
12/2018	Complete the alpha prototype of the basic DOCARE blockchain (data service), carry out a preliminary test of the data platform designed for healthcare projects, and deliver the beta version of the DOCARE blockchain
03/2019	Release the DOCARE App platform and the first batch of blockchain-based healthcare Apps including "Yunjiaopian"—which is an App that targets at the large domestic medical imaging market estimated to produced 20 billion medical images every year and provides patients with medical images based on cloud technology; launch the App "Personal Medical Image Data Bank"
09/2019	Complete the beta release of the basic DOCARE blockchain
12/2019	Release the self-developed community-level health data App, "Family Doctor Service" App and "Drug Supply Chain & Prescription Circulation" App
2Q2020	Release the official version of the basic DOCARE blockchain and the "Personal Health Data Bank" App
3Q2020	Release institutional health data Apps and introduce third-party healthcare service to the Apps
4Q2020	Use the basic DOCARE blockchain's APIs to connect to third-party Apps, and officially release the blockchain-based healthcare service platform
2021	Preliminarily create a healthcare App ecosystem powered by the basic DOCARE blockchain, and release a host of third-party Apps to provide healthcare service in all respects

3. DOCARE Technical Solution

3.1 Technical Pre-research (TPR)

This section mainly elaborates on the blockchain-related technology and scenarios applied to the DOCARE project.

3.1.1 Blockchain & Health Data

The DOCARE project expects to combine blockchain technology with health data and relevant Apps. It is blockchain technology that makes the following scenarios of health data generation, circulation and utilization become reality: it guarantees data security without depending on any individuals, institutions or centralized systems; it maintains database security based on algorithms; it uses algorithms to prevent database crashes brought by single point of leakage.

1. Tamper Proof

Health data may be tampered, forged and leaked in any processes that involve human and manual actions, which can cause grave harm to patients. Notably, the tamper-resistant, irrevocable and traceable blockchain is an effective solution to maintain health data correctness and uniqueness.

2. High Redundancy

Every node on the blockchain has a backup so that relevant data can remain intact in case of single point of failure (SPOF). Users' medical records and private data are stored in a blockchain-based data storage and verification platform and exist in the form of blocks in backup nodes of relevant computers worldwide to prevent data loss. Private keys are kept by users so that only private key holders have access to check the data security of the overall blockchain.

3. Multiple Private Keys

Multiple private keys to a single piece of data can be generated and distributed by

making a smart contract. Besides, every access to the said data shall be subject to the given rules and the corresponding private key holder's permission. Blockchain technology ensures standard and legal use of users' sensitive data in the network.

3.1.2 Homomorphic Encryption & Asymmetric Cryptography

To maintain data security and efficient data retrieval and search before encryption, both homomorphic encryption and asymmetric cryptography are applied to the DOCARE project for health data storage.

Asymmetric cryptography is the fundamental technology for blockchain security. It will be used to secure data ownership, data grants and data access. An asymmetric cryptography system uses pairs of keys: public and private ones. First, the system relies on a given key generation algorithm to yield private keys and then employs another algorithm to generate public keys based on the private ones. The public key generation is an irreversible process. Limited by the current computing power, it is impossible to generate myriad private keys based on public keys (i.e., computational infeasibility). On this basis, we can conclude that asymmetric cryptography can secure the data on the DOCARE blockchain.

Homomorphic encryption is a special form of encryption that allows computation on ciphertexts, generating an encrypted result which, when decrypted, matches the result of the operations as if they had been performed on the plaintext. In other words, "direct computation on ciphertexts" and "computation and encryption of plaintexts" lead to the same results. Homomorphic encryption enables data retrieval and comparison without decryption. Hence, it provides a perfect solution to the security problem arising from data grants to third parties to access data on the DOCARE blockchain.

3.1.3 Enterprise Operating System / EOS

The DOCARE project plans to build side chains and a decentralized application (DApp) platform based on the enterprise operation system (EOS).

EOS is the next-generation extensible DApp operating system for commercial purpose. It is a brand new blockchain-based smart contract platform that aims to provide high-performance distributed applications with underlying blockchain platform service, effective solutions to account and ID verification, database, asynchronous communication and program scheduling for hundreds of CPUs or clusters. The objective of EOS is to build a blockchain framework for DApps and a highly modular blockchain-based operating system at the horizontal and vertical levels. Apart from this, it expects to serve all necessary functions with exceptional processing capacity so that developers can fully concentrate themselves on the business layer. Meanwhile, it aims at higher performance of DApps and efficient multi-transaction processing (millions of transactions per second). In addition, regular users are hopefully to be provided with free-of-charge service in execution of smart contracts.

3.1.4 Delegated Proof of Stake (DPoS)

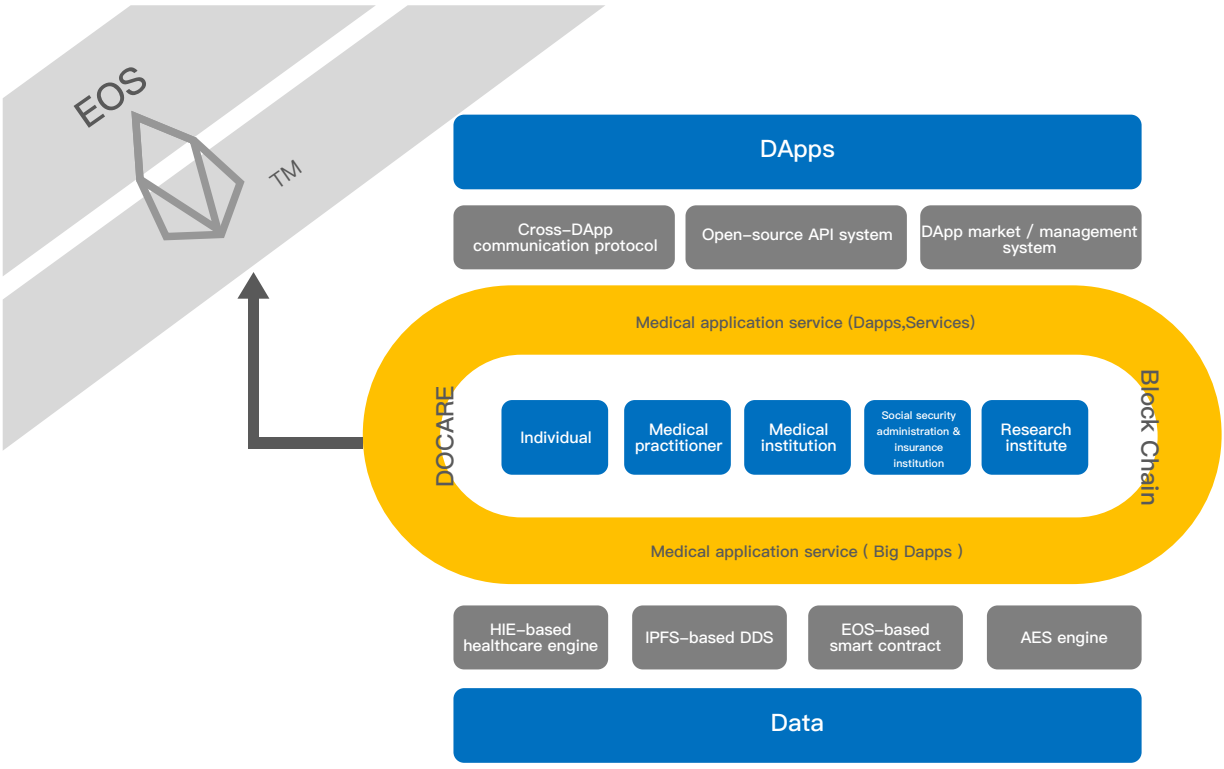
To perform efficient data transactions, payment and settlement operations, the consensus mechanism Delegated Proof of Stake (DPoS) is applied to the application layer of the DOCARE project.

DPoS is a voting-based consensus mechanism that resembles a board of directors. It allows every coin holder to participate in the voting that decides which nodes of the entire system can be trusted and authorized to carry out verification and bookkeeping. At the same time, these nodes will be rewarded according to their efforts in completing such tasks. With DPoS, the blockchain processing capacity will be improved substantially while the maintenance cost will be reduced, thereby narrowing the gap between the blockchain-based transaction processing efficiency and that of centralized clearing systems.

3. DOCARE Technical Solution

3.2 Platform Design

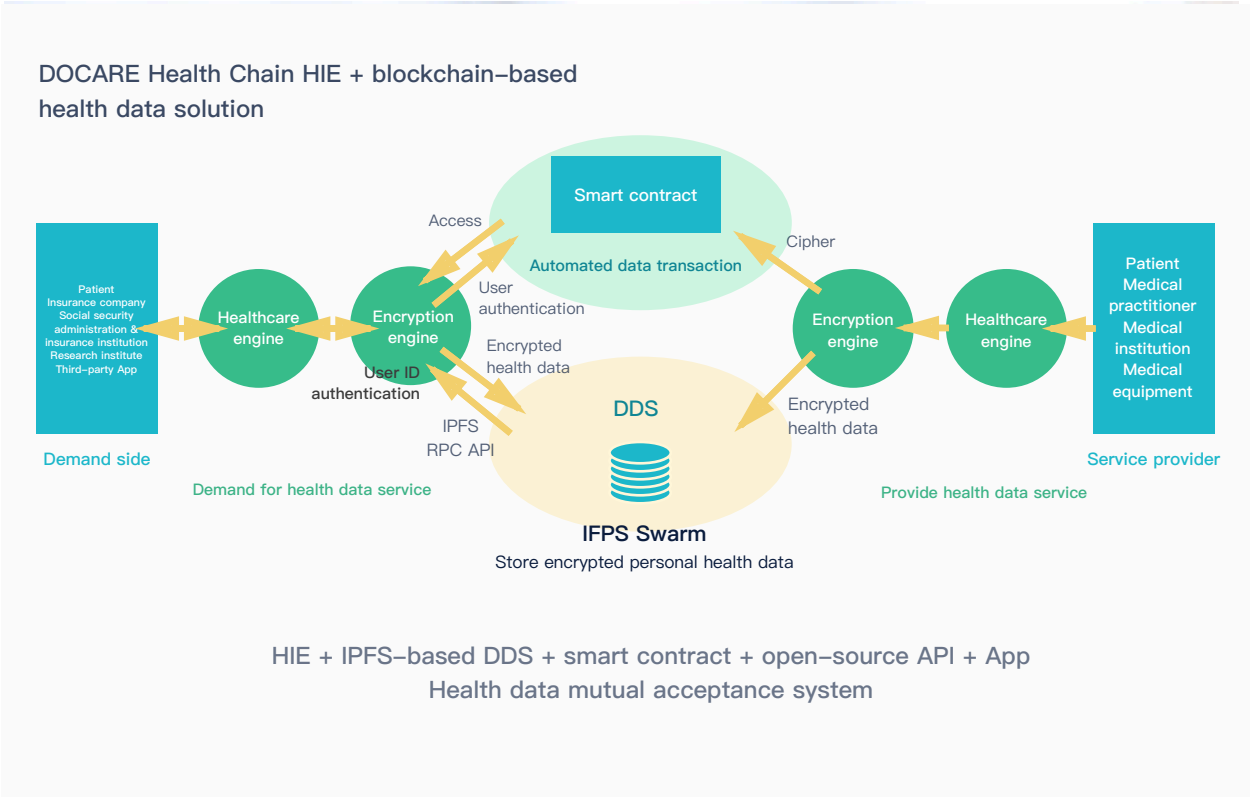
Built on EOS, the DOCARE ecosystem comprises a health data service module and a medical application service module. Each participant in the healthcare industry (individual/institution/government) is either a provider or user in the data and service systems.



DOCARE System Architecture

3.2.1 Health Data Service System

The health data service system includes four core business sub-systems.



1. Healthcare Engine Based on HIE and Big Data Technology

Combined with search engine, big data and IoT technology, HIE provides effective solutions for medical institutions to standardize and de-silo health data from different sources and subject to different standards, and realize uniform storage, exchange and utilization of disparate data (i.e., data from different sources and subject to different standards). On this basis, the healthcare engine provides solutions to the problems concerning the storage, search, location and follow-on use of data. Further, APIs of data utilization and relevant services will be provided for those who have obtained permission to make effective use of blockchain data.

3. DOCARE Technical Solution

2. User Data Encryption & Authentication Engine

The user data encryption and authentication engine is a health data encryption system that realizes DDS and data content encryption based on asymmetric cryptography and data grants. It lays a secure, tamper-resistant and traceable foundation for smart contract execution and user data storage.

Asymmetric cryptography systems are also known as public key cryptography systems. Asymmetric cryptography offers a highly secure solution to data encryption and decryption by using a pair of keys, i.e., public and private keys. The public key is used for data encryption and the private key for decryption. Only private key holders can perform data decryption actions. In cryptographic terms, this ensures data privacy and security.

In the meantime, homomorphic encryption, differential privacy, distributed storage and other advanced technologies are employed for data protection. Without data owners' permission, even the blockchain developers cannot access the corresponding data. The strict data encryption policy underpins the truly secure health data chain.

3. Smart Contract System

An EOS-based smart contract clearing and settlement system is developed to combine token money and the rigid demand for traditional healthcare according to the demand for healthcare service. It encompasses the healthcare participant smart contract system involved in the business process. The DOCARE project supports the whole smart contract life cycle of the EOS, including deployment, execution, upgrading and destruction; besides, it plans to develop smart contracts in multiple programming languages, such as solidity, go and java. Hopefully, these built-in systems can remarkably reduce the costs of secondary development by directly calling smart contracts.

DOCARE realizes effective data grants and traceability based on smart contracts

and builds an open platform for “transactions” between data providers and data users. Smart contracts ensure data legitimacy and timeliness, enable efficient data retrieval and utilization and reduce management cost.

4. DDS

The DDS system is indeed an IPFS-based framework compatible with the big data capacity and throughput of the health data industry. Meanwhile, storage equipment distributed in medical institutions is expected to be shared among blockchain participants by secure and transparent means. Multi-node data verification and DDS systems are adopted to prevent data loss or tampering caused by offline behaviors of or attacks against any nodes on the blockchain without compromising data security. As such, a secure, encrypted and distributed data storage framework for healthcare purpose is established for service providers and data users who would have purchased numerous storage resources. With the framework, they may subscribe for relevant resources according to their data plans, which effectively reduces the cost of healthcare service and informatization.

3.2.2 Medical Application Service System

The medical application service system is composed of three core business sub-systems.

1. DApp Market / Management System: User experience and feedback will be collected and delivered to relevant DApp service providers to adjust and optimize the corresponding functions of the platform—effective communication between users and service providers can facilitate iterations and updates of products; a given number of cases will be randomly selected from the latest service records and delivered to expert nodes for review and assessment every three months, and the DApps failing to meet relevant standards will be removed from the platform.

2. API System: It defines the access protocol and provides the corresponding

development and application kits to assist DOCARE participants with DApp R&D and deployment; besides, the API system also provides the participants with clients.

3. Cross-DApp Communication System: It connects independent DApps via the cross-DApp communication protocol to achieve connectivity and collaboration between DApps. Meanwhile, the data processing of different DApps according to their positions in the blockchain creates a variety of composite scenarios.

3.3 Application Context

This section describes typical business scenarios and briefly illustrates the business process of DOCARE, including the capacity of the core systems and modules. Blockchain-based scenarios of typical healthcare service are as follows:

3.3.1 Paid Application Service (Consulting / Treatment)

Assume that a patient requests diagnostic service, he/she may subscribe for the service (e.g., appointment registration) rendered by a given medical institution or family doctor with DOCARE Coins (DOCs) or other digital assets. The subscription is deemed as a business transaction on the blockchain between the patients and the medical institution or family doctor, with the former paying for the service and the latter charging for the service.

3.3.2 General Service System (Appointment Registration / Medical Record Storage)

Medical institutions or family doctors may access the appointment registration system without investing and building the system by themselves. In fact, they can enjoy any services available on the blockchain by paying with DOCs or other digital assets, and the transaction records will be stored on the chain automatically. Relevant data are under management of service providers, namely medical institutions or family doctors. With data owners' permission, individuals can access the corresponding data stored in the DDS system. The transaction and data grant records are stored in the smart contract system.

3.3.3 Health Data Generation & Use (Medical Record / Prescription / Bill Circulation)

Patients are required to seek medical advice from the specific medical institutions or family doctors given in their appointments and proceed with the service and payment formalities on the chain. Data generated from the diagnosis and treatment process are kept and used by institutions and individuals with data grants.

3.3.4 Data Processing & Circulation (Interhospital Transfer / Treatment away from Home)

If a patient has obtained the data about preliminary diagnosis and treatment, he/she may subscribe for remote treatment service rendered by an expert and authorize the expert to access the corresponding data. The transaction is conducted on the chain while the generated data are used and kept by institutions and individuals with data grants.

3.3.5 Storage / Computation Contribution (Health Data Storage & Protection)

The encrypted health data are distributed and stored in different nodes on the chain, which are granted tokens as a reward for their data storage service. These nodes can be storage systems of medical institutions, storage space of individual users and third-party cloud storage platforms.

3.3.6 Traceable Actions / Transactions (Data Modification & Grants)

The demand side may access encrypted data using private keys and decrypt the data stored in DDS nodes after authentication. These actions are recorded and traceable on the chain.

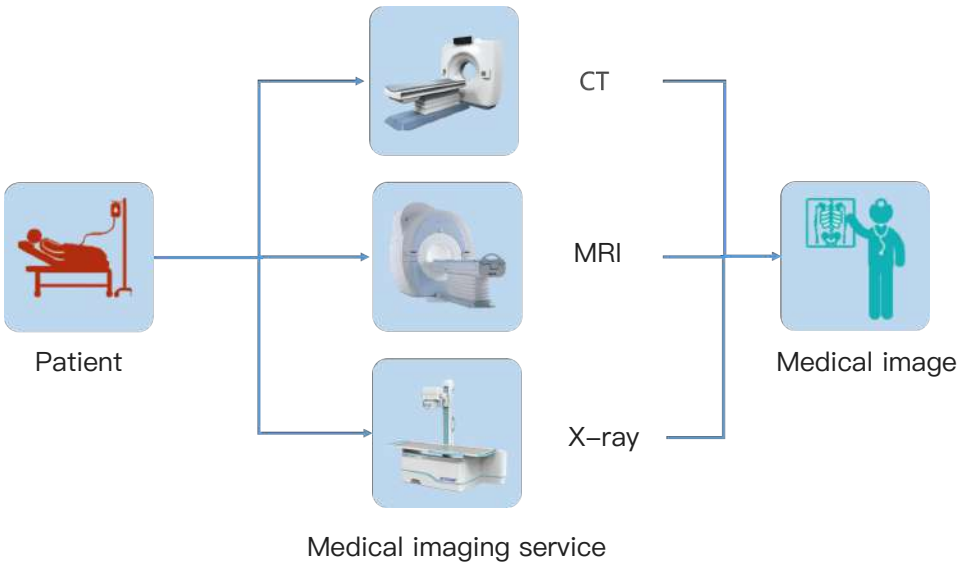
4. DOCARE Business Model

4.1 Business Solution to Medical Imaging Media

Medical imaging media play an important role in diagnosis and treatment activities. However, the business model in the field is relatively outdated. To optimize the business model and application forms, blockchain-based medical imaging is developed, which solves the problems of encryption and payment and applies cloud technology to create medical imaging media.

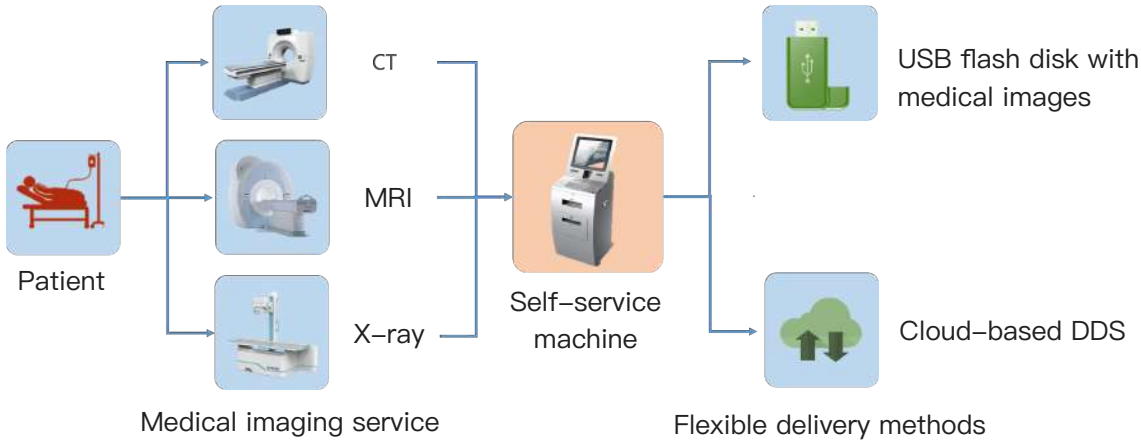
In this case, the blockchain App has realized online-and-offline data exchange, which sets a typical example for users as a blockchain App.

4.1.1 Traditional Medical Imaging Operation Mode



Traditional medical imaging service

4.1.2 Blockchain-based Medical Imaging Operation Mode



Blockchain-based medical imaging service

Blockchain-based medical imaging outperforms the traditional technology in the following respects:

— **Lower Cost:** Medical imaging data are generated and stored in USB flash drives and cloud-based storage systems, which achieves cost reduction by replacing traditional medical images with digital ones. Specifically, the hospital that applies the blockchain-based medical imaging technology to CT and MRI is anticipated to reduce its cost by 30%.

— **High-level Automation:** The self-service system helps hospitals reduce their input in human resources and increase their work efficiency.

— **Highly Digitalized Service:** All-digital service is available. Traditional medical images and diagnostic reports are all converted into digital files to meet relevant follow-on demands for clinical or remote diagnosis. It is easier for patients to keep and carry digital files.

— **Greater Processing Efficiency:** Thanks to the upgraded storage media, the cost of materials has been substantially reduced. Since medical imaging service is a

rigid demand, it is expected to cover the cost and gain economic benefit in a short time.

— **Future Business Opportunities:** Users' medical imaging data are stored in the cloud-based DDS system and used to create a powerful database to support follow-on remote diagnosis and other third-party services.

4.1.3 Application Example

In a small town in South China, there is a resident named Zhang Qiang who goes for physical examination every year. Zhang appears to be absolutely confident about his health status. This year, he did not line up with other patients to pick up his CT scan after examination, nor did he bring a big plastic bag to carry the CT scan. Instead, he went to an ATM-like self-service machine and got a USB flash drive in the size similar to a credit card, which contained his CT scan report.

There was bad news from the report, which suggested abnormalities in his lungs. Yet, Zhang doubted the examination result because he had no confidence in the hospital system of small towns like his. He inserted the USB flash drive into an available USB port and accessed the DOCARE platform where he noticed his health data account on the blockchain and found medical imaging services provided by different hospitals in first-tier cities on a healthcare service platform (DApp). It only took a few minutes for Zhang to grant permission to a designated specialist to access his report and CT scan, and complete payment for the selected service. He chose a hospital in Shanghai without the least hesitation. In the payment process, it came to his notice that the system supported payment with DOCARE points and he had earned a lot of DOCARE points because he had authorized a medical institution to use his health data for research purpose. Eventually, he decided to pay for the medical imaging service with the DOCARE points in his account. It is easy to operate and very convenient. In the next day, the service provider sent the examination results to Zhang's account. Receiving the definite diagnosis, he was well aware of his health status and immediately searched for relevant treatment services via the platform.

4.1.4 Blockchain-based & DApp Services

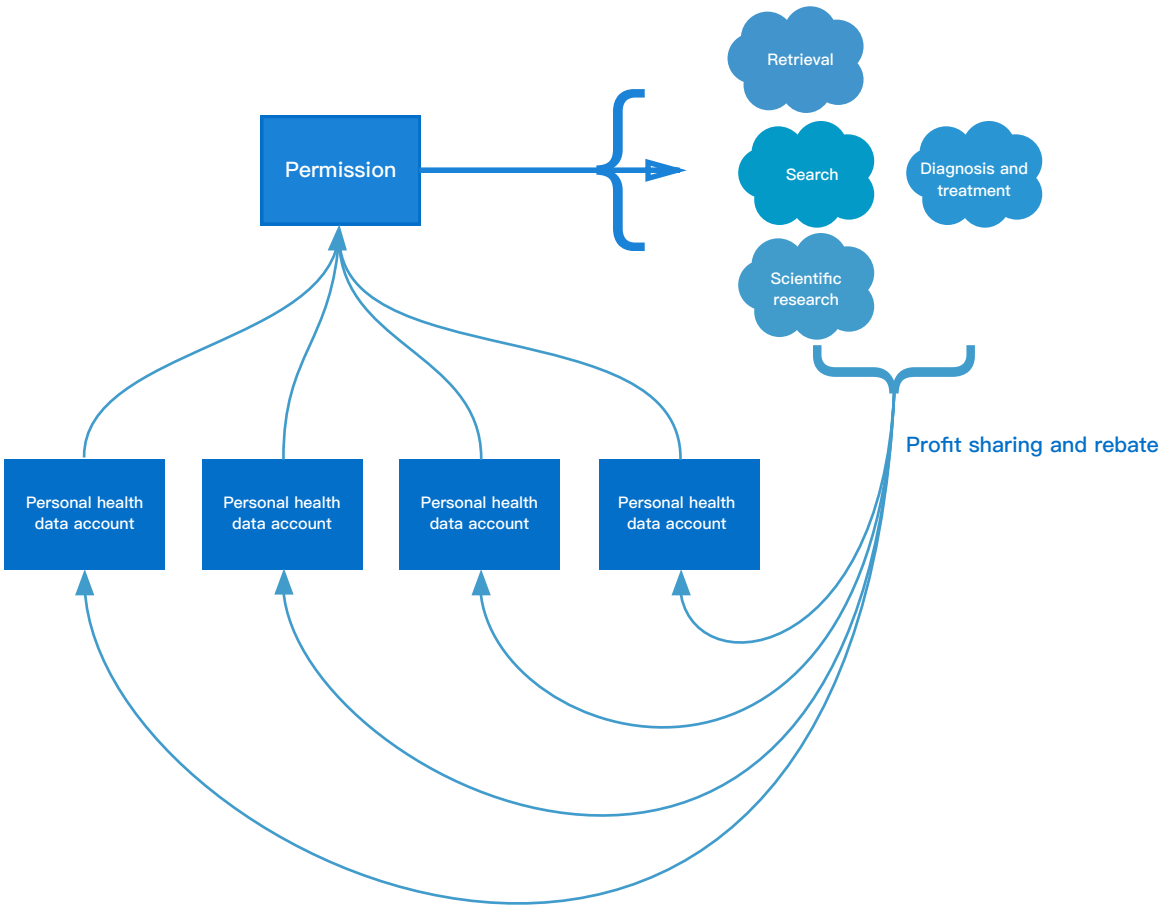
Presently, the DOCARE team has introduced the non-blockchain-based DOCARE App to three leading medical institutions in China. Combining with DOCARE service and the self-service medical image distribution machine, the DOCARE App is to create enormous business value in a short time. Hopefully, it can acquire massive medical imaging data from users, connect with thousands of the self-service machines and substantially expand the medical imaging data volume at a fast pace. The blockchain-based and DApp services, for the moment, are primarily faced with the risk of information leakage and the management risk brought by centralization, which can be solved once and for all by blockchain technology.

Online Operations: The DOCARE team is to develop the service and complete the corresponding deployment on the DApp platform of the DOCARE blockchain to fulfill such core functions as data encryption, circulation, authorization and utilization, payment and settlement.

Offline Operations: Specifically, different business models will be adopted flexibly to provide relevant service. Taking hardware for example, the DOCARE project may provide free hardware for a hospital to run the given service; a third party may purchase and provide equipment for a hospital while the latter shares its profit with the former; a hospital may purchase relevant equipment on its own (while the project team profits from the hospital's use of consumables).

4.2 Personal Health Data Bank

The Personal Health Data Bank integrates the data of all patients' health data accounts on the DOCARE platform, including diagnosis and treatment data, physical examination data, daily health data and sports data under management of medical institutions. An individual user may independently perform data management with his/her own account and carry out self-management accordingly. Meanwhile, with individual/institutional users' permission, he/she may also retrieve and search for relevant data for the purpose of scientific research and remote diagnosis and treatment.



Operation Mode of Personal Health Data Bank

4. DOCARE Business Model

Business Value

— Research institutes or other demand sides may log in to their Health Data Bank accounts and submit data retrieval/search requests via the DOCARE platform. For example, if a demand side requests data grants from 1,000 patients with slipped disc on the DOCARE and obtain permission of relevant patients, it can access these patients' masked data in their health data accounts.

— Profits accrue to the patients from the Health Data Bank via the incentive and reward mechanisms.

— This not only meets the privacy and compliance policies, but also assists research institutes and other demand sides with data acquisition in a legal, compliant and efficient manner. Compared to the traditional data acquisition methods, it has a higher efficiency and lower legal risk.

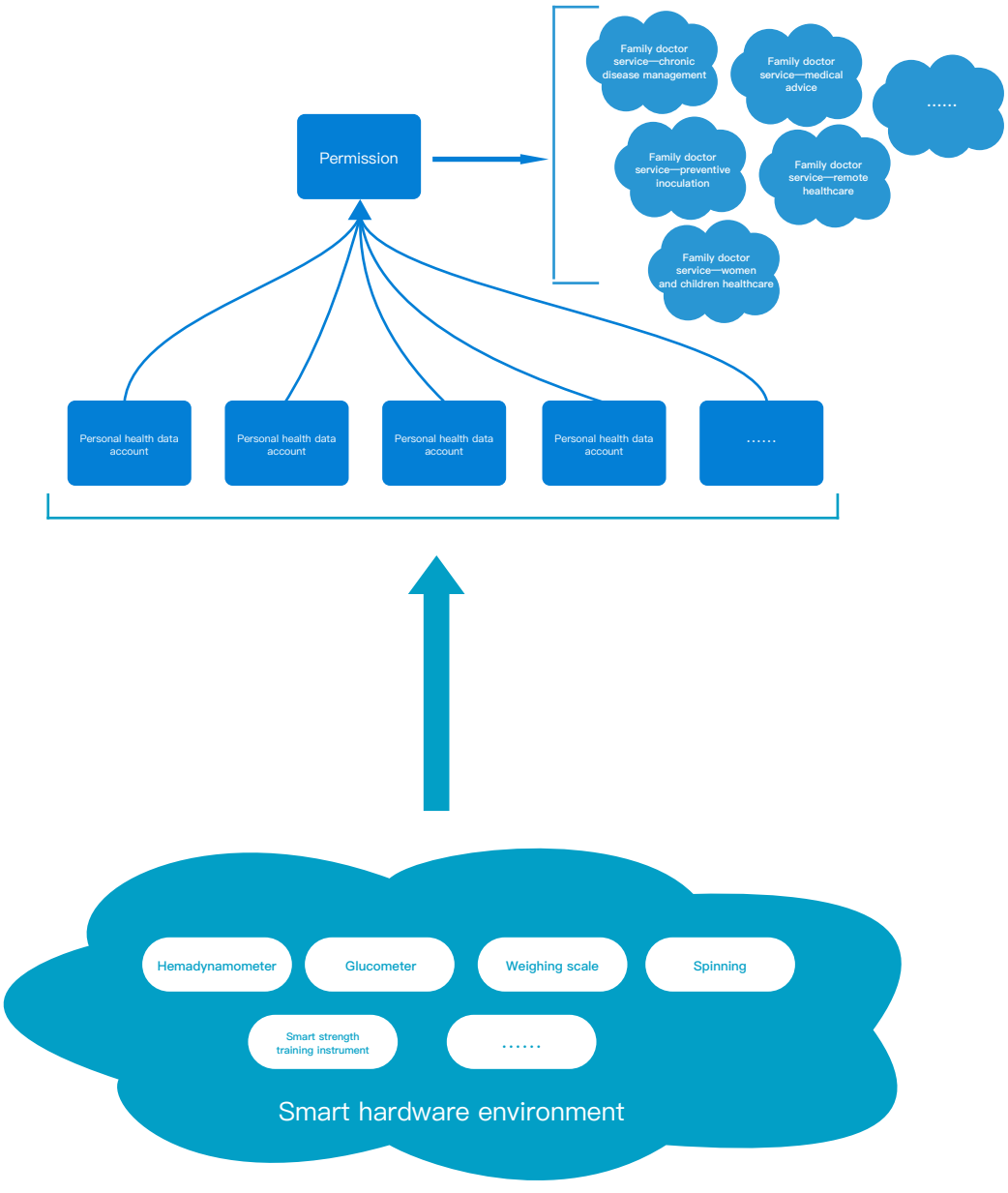
— The business and service processes fully manifest the great transparency and credibility of the DOCARE platform in terms of security, privacy protection and blockchain–based profit sharing.

4.3 Family Doctor Service System

The family doctor service system reaches a stage of rapid development in China. In 2017, those who had signed for family doctor service accounted for 30% of the total registered users. On average, each family doctor has to render healthcare service for about 2,000 residents, and it is extremely difficult for a family doctor to acquire the health data of some residents. Besides, considering the relatively low availability of family doctor service, a large number of residents still have to go to medical institutions for basic healthcare service.

Nevertheless, with the increasingly extensive use of smart home medical devices and smart fitness trackers such as Mi Band, hemadynamometer and glucometer, the corresponding family health data generated from these devices can be transmitted to users' Personal Health Data Bank accounts on the DOCARE platform and shared with their family doctors via the Health Data Bank. This has markedly lightened the workload of family doctors and provided them with firm support in daily data acquisition.

4. DOCARE Business Model



Family Doctor Service System

4. DOCARE Business Model

Business Value

— The DOCARE project offers effective solutions to the recruitment of family doctors, publicity of family doctor service and follow-on service delivery. In the future, governments are expected to subscribe for family doctor service on behalf of their residents.

— Apart from this, it enters into cooperation with insurance companies to launch commercial insurance products relating to chronic disease management and preventive medicine. It thrives on preventive treatment of diseases to improve residents' health condition and medical service experience and cut unnecessary healthcare cost.

— Meanwhile, it also enlists cooperation with research institutes in accordance with relevant state laws and regulations. With residents' permission, the platform provides their health data for relevant research institutes and shares the profit arising from the data service with the corresponding residents, thereby making them keenly aware of the benefit of health management.

4.4 Medical Insurance Payment

With its distributed, decentralized, tamper-resistant, traceable properties and the favorable privacy policy, the blockchain-based DOCARE platform provides ID management service for doctors, patients and commercial insurance companies to verify and record the treatment process and check every payer's ID information; in addition, the HIE technology enables data connectivity and thus commercial insurance companies may view relevant data in real time and confirm data authenticity and credibility when processing online real-time settlement and medical insurance claims; also, smart contracts can be executed immediately after verification, which accelerates the insurance claim process to suit the convenience of medical institutions, insurance companies and insurers. For hospitals and patients, the blockchain-based DOCARE platform can soundly protect their privacy with its data security system. At the same time, it minimizes the risk of personal information leakage by decentralization. To be specific, only patients themselves and those with their permission can access their health data. To maintain health data security, each data access is under control and traceable. Patients may also reproduce their medical records and process insurance claims via DOCARE App without going to relevant medical institutions and commercial insurance companies.

4.5 Drug Supply Chain Management & Prescription Circulation

The blockchain-based DOCARE platform also supports drug supply chain management and prescription circulation. Against the backdrop of zero price mark-up for drugs and other medical policies in China, regulators, hospitals and pharmaceutical enterprises all take part in the DOCARE platform and link drug production and circulation, diagnosis and treatment, procurement of drugs, payment and delivery to the chain, thereby achieving closed-loop regulation and eliminating fake and counterfeit medications, prescription drug abuse, private information leakage and drug-dispensing mistakes at source.

4. DOCARE Business Model

Various drug dispensing options are available for patients. If prescription drugs are available outside the hospital pharmacies, patients may purchase them from any pharmacies in cooperation with the corresponding hospitals, and even choose home delivery service, which spares them the trouble of waiting at dispensaries. For hospitals, electronic prescription offers a solution to secure and traceable prescription circulation. The separation of dispensing from prescription policy plays a prominent part in reducing the operating costs of dispensaries and raising the profitability of hospitals.

4.6 Value of Blockchain-based Healthcare Service

DOCARE aims to build a blockchain 3.0 in healthcare. As the basic blockchain-based platform in the healthcare industry, it is for sure to facilitate the release of healthcare Apps built on blockchain technology. Data users may submit an application on the chain to request and obtain permission of data owners and access the corresponding data after paying data providers. Service providers can access secure and credible data on the chain with data grants and provide valuable and quality service for subscribers based on the accessible data. Any Apps that meet the corresponding requirements can be linked to the chain. Eventually, an integrated healthcare ecosystem will be established and users can acquire, manage and use health data and get healthcare service on the chain.

5. Digital Asset Replacement Plan

5.1 Offering Overview

5.1.1 Project Token

The proposed digital currency of the DOCARE project is DOCARE Coin (DOC), which can be used for the following purposes:

1. A given number of DOCs will be granted as rewards when users upload their personal health data to the platform and provide nodes for the chain;

2. DOCs can be used for payment/exchange and as fuel for smart-contract execution, i.e., Proof of Work (PoW);

3. Users may subscribe for DApp/services (i.e., remote healthcare, medicine, insurance, offline services) available on the DOCARE App with DOCs;

4. DOCs can be exchanged with other digital currencies and assets as an investment or hedging instrument.

5.1.2 Project Foundation

The DOCARE Foundation (the "Foundation") is a nonprofit entity established in Singapore that carries forward the DOCARE project. The Foundation applies itself to project construction and transparent management. It aims to take the lead in driving the secure and harmonious development of the DOCARE project. A credible third party is authorized by the DOCARE team to facilitate the establishment of the Foundation in Singapore, oversee the day-to-day operations of the Foundation and report to the DOCARE team. Upon establishment, community members will be invited to join the Foundation Committee after careful selection and the committee members are responsible for practical management and decision making.

5. Digital Asset Replacement Plan

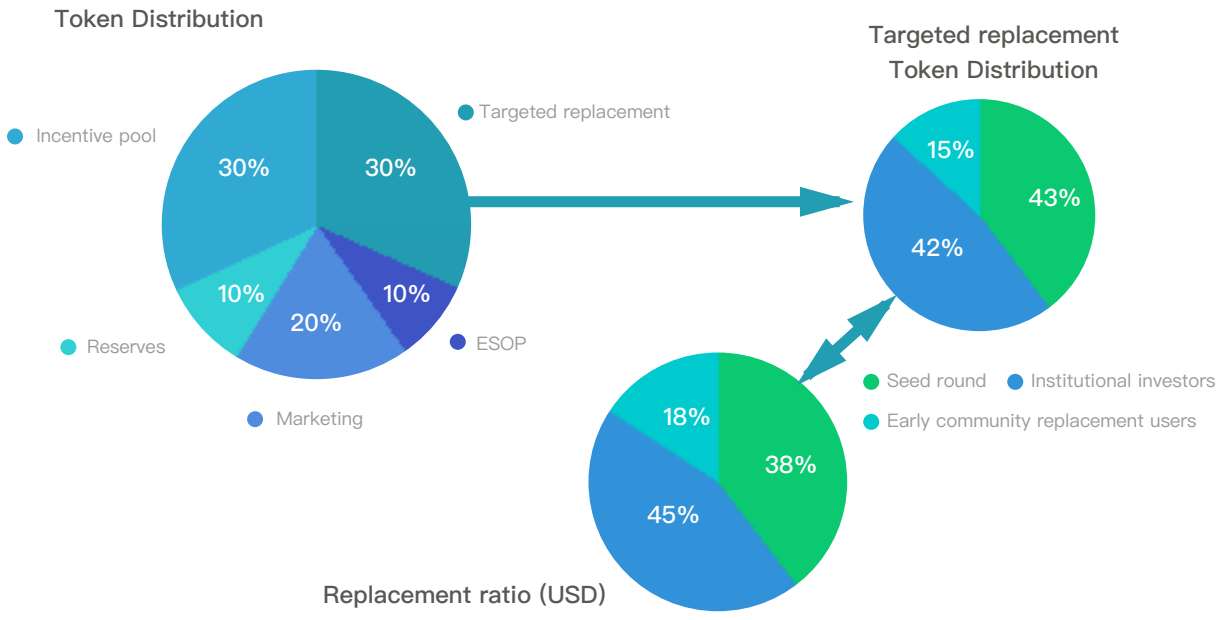
5.2 Fundraising Rebate Policy

	Seed Round ($500,000 per share)	PE Round ($200,000 per share)	Early Community Replacement ($50,000 per share)	Total
Number of replaced tokens	258,000,000	252,000,000	90,000,000	600,000,000
Rebate	70%	85%	95%	/
Amount of replaced digital assets (USD)	3,000,000	3,600,000	1,400,000	8,000,000
Incentive lock-up period	6 months	3 months	1 month	/
Estimated average price	$0.01163	$0.01429	$0.01556	/
Shares	6	18	28	
Tokens per share	43,000,000	14,000,000	3,214,286	/

*Relevant information (e.g., date of implementation, exchange ratio) about the digital asset replacement plan is subject to official release.

5.3 Token Distribution Plan

Proposed offering amount: 2 billion. See the distribution plan below:



5. Digital Asset Replacement Plan

5.3.1 Offering & Replacement

600 million (30%)

In the early stage, the “lock-in and gradual release” policy on token sale applies to the eligible investors who hold favorable views on the DOCARE project in the long run, including influential investors in communities, strategic investors and partners, early investors, main stakeholders, industry partners and institutional customers. However, to ensure distributed holdings of DOCs, each should purchase no more than 6 million DOCs. The DOCs in reserve will be sold after transactions in the secondary market. The funds generated by selling DOC are mainly used for technology development and construction of the DOCARE project.

5.3.2 Incentive Pool

600 million (30%)

DOCs in the incentive pool will be granted to individuals and institutions that upload health data and provide nodes for the chain. It is locked by smart contracts and gradually released on annual basis. Specifically 5% of the DOCs balance of the incentive pool will be released every year.

5.3.3 Promotion & Operation Pool

400 million (20%)

The promotion and operation pool is built to support incubation activities, marketing events and liquidity schemes. New users and opinion leaders will be granted DOCs to expand the market, cultivate active users and exert the network effect on the DOCARE platform. Because the promotion and operation pool adopts 100% transparent management, information disclosures will be released at regular intervals.

5.3.4 Foundation

200 million (10%)

The DOCARE Foundation is a nonprofit organization. It provides financial support for the technology development, day–to–day operation and maintenance of the DOCARE project with its DOC holding. The foundation is not available until DOCARE has made its entry to relevant exchanges for three years. By then, the funds can be used if necessary.

5.3.5 ESOP

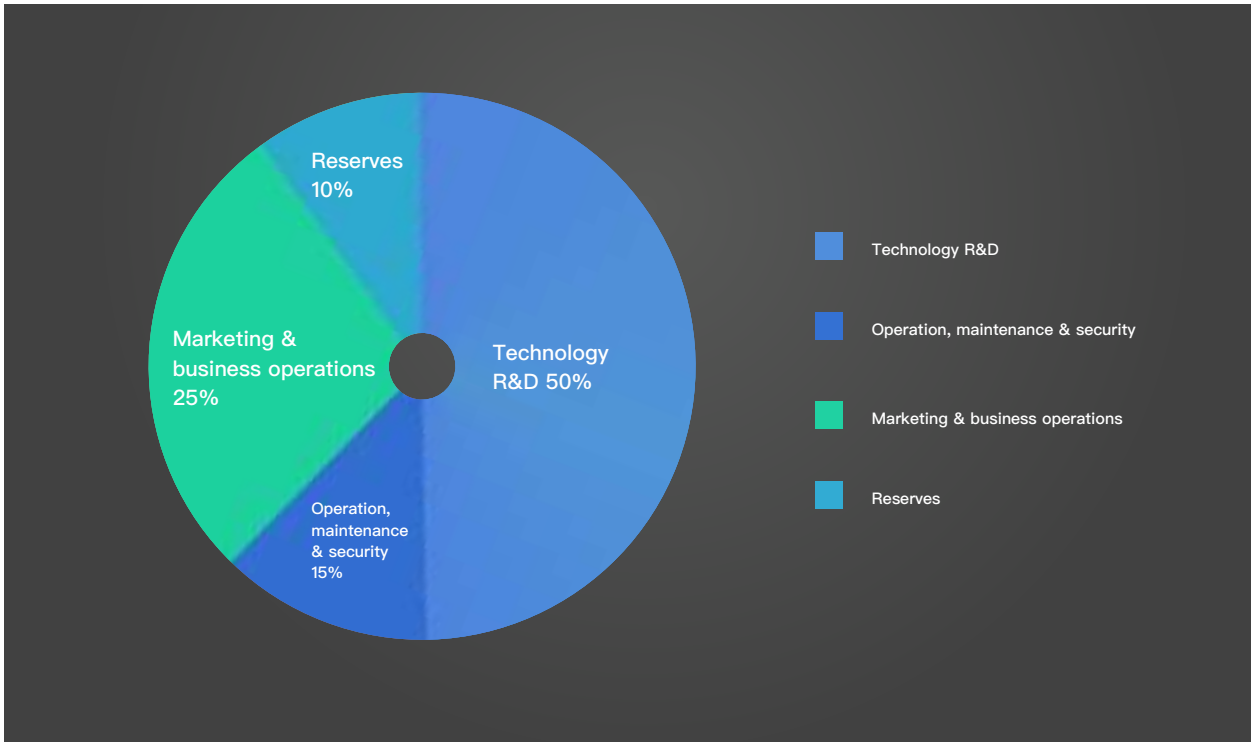
200 million (10%)

The ESOP is designed to motivate the founding and operations teams. It is implemented after three years of exercise and 5% of the plan will be unfrozen and allocated after 7 months from DOCARE's entry to relevant exchanges while the remaining will be distributed after a year, with 10% of the balance being released quarterly.

5. Digital Asset Replacement Plan

5.4 Funds Distribution Plan

The funds distribution plan is as follows:



1) Technology R&D (50%)

DOCARE is to set up a secure and credible health data system, with HIE and IPFS respectively solving the information silo and data storage problems. Considering that the leading-edge technology and ideas are relatively challenging and the project involves the medical imaging App Yunjiaopian, it requires a substantial input in the R&D and construction of the DOCARE platform, which thereby promotes the formation of a business ecosystem and product iteration.

2) Operation, Maintenance & Security (15%)

Since DOCARE is a health data platform that enables remote healthcare service and transactions based on smart contracts, it is highly demanding in terms of data storage and utilization, hardware configurations and data security. Therefore, specific optimization and investment should be made to establish a scientific management mechanism.

3) Marketing & Business Operations (25%)

To create a large-scale ecosystem in a short time, the platform should support various clients and payment scenarios. Bracing itself for complex business scenarios and different roles, DOCARE has to adopt a diversified strategy; to build the ecosystem at a faster pace, it should vigorously roll out extensive publicity, develop more institutional customers and improve operation and service performance.

4) Reserves (10%)

A given amount of DOCs is reserved to cope with emergencies and cover miscellaneous expenses.

6. Team DOCARE & Industry Endorsement

6.1 Healthcare & Technology Executives

Guo Lingyu, Shanghai WeCare Information Technology Co., Ltd., CEO

Guo was Director of R&D Center, Project Implementation Center and Pre-sales Support Department of DJ HealthUnion Systems Corporation (top HIE-based healthcare informatization company in China). He has been in the healthcare informatization industry for 16 years and accumulated enormous experience in product design, development, implementation and maintenance, team management and market promotion. As an HIE expert, he is the first to build a domestic team that independently designs and develops HIE products, which have been successfully launched at customer sites.

He has played a part in the development of the following products: PACS, RIS, EMR, HIE, a patient service App, an integrated payment and settlement platform, a regional imaging data platform, a regional health data platform, BI data analysis system and a remote diagnosis platform.

Representative Projects:

— Health Data Exchange Platform-based Electronic Medical Record System Construction and Restructuring Project of the First Affiliated Hospital, Sun Yat-sen University (HIE-based Intra-hospital Information System)

— Shanghai Hospital-Link System (a municipal project of building a health data platform to connect twenty-three 3A hospitals in Shanghai)

— Suzhou Health Commission Medical Imaging Platform Construction Project

(the first organization to apply HIE technology for medical imaging data storage, sharing and utilization)

— Remote Medical Imaging Diagnosis Platform of Shangdong Medical Imaging Research Institute (HIE-based remote medical imaging diagnosis platform at provincial level)

Ye Xin, Shanghai WeCare Information Technology Co., Ltd., CMO

Ye is an associate chief physician, holder of master degree in software engineering, CTO of IT Division of Cross-strait Tsinghua Research Institute and expert of the National Health Commission on electronic medical records. He was Director of Information Center of Zhongshan Hospital, Xiamen University, member of China Hospital Information Management Association (CHIMA) and Vice-chairman of Fujian Province. In addition, he took the lead in the design and planning of a regional healthcare informatization project in Xiamen. Presently, Ye is an expert of the National Health and Family Planning Commission on electronic medical records who plays a part in formulating relevant national standards for electronic medical records. He has been practicing medicine for 24 years and accumulated 18-year experience in healthcare informatization.

Representative Projects:

— Informatization Project of Zhongshan Hospital, Xiamen University;

— Regional Healthcare Informatization Project in Xiamen;

— Other large-scale hospital and regional healthcare informatization projects;

— Compiling national standards for electronic medical records.

6. Team DOCARE & Industry Endorsement

Huang Hongqing, Shanghai WeCare Information Technology Co., Ltd., Chief Technical Advisor

Huang is the Co-founder and Software Technical Director of iRiding (Xiamen) Technology Co., Ltd. He has been in the healthcare informatization industry for 11 years, during which period, he has accumulated a wealth of experience in healthcare project development and played the leading role in building and implementing electronic medical record and informatization frameworks for many hospitals and medical institutions. Being an Internet entrepreneur for six years, Huang has contributed to the design and planning of numerous projects, such as the IoT and Internet projects of a smart sharing mobility platform and the development of a cloud-based IoT system and App related to smart hardware.

Representative Projects:

— Health Data Exchange Platform-based Electronic Medical Record System Construction and Restructuring Project of the First Affiliated Hospital, Sun Yat-sen University

— QiCycle Sports Social Networking Platform (QiCycle App, online community operation/social networking platform, e-commerce platform, smart hardware operation, maintenance and after-sale service system)

— Micycle solution (pedal electric cycle) developed by QiCycle (cloud client, App, smart hardware/bluetooth access control layer, production automation/smart manufacturing module)

— ofo shared bike IoT solution (cloud, IoT layer, App API layer, smart hardware mobile network/bluetooth access control layer, production automation/smart manufacturing module)

6. Team DOCARE & Industry Endorsement

Grissom Hwang, Dr.

Data Mining and Anomaly Detection Expert, Cloud Computing Expert

He has been in the software development industry for more than 16 years and accumulated extensive experience in product design and development for large scale distributed computing systems and cloud based computing systems, including plenty of projects for top class cloud service provider in the world.
He has been very interested in doing research on anomaly detection research for more than 10 years, published many papers about anomaly detection using data mining techniques. He is also a co-author for the book <Anomaly Detection Principles and Algorithms>, and had collaborated with the world's top investment bank in joint research and development of risk analysis algorithms for big data in the financial industry. He has been invited as peer reviewer by many famous international conferences, including but not limited to:

- International Conference on Industrial, Engineering and Other Applications of Applied Intelligent Systems.

- Industrial and Engineering Applications of Artificial Intelligence and Expert Systems.

- International Conference on Computers and Their Applications.

- Journal of Statistical Computation and Simulation.

6. Team DOCARE & Industry Endorsement

6.2 Advisors & Partners

Li Baoluo (Health Data Advisor)

Li is the former Director of Information Center of Chinese Academy of Medical Sciences & Peking Union Medical College, professorate senior engineer, member of the Panel of Experts of Technological Innovation Award Review Board of Chinese Hospital Association and Special Planning Advisor of Chinese Hospitals. He is also a member of the Panel of Experts of Informatization–steering Group of the National Health Commission, Vice President of Chinese Health Information Association, Vice–chairman of CHIMA Standing Committee, Editor–in–chief of China Digital Medicine and member of the Editorial Committee of Chinese Hospitals.

He remains actively engaged in the research on applying computer science to medicine, design and development of hospital information systems, hospital administration, medical data analysis and epidemic data processing systems. About 70 of Li's publications are included in the influential magazines, such as Chinese Medical Journal, Medinfo 89 Memoir, Chinese Journal of Hospital Administration, Chinese Hospitals, Hospital Administration, Minicomputer & Microcomputer System and China Computer World. Besides, he played the leading role in seven key projects held by the National Health Commission and State Ethnic Affairs Commission, including the Research on Integrated Hospital Information System, and received plenty of rewards for his remarkable accomplishments in these projects. Presently, he is working on the project held by the National Health Commission, that is, formulating the Basic Data Set Standard of Chinese Hospital Information (BDSS). In recent years, Li has published 11 works. In 2003, he took part in the compilation of the Hospital Administration: Information Management as the Editor–in–chief. He has been granted numerous awards at different levels.

6. Team DOCARE & Industry Endorsement

Wang Xiaolai (Design Advisor)

Wang is the Chairman of Board of Directors and Chairman of Business Decision-making Committee of Jiangsu Health Corporation (JSHC). At the same time, he holds the concurrent positions of Senior Member of Academic Development Advisory Committee of Advanced Institute of Media Culture and Society Development, SJTU, Executive Director of Chinese Health Association (CHA) and member of Society of Health Risk Assessment & Control, Chinese Preventive Medicine Association.

Wang took the lead in the planning and implementation of the "Intercity Information and Knowledge Sharing Platform" and other projects held by the World Bank; he also participated in the research on PPP model jointly held by the Pacific Economic Cooperation Council (PECC (China)) and Bank of China; in addition, he was the former Secretary-general of PECC China Finance Committee. During 2002 and 2004, Wang took part in a number of national projects and contributed to the planning and design of "National PKI Authentication System", "Models of Digital Creative Industry and Communication Service System", "Model of Collaborative Service System of Public Healthcare" and "Model of Collaborative Service System for Data Heterogeneity and Exchange in Urban Planning". From 2009 to 2010, at the invitation of the government of Jiangsu Province, he played a leading role in the planning and design of the prospective public service platforms based on the broadcast & TV network system, including "Healthy City", "Learning-oriented City" and "Cultural & Creative City". Since March 2011, he has engaged in the project of "WAN Full-coverage Interactive Service System Based on Healthcare Informatization", in which he mobilized relevant broadcast, TV and broadband network resources and organized cross-functional collaboration in the province to set up pilot public service stations. In 2012, the Jiangsu Health Corporation (JSHC) was founded and he is the Chairman of Business Decision-making Committee of JSHC. He took the lead in the overall construction of the "Healthcare and Smart Healthcare Informatization Service System" in the socialized third-party service framework.

6. Team DOCARE & Industry Endorsement

SlowMist, Inc. (Security Audit Partner)

SlowMist is an enterprise that provides professional blockchain security solutions. With its headquarters situated in Xiamen, the SlowMist team has accumulated a wealth of experience in the field of network security. SlowMist has provided service for many renowned companies, including Google, Microsoft, W3C, the Ministry of Public Security, Tencent, Alibaba and Baidu. In addition, its research results have been widely accepted at Black Hat and other information security events. It is technically proficient at security audit, defense deployment, tracking underground hackers. SlowMist is a service provider for a number of stock exchanges and other entities across the world to offer security audit and defense deployment solutions to their wallet Apps and smart contracts. Meanwhile, it provides threat intelligence for customers and government departments using its self-developed underground hacker tracking engine. In the DOCARE project, SlowMist oversees the security audit and defense deployment of smart contracts.

Shanghai WeCare Information Technology Co., Ltd. (Technical Support)

WeCare is engaged in the R&D and application of blockchain 3.0 in healthcare. With its headquarters standing in Shanghai, WeCare has exceptional core team members who have accumulated invaluable experience in product development, implementation, maintenance and promotion in the fields of healthcare informatization, Internet, IoT and smart hardware, and obtained a profound understanding of the underlying blockchain technology, such as smart contract, encryption algorithm and DDS.

WeCare has successfully developed a basic health data chain, which has received extensive attention from a lot of listed companies in the domestic healthcare industry. WeCare and some of these listed companies, including Ylz Information Technology and Medicalsystem, have achieved initial intent of cooperation on the basic health data chain. Hopefully, numerous users, data and Apps will be available after the beta release.

6. Team DOCARE & Industry Endorsement

Shanghai Zhiying Information Technology Co.,Ltd. (Partner in Medical Imaging Service)

The company mainly provides digital solutions to medical imaging service, including self-service USB flash disk dispensing machine, Yunjiaopian App, cloud storage platform for medical images, patient data synchronization App and online remote diagnosis based on medical images. So far, it has reached intent of cooperation with a number of domestic 3A hospitals and other medical institutions in the private sector. Meanwhile, some projects have already been launched and put into implementation.

In the future, the company will be linked to the DOCARE chain to realize data storage, exchange and application.

Jiangsu Health Corporation (Partner in Regional Healthcare Service)

With the approval of the People's Government of Jiangsu Province, JSHC, a third-party corporation built on healthcare informatization, is jointly established by Jiangsu Broadcasting Cable Information Network Corp., Ltd. (JSCN) and a group of healthcare informatization experts.

Through regional pilot projects, JSHC has fully utilized relevant broadcast, TV and broadband network infrastructure to build the IaaS, PaaS and SaaS models and create the third-party full-coverage business model, namely the "Healthcare and Smart Healthcare Informatization Service System".

7. Early Investors

Young+ is an innovative investment platform that provides blockchain-based service for individual and corporate customers. It is especially proficient at developing integrated financial solutions based on its self-developed "finance + service" model. Young+ engages itself in building an open platform where projects and investments have innovative and efficient capital and asset flows in the consumption upgrading framework.

Byzantium Capital is a Hong Kong-registered private investment firm with four-year experience in digital asset management. It remains engaged in blockchain asset management and global investment. Equipped with top professionals in the blockchain industry and experienced fund managers who have been in the field for over a decade, it has played an active role in a host of domestic and overseas projects, including Ruff, Elf, BlockV, Arcblock and RSK.

7. Early Investors

Zenith Ventures was jointly founded by the Vice President of the Belt and Road Foundation Qu Jiawei and the Founder of Leilook Finance Duan Yu. It mainly engages in investment in underlying blockchain technology, upper-layer applications, blockchain-based service and the secondary market of digital currency. So far, the enterprise has made investment in NEO, ripple, eos, Qtum, IPFS and steemit.

S.Capital focuses on encrypted digital asset management, advisory service for digital asset investors, blockchain technology and business consulting service. Founded by investors who are profoundly aware of the technical, personnel and Internet risks involved in the blockchain industry and relevant key opinion leaders in the field, it attaches the greatest importance to the investment in blockchain technology and encrypted digital assets. It has contributed to over 30 successful blockchain investment projects, including Aelf, Bytom, Nebulas, Arcblock, Theta, Trinity, Ruff.

8. Risk Disclosure Statement

Investors should be fully aware that the DOCARE project faces the following risks:

Compliance & Operational Risk

DOCARE may be forbidden to continue operation for violating local laws and regulations in the process of fundraising and business operation.

The operations team avoids the compliance and operational risk by:

1. Adopting the distributed operation pattern together with the decision-making committee to eliminate single-point compliance and operational risk;

2. Hiring local attorneys to oversee compliance issues related to offerings and transactions of digital assets, blockchain-based financial activities and Apps.

Market Risk

It is possible that the DOCARE project is not accepted by the targeted markets, or fails to attract a given number of users, or suffers from serious drawbacks to business development, or shows poor profitability.

The operations team avoids the market risk by:

1. Sharing DOCARE's ideology with other participants in the healthcare industry and optimizing the DOCARE project by reference to overseas operational experience;

2. Developing a profitable ecosystem based on the experience of the founding team and its partners in the health data and healthcare service markets.

8. Risk Disclosure Statement

Technical Risk

The DOCARE project may encounter major fault and failure of its underlying technology, leading to failure in fulfilling its expected functions or tampering or loss of key data.

1. Developing the DOCARE project based on mature, open-source and secure blockchain technology and widely used frameworks that have been accepted and verified by institutional customers;

2. Inviting more high-end professionals to join the development team to strengthen the team and accumulate more successful development experience after the special group has collected sufficient resources.

Capital Risk

The DOCARE may suffer a material loss of funds caused by stealing, impairment loss and substantial depreciation of reserves.
The operations team avoids the capital risk by:

1. Applying multi-signature wallet and cold storage techniques to the reserves under joint management of the decision-making committee, under which circumstance, the reserves in the multi-signature framework are exposed to capital risk only when three directors fail to assume their responsibilities at the same time;

2. Fully drawing on the risk control experience of the operations team to effectively control relevant project risks and protect users' fundamental interests.

8. Risk Disclosure Statement

This document shall be only used for the purpose of conveying information and shall not be considered as investment advice on the token sale of the DOCARE project. The information or analysis above does not contain all of the information that you need to consider in making your investment decision. The information provided in this document does not constitute advice, preference or recommendation on any investment. This document does not constitute and should not be regarded as an offer to sell or a solicitation of any offer to buy, or an invitation of stock trade or contract or commitment in any forms. The intended users should be explicitly aware of relevant risks involved in the DOCARE project. Investors shall be deemed to fully understand and accept the risks entailed by the project.

DOCARE

DOCAREBlockchain-based Smart Health Data Platform

White Paper