January 2018

Deep Health Chain

Blockchain-based Healthcare Service PlatformWhite Paper

V 1.0.9

DHC

DEEPHEALTHCHAIN

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1 Abstract

Deep Health Chain (“DHC”), a decentralized healthcare service platform, breaks away from the traditional facility-centered healthcare model and instead establishes a blockchain-based medical data sharing network that enables universal access to high-quality healthcare resources and services across the world.

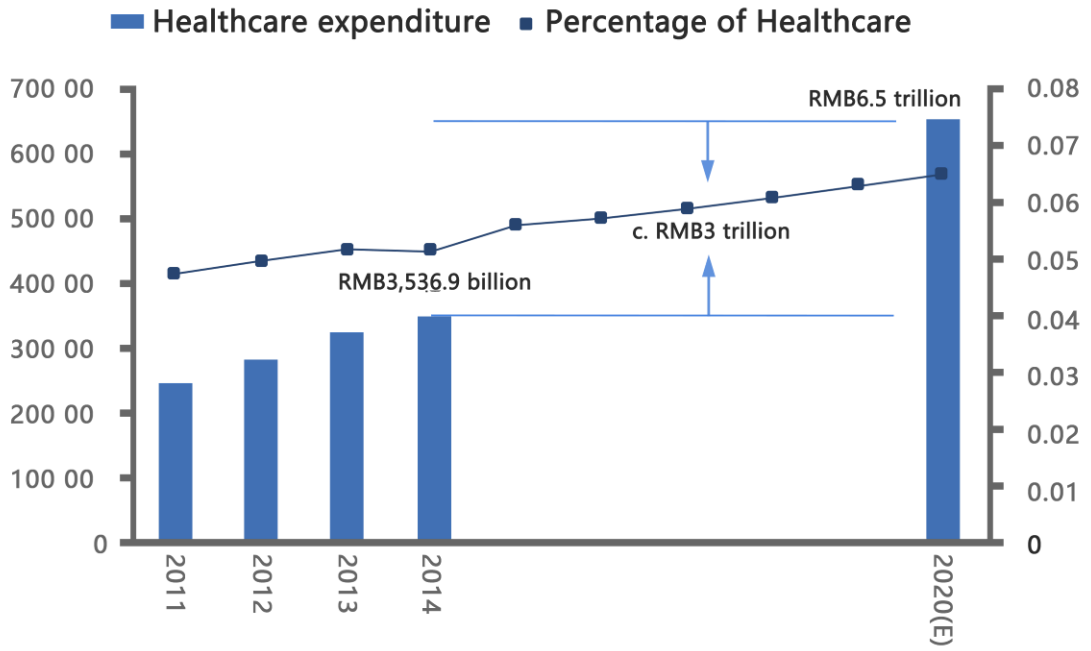
The world on average spends 9.9% of its GDP on healthcare and the U.S. even up to 17%. Medical costs across the world have been rising, though with poor care received by patients. For example, the misdiagnosis rate hovers high, and inadequate and expensive care is still a global issue.

The combination and rapid development of various technologies, including big data, blockchain and artificial intelligence (AI), is making an increasingly huge difference in a wide range of sectors. The marriage of medical data and the above technologies is set to disrupt the existing landscape of healthcare sector and reshape its value distribution. DHC and its partners in the healthcare ecosystem own the medical data of more than 30 tertiary A-level hospitals and hundreds of other medical facilities, plus top technical specialists and medical experts specialized in blockchain, AI and big data. DHC is committed to building an autonomous public chain to address privacy protection and secure exchange of medical data and establishing a DHC data marketplace and app marketplace by leveraging a variety of technical solutions, such as smart contract, decentralized distributed storage, proof-of-stake (PoS) consensus mechanism, homomorphic encryption, differential privacy, etc.

2 Background Introduction

2.1 Huge healthcare market

Over the past decade, China's healthcare sector has been growing rapidly with total health expenditure doubled and a compound growth rate at 17%. The *Healthy China 2020: Strategic Research Report* predicted that by 2020 China's total healthcare expenditure would account for 6.5% to 7.5% in its GDP. At the current rate of economic growth in China, by 2020, GDP is expected to hit the range between RMB90 and RMB100 trillion, which means an expected total health expenditure of RMB6.3 to RMB6.7 trillion at a CAGR of 12.9%. China's total healthcare expenditure recorded RMB3,537.89 billion in 2014. This means the Chinese healthcare market is expected to grow by approximately RMB3 trillion in the next five years.



Data source: *Healthy China 2020: Strategic Research Report*

2.2 Medical dilemma

In recent years, as IT application develops rapidly in hospitals, nearly 90% of hospitals have established sound hospital information management systems. However, some problems persist in the healthcare sector due to the special nature of this sector and the sensitivity of medical data. Such problems are detailed as follows:

- **Unmanageable medical data on the part of patients**

Medical data is scattered across various medical facilities. This renders patients, the sole lawful owners of medical data, unable to have reasonable access to and effective control over their medical data. Also, patients can hardly know if their own medical data has been accessed, retrieved or tampered arbitrarily by others.

- **Reduced value of patients' data**

Scattered medical data renders doctors unable to offer comprehensive diagnosis and treatment to patients by tapping into a complete set of medical data, which reduces the value of such data to patients. Moreover, fragmentation reduces the social application value of medical data in analysis and decision-making.

- **Data security risk at hospitals**

Medical data is mostly stored in hospitals in a centralized manner. This means that data is prone to damage or destruction caused by malicious tampering, hacking, or natural disasters, among other factors, and even data loss.

- **Poor data interoperability between hospitals**

Diverging medical data standards lead to poor interoperability of data between hospitals, and between hospitals and third parties.

- **Lack of access to medical data for scientific research purposes**

Both deep learning, a branch of AI, and case-specific medical record research require access to valid medical data. However, due to

scattered storage and privacy of medical data, relevant scientific research institutions are unable to acquire effective access to such data.

- **Imbalanced allocation of medical resources**

China's healthcare sector is faced with shortage and imbalanced allocation of medical resources. About 80% of quality medical resources concentrate in economically developed areas and big cities while populations in central and western China regions and grassroots rural areas are underserved, thus patients suffering from difficult and complicated diseases find it hard to get medical care.

2.3 Blockchain plus medical big data

Blockchain is a new technology combining decentralized, distributed storage of data, multiple encryption algorithms, and consensus mechanism that can effectively ensure data security and control over data access. Blockchain technology is characterized by decentralization, openness, transparency, and tamper-proof property. Such properties enable all parties to engage in the usage and recording of database. Thus, blockchain is an appropriate fix to core problems of healthcare sector, i.e. data security and patient privacy protection. With high redundancy, low cost and manageable multi-signature function, blockchain stands out as the best option for curation of medical data.

In 2016, blockchain was designated as a development direction of healthcare big data in the 13th Five-Year Plan for the Development of Information Technology.

On October 18, 2016, at the Inaugural Meeting of China Blockchain Technology and Industrial Development Forum (CBD-Forum) & the First Developers Conference, the Ministry of Industry and Information Technology (MIIT) issued the *China Blockchain Technology and Application Development White Paper*.

3 DHC—Blockchain-based Healthcare Service Platform

3.1 DHC Mission

DHC, as a decentralized healthcare service platform, breaks away from the traditional facility-centered healthcare model and instead establishes a blockchain-based medical data sharing network that enables universal access to high-quality healthcare resources and services across the world.

3.2 DHC design concept

DHC seeks to realize secure storage and usage of healthcare data and maximize the value of data while meeting requirements for healthcare data in terms of reliability, scalability, and security. The DHC platform provides a variety of APIs and SDKs for convenient access to healthcare data on the platform by various applications and services, and attracts more medical facilities, patients and third-party organizations to join a healthcare service ecosystem platform.

- **Reliability**

DHC stores healthcare data in distributed data storage spaces, which fundamentally prevents data loss, and records the hash values in blockchains to validate the integrity of data so that a validation would be performed to restore the original state of data when it is subject to forced changes or falsifications.

This prevents all users of healthcare data from altering saved information at will, thus ensuring the integrity and reliability of healthcare data.

A medical record may only be generated upon DHC platform authentication, with all generation processes recorded for traceability. Meanwhile, healthcare providers must go through such authentication processes and obtain authorization from data owners if they want to view others' medical data.

- **Security**

Leveraging underlying blockchain encryption technology, decentralized management and smart contract, DHC reduces the probability of data leakage to the greatest extent. By handing over the access to medical data from healthcare providers to patients themselves, only patients can control their own medical data, set up access control over their medical data at liberty, which will be recorded on the blockchain. This way, data leakage is minimized, eliminating the possibility of massive leakage of patients' medical data by medical facilities.

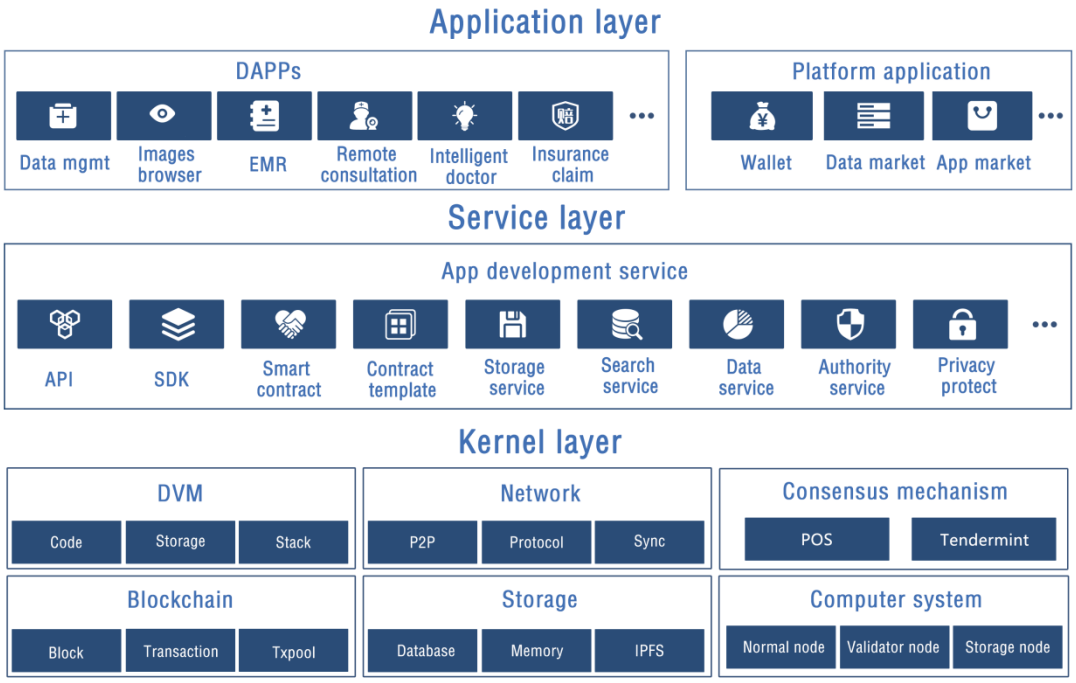
- **Scalability**

Data and information stored on the DHC platform can provide free links to a variety of medical apps given its uniform standards for medical imaging information and patient care information.

The DHC platform, highly flexible and scalable, supports multiple standard protocols including DICOM, HL7 and CDA, and provides standard APIs and SDKs for realization of data access authorization and development of medical services.

4 DHC Technological Implementation

4.1 DHC platform architecture



4.1.1 DHC application layer

DHC application layer groups applications into ecosystem ones (Dapps) and platform ones.

Dapps manage all applications on the platform, including web, DAPP, and other forms of apps. The platform offer developers with a diversity of SDKs and APIs that simplify and make development process easy and enhance development efficiency.

The platform provides users with native apps, including wallet, data mart and app store. Platform users may transfer money via the wallet, check personal transaction history, and directly or indirectly benefit from contributing data to the data mart or spend tokens on data purchases. While the app store provides platform developers with app release

systems so that third-party healthcare providers may upload apps and render services to generate earnings and app users may use their tokens to buy app services.

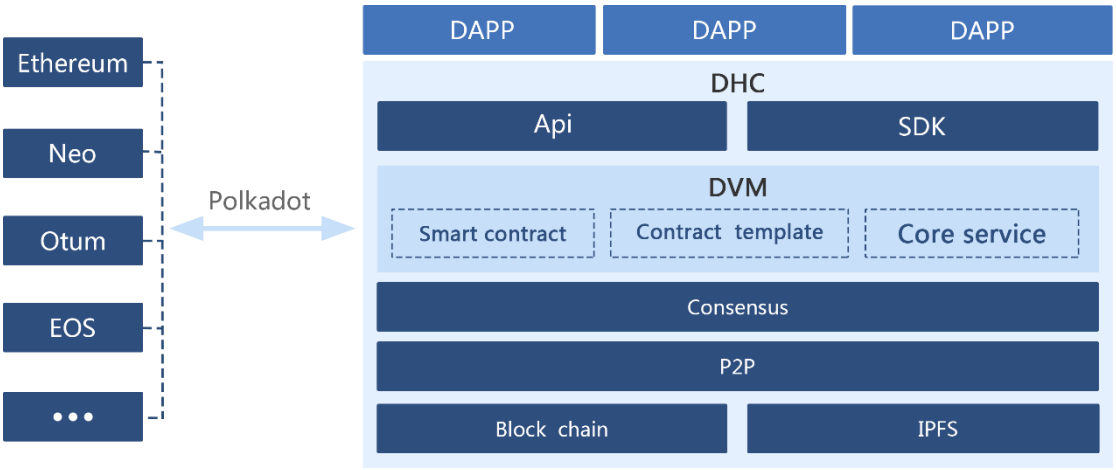
4.1.2 DHC service layer

DHC service layer provides app development services that connect the application and kernel layers. It allows third-party app developers to conveniently leverage core services offered by DHC platform via APIs and SDKs to conduct DAPP development. Such services are packaged with common service components required for app development and block underlying blockchain, network and consensus, among other details, from app developers to allow out-of-box usage, free combination, focused service and efficient development. Such services include DHC user system, DHC Token system, smart contract, scenario-specific contract template, data authorization service, storage service and access control.

4.1.3 DHC kernel layer

DHC kernel layer allows indexing and storage of medical data using blockchain technology. The hash values of data on DHC public chain are subject to distributed storage using IPFS. The authorization, usage and tracking of data are controlled via DVM-based smart contracts. validator nodes adopt POS consensus mechanism to realize consistency using Tendermint distributed consensus algorithms.

In DHC underlying blockchains, when a transaction takes place at a node, transaction data is signed before being broadcast to the blockchain network, verified by a validator node following the consensus rule, then packaged and written in new blocks and synced to other nodes via the P2P network.



4.2 DHC blockchain design

Blockchain is at the core of DHC platform which, by extending the Ethernet workshop, maintains an autonomous public chain to ensure high service scalability, high system performance, and high data security.

4.2.1 Smart contract

The Ethernet workshop contract system is upgraded to build a DVM (DHC Virtual Machine) to make it a more proper fit for data access control, data flow, and app development in the healthcare scenario. Given the sensibility of medical data, the scenarios where such data is used have to be limited. Thus, the DHC platform pre-sets and subsequently adds compliance templates via smart contracts so that players on the platform authorize and use data in these defined scenarios.

4.2.2 Consensus mechanism

Currently, the POW consensus mechanism of Ethereum embraces low efficiency and serious network congestion, while the DHC chain adopts the POS consensus mechanism achieved with the Tendermint distributed consensus algorithm, so as to ensure the system's high availability and high performance.

Tendermint mainly involves the blockchain consensus engine and the common application interface. The consensus engine ensures that the same transactions are recorded in the same order in each machine. The application interface enables transactions to be processed by programs written in any programming language. The Tendermint consensus engine runs on the basis of the cyclical voting mechanism, in which one round turn is handled by three steps: the verifier puts forward a block, sends the intent of submitting, and submits a new block after signing. If less than 1/3 verifiers are from Byzantium, Tendermint ensures that the security is never destroyed. Specifically, the verifiers (more than 2/3) never submit conflicting blocks at the same height. Therefore, the Tendermint-based blockchain will never fork.

The explicit attributes of Tendermint include:

- Provable activeness
- Security threshold: 1/3 verifiers
- Public/private chain compatibility
- Prompt ultimate certainty: 1-3 second(s), depending on the number of verifiers
- Priority of consistency
- Consensus security in a poor synchronous network

4.2.3 Security mechanism

The generation, maintenance, contribution and utilization of all data are subject to smart contracts made by the system to highly protect the users' data privacy. Moreover, the homomorphic encryption is adopted to ensure that the data will not be used outside the DHC platform, the differential privacy is adopted to ensure that the individual data will not be derived, and the encrypted storage, control over the authority of

access to the data in IPFS, and other means are adopted to ensure that the data will not be divulged.

In the case of sensitive data, the multi-signature technology can be used to ensure that the data is referred to or used upon authorization by several people.

4.2.4 DHC storage

The storage of the hospital's diagnosis and treatment recording file do not exceed 10 megabytes each. However, the storage of medical image data easily reaches tens of thousands megabytes, and some institutions' storage exceeds thousands of megabytes every year. Thus, it is quite difficult to store large volume data completely in blockchain, but the IPFS theory can solve this problem perfectly. Serving as a point-to-point distributed system, the IPFS can split and store files freely. In addition, the special network features of IPFS meet the requirements of CDN, thus the sharable distributed database can be established in a sound manner. As the hash index values of data are stored in the DHC chain and the specific data are stored in the IPFS system after encrypted treatment, upon the authorization by the data owner, the data user can exchange encrypted secret keys through the Oakley algorithm and conduct authorized data encryption transmission through the Rijndael symmetric encryption algorithm.

4.2.5 Performance optimization of the DHC chain

The Raiden Network, sharding and other technologies can be integrated to further optimize the performance of the DHC chain. The tps can be up to more than 100000 in principle, and can be expanded horizontally.

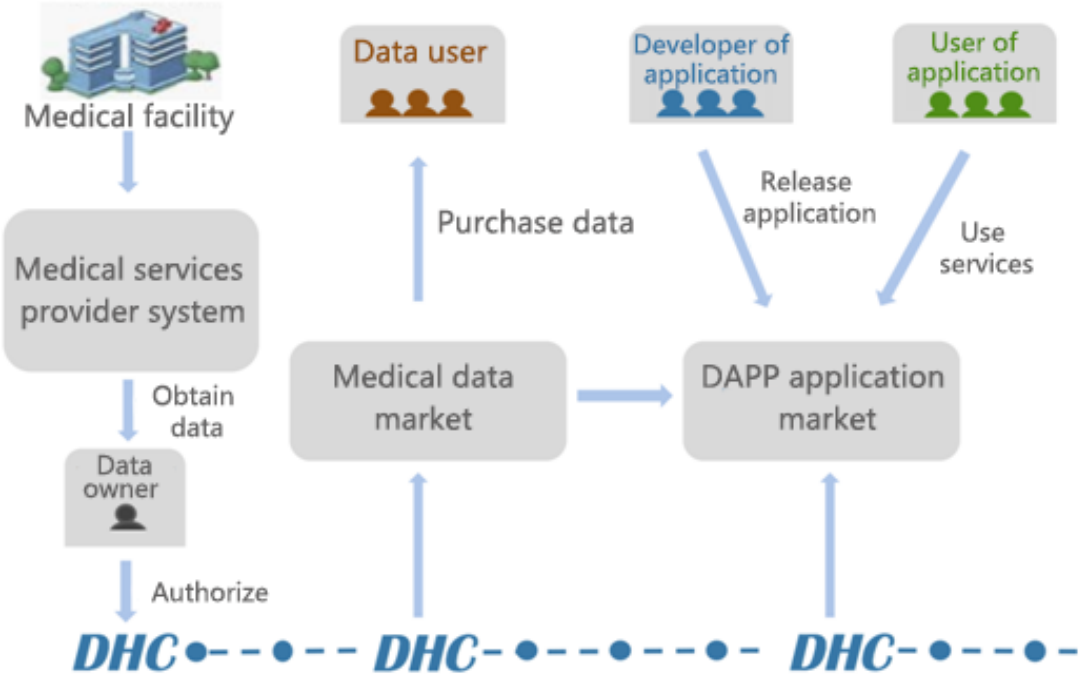
4.2.6 DHC cross-chain application

As the number of publicly-owned chains increases rapidly and one publicly-owned chain can not complete all things in the future, the DHC, from the very beginning, is open to link with the publicly-owned chains outside and integrate with Polkadot and other cross-chain technologies, so as to enable other applications developed on the basis of publicly-owned chains to use the data and services in the DHC chain, and enable the DHC chain to use the excellent characteristics and techniques of the publicly-owned chains outside.

4.2.7 Lower cost of applications development

Rich APIs, SDKs, preset contracts and service components must be available, mainstream development languages such as java, go, javascript and sodility must be supported, and easy debugging platforms and tools must be provided, so as to minimize the cost of developer.

5 DHC Ecological Model



On the DHC platform, all participants are linked up effectively by sharing and utilizing data and obtaining and consuming Tokens, to jointly build and improve the DHC ecosystem.

5.1 DHC ecosystem

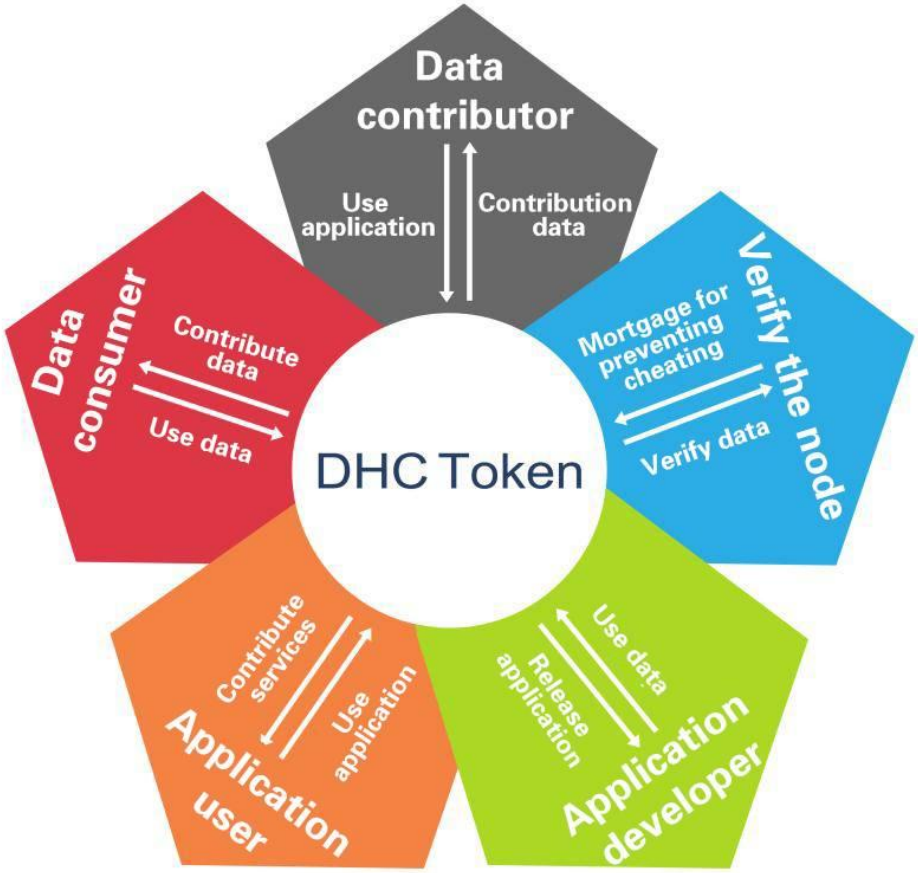
The DHC ecosystem involves two significant ecological markets – data market and application market. In the data market, the data contributors can authorize and contribute their assigned data, and the data users can purchase the data they need; the third-party institutions and developers can conduct research and application development on the data after purchase, and then release the DAPPs and services developed in the application market for purchase and utilization by other ecosystem participants.

The DHC ecosystem conducts many activities regarding data and application, in which the participants relevant to data cover validation node, data contributor and data consumer; the production and utilization

of data usually results from the production and transfer of DHC Token, in which the participants relevant to application cover application developer and application user; the development and utilization of application results from the production and transfer of DHC Token as well.

5.2 DHC Token mechanism

As DHT (Deep Health Token) is the Token issued on the DHC platform for the purpose of ensuring the effective operation of ecosystem and all activities in the DHC ecosystem should be linked by DHT, it is quite important to design a fair, just and reasonable Token mechanism.



5.2.1 DHT incentive pool

In the DHC system, the DHC platform produces DHTs every day, which are stored in the Token pool and distributed to the original data

contributors. The number of Tokens in the Token pool gradually decreases over time. The Tokens are distributed with the algorithm model. After distribution, the remaining Tokens on the current day are included in the Token pool on the next day.

5.2.2 Validator node

In the DHC ecosystem, the authenticated institutions or third parties can become the DHC chain validator nodes, which are responsible for the data verification and packaging of the chain and get corresponding remuneration of Token. However, in order to prevent the validator node from cheating to make a profit, each validator node should mortgage some DHTs in the system and will be subject to deduction of corresponding amount of Tokens in case of cheating behaviors, and the institutions will be listed in the blacklist until recharging DHTs where all Tokens of such institutions are deducted. Therefore, cheating is costly.

In addition, the validator node institutions extract the original data and make data standardized, then develop and provide data management DAPPs to users who utilize DAPPs to contribute their data to the DHC data market.

5.2.3 Data contributor

The ownership of data in the DHC ecosystem is attributed to users who can decide whether to contribute the data or not for specific purposes (smart contract limitation), and the user can obtain some DHT rewards in case of data contribution and the DHTs obtained can be used to purchase services in the application market. In terms of the data

contributed by users, the system distributes the DHC-contributed Token pool on the current day in compliance with the POQ (Proof of Quality) model.

The POQ model marks according to the dimensions of data contributed by users, the importance of each dimension, and the similarity between the contributed data and the existing data, so as to achieve the number of Tokens available for users after data contribution.

The dimensions of medical data involve medical record and diagnose description, prescription record, imaging examination, test result, and monitoring information of vital signs, etc. The dimensions of hospitals include the diagnoses and treatment data of secondary hospital, tertiary hospital and ultra-large tertiary A-level hospital. The dimensions of lesion categories include common disease, stubborn disease, rare disease and infectious disease. For the mentioned dimensions, each indicator has its weighted value and weight proportion in the DHC system. If there are n evaluation indicators in total, the weighted value of each indicator is V, the proportion of each indicator is R, and the system will calculate the similarity S between the contributed data and the existing data, then the number of Tokens available for a user after data contribution is:

$D=\frac{\sum_{i=1}^{n} V_i R_i}{\sum_{j=1}^{m} V_j R_j} \times \frac{(1-S)}{R} \times (R+R')$ Where $\frac{\sum_{i=1}^{n} V_i R_i}{\sum_{j=1}^{m} V_j R_j}$ refers to the ratio of the current data contributed and the total evaluation dimensions, $\frac{1}{R}$ refers to the unit proportion of data contributed on the current day, $1-S$ refers to the similarity value of such data, for which the lower the existing similarity is, the higher the proportion of reward available will be, R and

R refer to the numbers of Tokens to be distributed on the current day and the previous day.

5.2.4 Data consumer

The third institution or the developer can purchase authorized data from users through the data mart to carry out analytical research and application development, etc. And the purchaser needs to pay DHT in accordance with the scenario and quantity of the purchased data. Expenditure of Token for using data can be calculated by POT (Proof of Times, proving the effective times) model, through which data are progressively charged based on the use frequency in a certain period. Specifically, the data used more frequently in the period is more valuable. Therefore, the consumers need to spend more money on the data, and the contributors can make more gains.

The amount of Token for using data can be calculated with the following model:

$$C=\begin{cases} 0.01x\theta & x \le 5 \\ (0.03x-0.1)\theta & 5 < x \le 100 \\ (0.05x-2)\theta & 100 < x \le 500 \\ (0.1x-25)\theta & 500 < x \le 2000 \\ (0.2x-200)\theta & 2000 < x \le 10000 \\ (0.35x-1500)\theta & 10000 < x \le 50000 \\ 17500\theta & 50000 < x \end{cases}$$

where, X indicates the number of times that data has been used, and θ, representing the current regulatory factory in the system, will fluctuate under the impact of Token's price, data's time cycle, etc.

5.2.5 Application developer

The institutions or individuals capable of analysis and development can use data in the data mart to make analysis and development. Developed applications can be launched in the app store, available for users or

institutions. It is also free to charge the application or restrict its application scope.

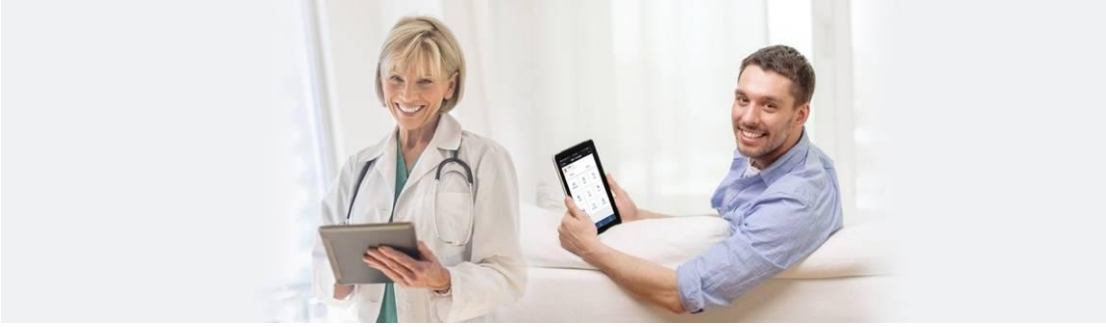
5.2.6 Application consumer

Users or institutions can choose what they need in the app store, probably paying a certain amount of DHT as the service fee.

The DHC platform uses ERC20 token of Ethereum as the Token before launch of the main chain. It switches to the DHT on main chain after launch of the main chain.

6 Business Outlook

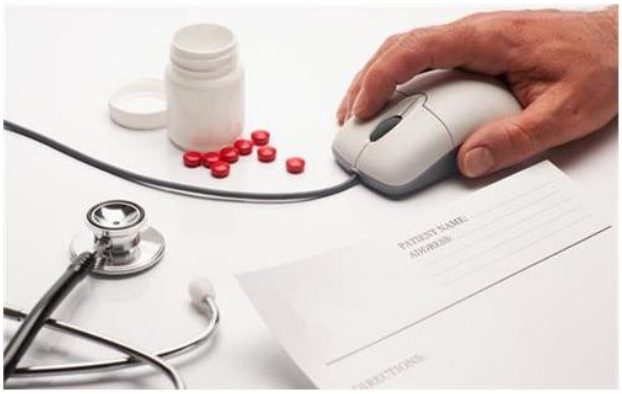
6.1 Personal health report



The DHC platform can contribute to consolidate medical records that are kept by different medical providers. Consolidated information can be managed and used as the complete health records of medical consumers. Medical consumers can not only check when and what medical treatment they have received in hospital and their health condition at any time, but also have an idea of information like what medicine they are taking, the ingredients of the medicine and possible side effects. Besides, they can grasp relevant information like the change of their health condition and current health condition by comparing the present medical records with the previous ones. In this way, users can implement health management with higher quality.

6.2 Completeness of medicine supply chain and source of medicine

According to the industrial estimation, pharmaceutical companies all over the world lose 200 billion dollars for quack medicine each year. Especially in developing



countries, 30% of medicines in the market are counterfeit.

If the blockchain-based system is applied, the whole distribution process of medicines, from the supply chain to each individual consumer, can be guaranteed. Moreover, other functions including private key and smart contract can prove the manufacturer and source of the medicine at any sales stage.

6.3 Pharmaceutical clinical trial and population health research

It is estimated that 50% of clinical trials are not reported, and the researchers do not provide their research results. Such circumstance is a severe safety risk for patients. And for shareholders of healthcare companies and the makers of health policies, there is a wide knowledge gap.

The blockchain technology can provide real-time and traceable records of clinical trials, research reports and research results, and these data are unalterable, therefore reducing the fake and false records in clinical trials. It can also promote high collaboration between the personnel in clinical trials and the researchers.

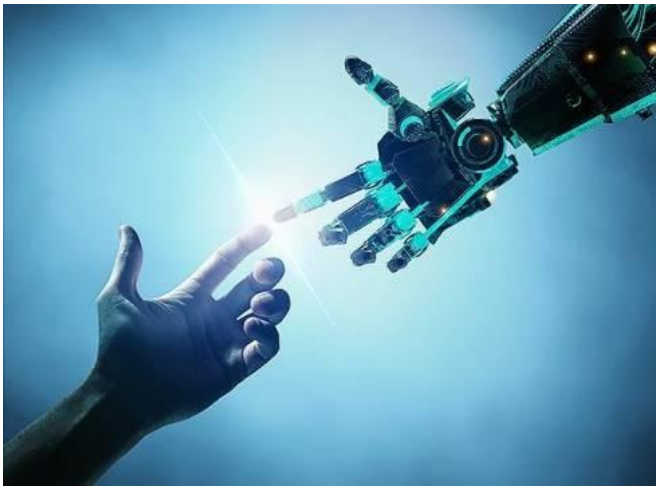
6.4 Network security and healthcare IoT

As for disclosure of health data, nearly 43% of data are disclosed by insiders, and 27% are disclosed because of hacking and ransomware. With the rapid development of IoT healthcare devices at present, it will

be hard for IT companies to provide support for healthcare IoT ecosystem's growth.

In 2020, the IoT healthcare devices all over the world are expected to reach the quantity of 20 billion to 30 billion. The blockchain technology is a great solution to prevent the data of these devices from being hacked. It can also achieve interoperability of data among different devices while guaranteeing security, privacy and reliability.

6.5 Artificial intelligence



Currently, all industries, including the medical field, attempt to innovate on artificial intelligence technologies. Artificial intelligence is comprehensively changing the development of all medical fields, from complex and highly difficult fields like medical diagnosis and drug development to simple health management. Artificial intelligence development is mostly depending on the quantity and quality of data. So, developers who intend to develop artificial intelligence services can acquire lots of data and resources with high quality through DHT to create more advanced AI development services.

The DHC platform can provide services, for example, recommending doctors for patients in urgent for medical care, estimation of diagnosis, and treatment recommendation, etc. Consolidating these functions enables users to have an individualized health management service.

6.6 Purchase and verification of medical insurance

Based on the authorization of the policyholder, DHC can provide users' personal health examination information to insurance companies so that the insurance companies or individuals do not pay for repeated check while handling insurance affairs, therefore exempting unnecessary medical fees. Furthermore, DHC can provide accurate analytical results of health data, and arrange appropriate items for insurance, to avoid insurance fraud and reduce the risk of insurance claims.

6.7 Data-based decision-making of government agency

Authorized by government and health care facilities, DHC is responsible for providing health data analysis results of citizens. Health care facilities issue relevant medical policies based on the data analysis, to improve the awareness of citizens for health. And governments, in accordance with diagnosis and treatment data analysis, are dedicated to allocating medical resources reasonably through macro-control. DHC can make distributed statistics of the places where epidemics and infectious diseases break out so as to monitor the epidemic situation in real time. Governments and healthcare and medical facilities can also formulate corresponding solutions more quickly.

7 DHC Global Strategic Partners

The DHC is committed to, together with its global partners, creating a decentralized healthcare service ecosystem. Shanghai Ruilian Medical Technology Co., Ltd.as partners of DHC project in China, will co-develop DHC blockchain network and healthcare DApps.

7.1 About Ruilian Medical

Ruilian Medical specializes in mobile healthcare services in the field of urologic surgery. Its Dr. Stone (石医生), an application for urinary stone diseases, builds a shared platform for the benefit of doctors, patients and businesses that combines strong capabilities in resources integration and offline services, with a shift away from the traditional patients-pay business model of mobile medical apps towards a pharmaceutical-and-device-companies-pay-for-promotion one.

7.2 About Vijuvia

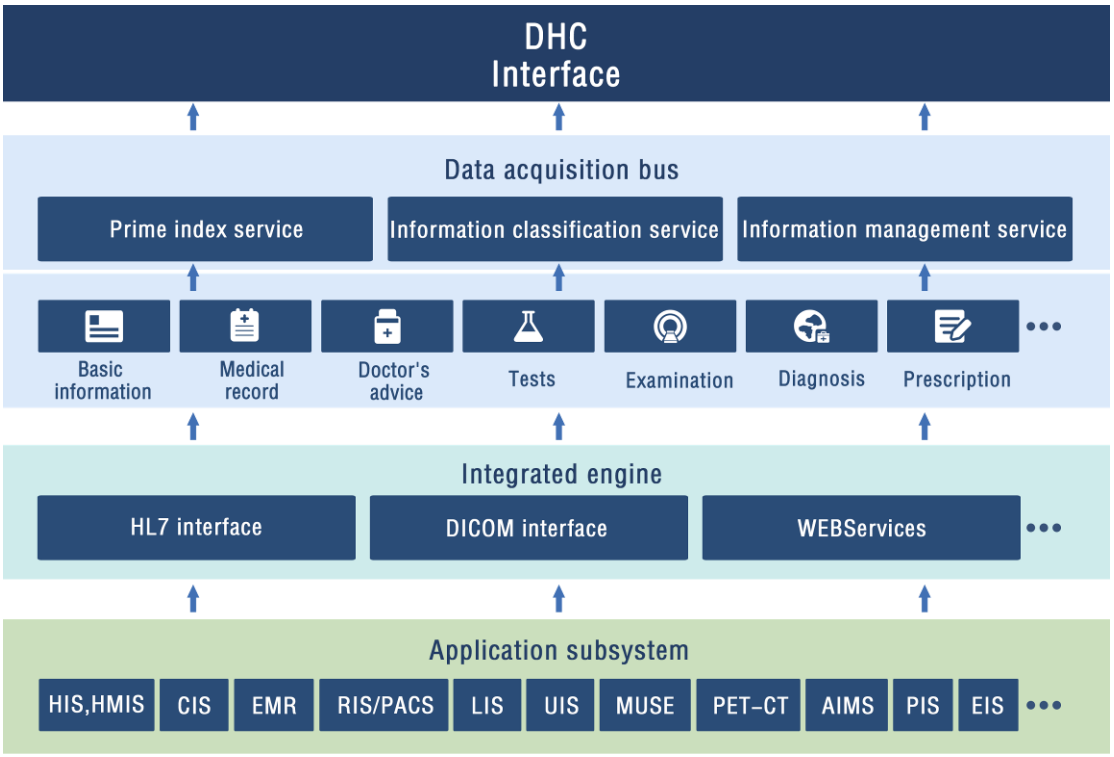
Founded in 2016, Vijuvia Life Centers™ quickly established working relationships with a wide range of medical professionals and medical practices across the State of Florida. Vijuvia is a company whose mission is to combine technologies resulting in better outcomes and reduced health care costs.

The term Vijuvia was derived from the words vitality and rejuvenation or Vi-juvia. Vijuvia's practices offer FDA regulated technology that can help reduce pain or deep scars without pharmaceuticals or surgery. In addition, Vijuvia offers advanced regenerative Amniotic Fluid therapy that can help rejuvenate tissues.

Vijuvia's core team is comprised of healthcare professionals and business professionals sharing a vision to advance healthcare with safe and effective products in over 100 locations by 2021.

7.3 Platform practicing route

- Transfer scattered data from medical facilities to the front-end processor through “data integration platform”
- Input the transferred data into the DHC platform through DHC Interface
- Develop Dapps through SDKs and APIs provided in the DHC



7.4 Products of eco-partners

7.4.1 Dr. Stone

Dr. Stone helps doctors manage a growing patient base with enhanced efficiency by adopting mobile Internet-based smart terminals and relying on its strong database back-end managerial capability. Operation specialists help doctors conduct condition follow-up, patients education, data analysis, etc. Patients register with the app voluntarily upon doctor recommendation, generating data from legitimate sources.

Functions:

- Doctor-patient communication
- Departmental discussions
- Online consultation
- Patients management
- Seeking for advice

Expert Resource :

上海中医药大学附属曙光医院 SHUGUANG HOSPITAL

复旦大学 · 中国红十字会 華山醫院

上海市第一人民医院 SHANGHAI GENERAL HOSPITAL 上海交通大学附属第一人民医院 上海市红十字医院

上海交通大学医学院附属瑞金医院

上海长征医院 SHANGHAI CHANGZHENG HOSPITAL

上海交通大学医学院附属仁济医院 RENJI HOSPITAL SHANGHAI JIAOTONG UNIVERSITY SCHOOL OF MEDICINE

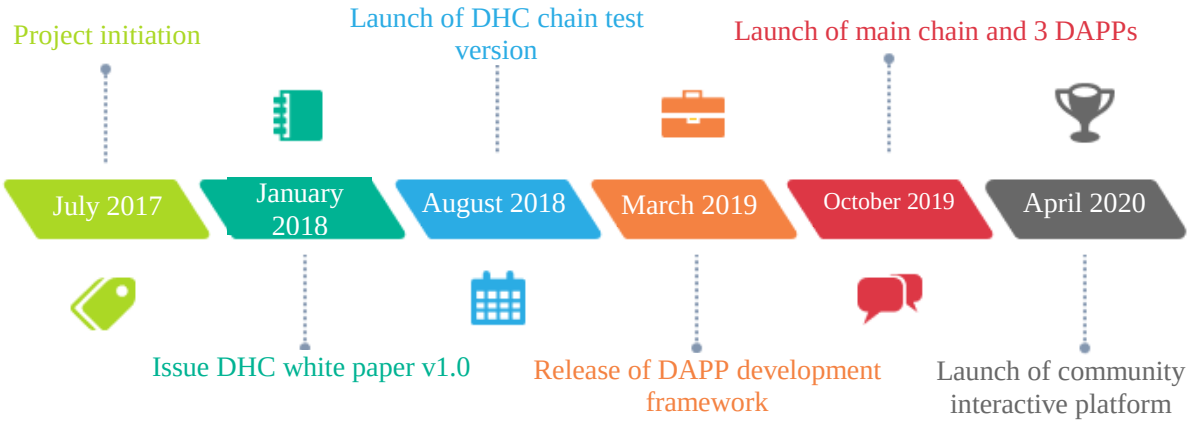
7.4.2 Medicine research

Vijuvia provides DNA test, pain management, trauma repair and many other FDA certified non-surgical medical programs. The data of patients related to the project, drug efficacy and other data can be combined with DHC platform. The patient is authorized to share their own medical data, and the results are fed back to medcine and treatment development.

Functions :

- Patient data
- Test results
- Data feedback
- Advisory

8 Development Planning



The route for product evelopment on the DHC platform involves four stages. The research and development in each stage can be independently released and run, and the codes will be finally submitted to github for easy access and professional audit. For strict medical safety, a medical deployment practice will be carried out during the release of each stage, but the problems arising in the later stage must be solved to ensure normal operation of the previous stage.

In addition, the *Supplementary White Paper* will be issued when a new version is officially launched.

The following four stages is planned to be finished in 2 years, and a phased mission will be completed every 6 to 8 months. The specific goals for each stage are as follows:

- **Stage 1:** (February 2018 to August 2018)

Complete the creation of the underlying DHC blockchain core service layer, and create effective signing, storage, tracking and management of the user key. Achieve the standard medical transmission protocol to ensure a smooth data connection. Establish the data interaction foundation between patients and medical service providers, medical service providers and medical service providers and patients and

third-party institutions by achieving the DHC public chain. Integrate blockchain and smart contracts to achieve the security of medical data, the audit of use, and so on. Complete the preliminary development and tests of the DHC underlying chain.

Achieve user wallet DAPP on the DHC health services platform.

- **Stage 2:** (September 2018 to March 2019)

Based on the service function of the DHC underlying chain and the specific data features of medical services and medical application business, abstractly design a standard framework of developing the DAPP for the DHC application platform, such as code and standard, SDK, and API. Third-party co-developers can construct their DAPP based on the SDK and API of platform.

- **Stage 3:** (April 2019 to October 2019)

Realize the launch of the DAPP eco-market, which allows medical facilities, patients, medical data users and third-party developers to sell, acquire and purchase the required DAPP through the DHC's application market, so as to further promote the virtuous circle of ecosystem. Launch a minimum of more than three DAPP products (such as moving image DAPP, mobile medical record DAPP, hierarchical diagnosis and treatment DAPP, etc.)

- **Stage 4:** (November 2019 to May 2020)

Improve and enrich the functions related to the DHC ecological platform. Achieve the community developed by third parties, and create a platform for communication between patients and healthcare providers. Based on rich DAPP products on the platform, work with developers to jointly promote the cooperation with hospitals to get more access to medical data in hospitals.

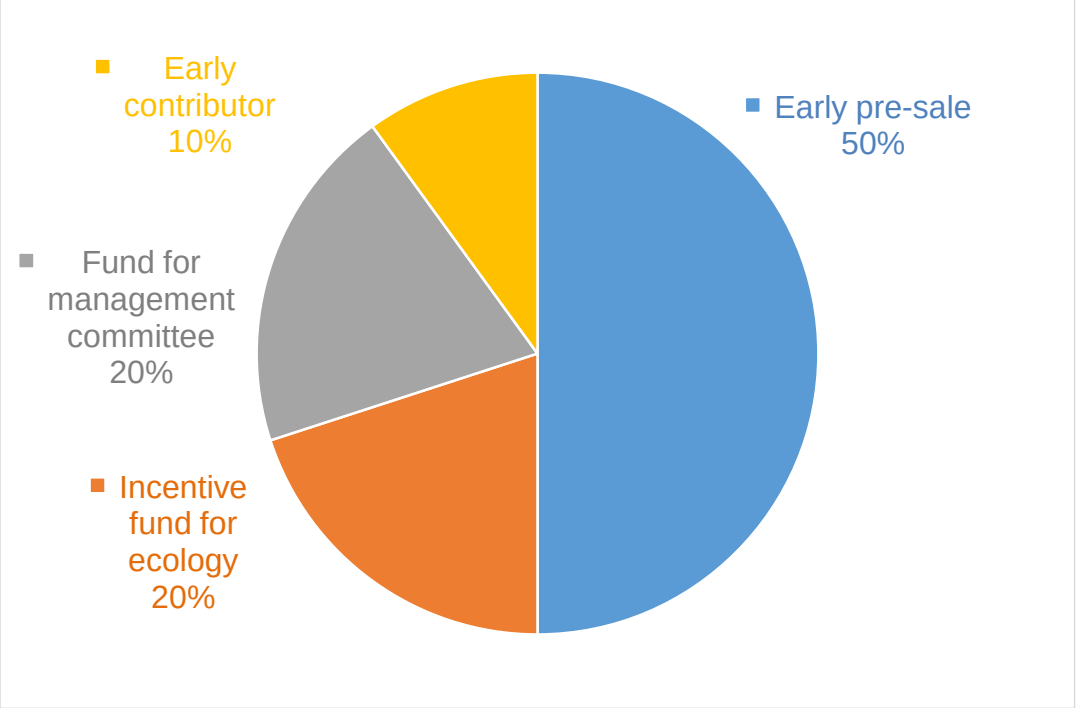
Finally, continuously enrich the DHC medical service platform, and achieve a medical service ecosystem with continuous improvement and self-propagation through the medical data value ecology and hospital applications DAPP ecology.

Time	**Milestone Event**
July 2017	Project initiation
October 2017	Complete the investigation for requirements of integrating blockchain and medical data products.
November 2017	Gather the startup teams, and get them ready.
December 2017	Complete technical investigation and model selection to determine the scheme for system architecture.
January 2018	Issue the DHC white paper (V1.0).
July 2018	Launch the user wallet DAPP (for test).
August 2018	Launch the DAPP chain (for test), and upload codes to github.
March 2019	Launch the DAPP development framework.
July 2019	Launch the application market (for test) for the DAPP platform.
October 2019	Officially launch the main chain, with three online DAPP products available.
April 2020	Achieve a community developed by third parties, and

	create a platform for communication between patients and healthcare providers.

9 Release Plan

9.1 Totals and distribution plan



The total DHT is in the quantity of 10 billion.

Distribution Proportion	Distribution Plan
50%	Early pre-sale
20%	Incentive fund for ecology
20%	Fund for management committee
10%	Early contributor

9.2 Pre-sale plan

Under the lead of the DHC Foundation and based on the development progress of the project, 50% of DHT will be distributed to the community in batches by replacement, amounting for about 4 billion, and being expected to raise enough funds for development and improvement of the project.

9.3 Incentive fund for ecology

The DHC's exclusive health data mining mechanism allows users to upload their health sign data, medical data to the DHC chain, and activities like "mining" will get DHT reward. Users of the DHC chain reserve 20% share as reward by mining, possessing and transacting with health signs data.

9.4 Fund for management committee

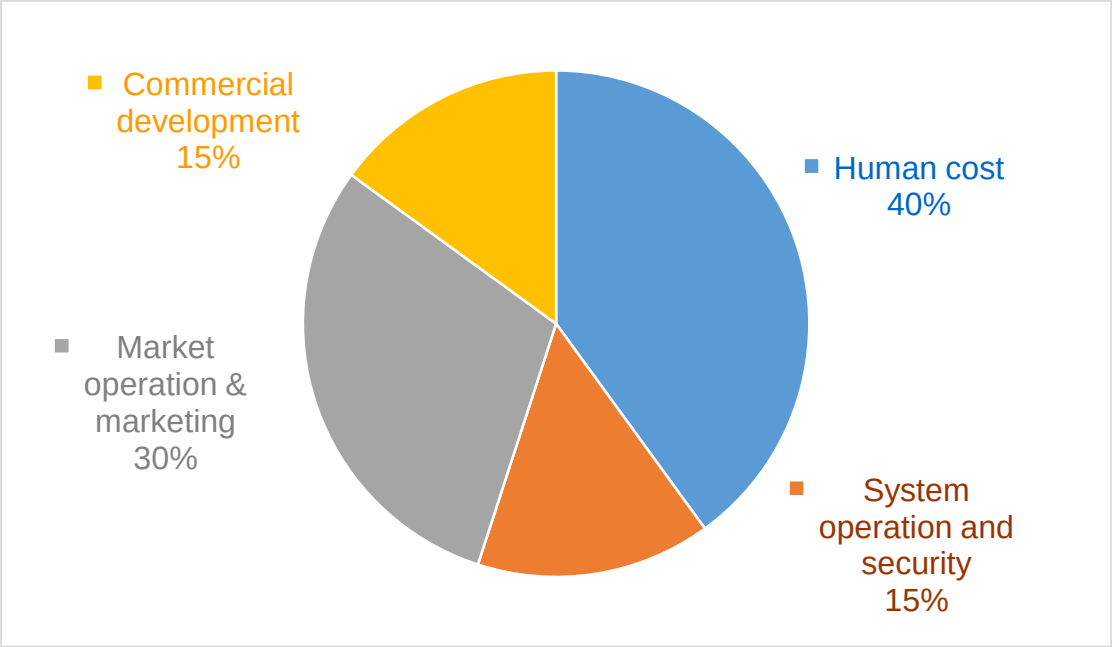
In order to safeguard the rapid, healthy and sustainable development of health application communities and the entire ecosystem, the DHC Foundation reserves 20% share for ecology prosperity, marketing, business development, legal compliance, rewards for early special contribution, mobility plan, and so on.

9.5 Early contributor

The DHC's startup and development teams have done a great deal of work in respect of project design, resource organization and pre-business environment incubation. They have continuously input manpower, intelligence and materials in shaping the ecological environment. Therefore, 10% DHT share will be reserved as rewards for the teams in the Token distribution plan formulated by the DHC foundation.

9.6 Use of funds

The raised funds will be used for the following purposes to support the development of DHC:



Item	Proportion	Description
Human cost	40%	The system adopts the state-of-the-art technologies and design concepts to achieve large-scale, high-concurrency, secure and stable commercial health and medical distributed AI platform. It requires huge quantity of R&D manpower and faces great technical difficulties. Moreover, it consumes a large amount of R&D technology to promote rapid formation of business ecology, rapid iteration of products, as well as expansion and rapid access and cooperation of

		health management agencies. Therefore, the DHC will input a great deal of fund raised for development and shaping of the basic technology platform.
System operation and security	15%	The interaction of data transactions, virtual goods transactions, storage of health and medical data, etc. on the DHC platform highly require for security. The hardware and their security on the platform are also highly required. Meanwhile, the cross-node secure switched transmission of health data highly requires for network bandwidth.
Market operation & marketing	30%	Expand cooperation agencies, introduce third-party DAPP partners, promote products, and attract consumers to use such products in time to build a ecological platform with certain scale in a short period of time.
Commercial development	15%	The DHC needs to nurture and tap commercialized applications of various types of healthcare, encourage data exchange transactions, and mobilize and prosper the entire industry.

10 Team

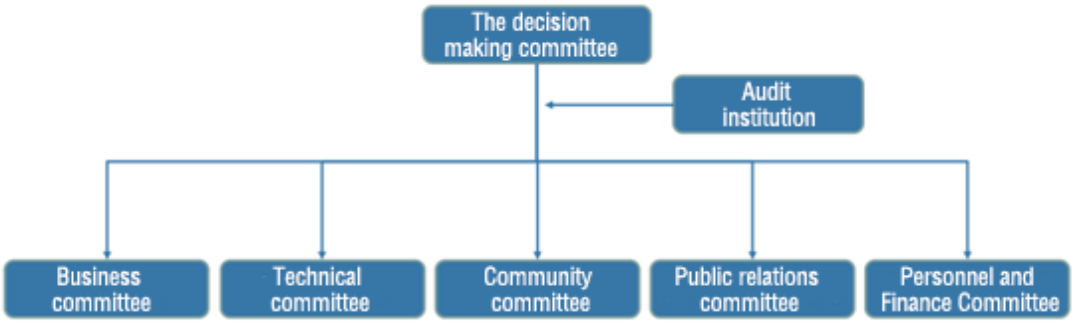
10.1 DHC ecological community foundation

The DHC community will be managed by a foundation in Singapore. As a legal entity of the DHC community, the foundation is responsible for technology development, business promotion and community operations of DHC, and bear all DHC's legal liabilities. The DHC foundation involves the following subordinates:

Decision-making committee:

The decision-making committee, which is the highest decision-making body of the foundation, manages the executing agencies under the foundation and has the power to decide on the use, rewards, penalties and freezing of the funds. The members of the decision-making committees are elected by the community.

The decision-making committee has a term of two years. Upon expiration of the term, it will be elected by the DHC community. The decision-making committee has 5 subordinate executing agencies, as shown in the figure:



Business committee

Be responsible for business promotion, business development, ecological construction, etc. of DHC.

Technical committee

Be responsible for technology development and management, code open source management, Github open source code maintenance, community technology update and evaluation, etc. of DHC.

Community committee

Be responsible for DHC community's operation and management, event planning, resource connection, distribution of community rewards, implementation of community punishment.

Public relations committee

Be responsible for progress report and handling of public relation issues of DHC projects.

Personnel and Finance Committee

Be responsible for distribution of daily allowance for DHC Foundation members, normal financial expenses and volunteer recruitment and so on.

10.2 Investment Organization

- **Waterdrip Capital**

Waterdrip Capital is a professional investment fund in the area of block chain, which was founded by the early lover of the industry from 2011 to 2013. The fund is committed to improving the ecological investment of the block chain industrial chain, and is committed to promoting the technology investment of the underlying development of the block chain, and is committed to integrate the application investment of the block chain and the real business scenario.

- **ZRZF Fund**

ZRZF Fund is the investment mechanism of a new focus on the application of artificial intelligence and block chain technology, management team members from well-known Internet Co and financial group, is committed to the promotion of artificial intelligence and block chain technology used in medical, financial and security industries.

- **Dinglian Capital**

Ding Lian Capital, the top domestic block chain investment capital, participating in the planning and investment of the domestic three

carriages: Qtum and VeChain. At present there are more than 30 projects, including Energy Eco Chain.

11 Risk Statement

11.1 Disclaimer

This document is used to convey information for reference only, and shall not constitute any buying and selling recommendation, solicitation or invitation of sales of shares or securities in DHC and its relevant companies. Parts of this document shall not be construed as provision of any act of purchase and sale, or contract or commitment in any form.

Given the unpredictable circumstances, objectives listed in this white paper may change. The team will do all they can to achieve all the objectives of this white paper, but all individuals or groups who buy DHC shall assume risks at their own. Parts of the document may be correspondingly adjusted in the latest version of white paper with the project progress, and the team will make the updates available to the public by publishing a bulletin or new white paper on the website or other means.

DHC makes it clear that it will not assume direct or indirect losses caused by participants, including:

1: Relying on the document content;

2: Errors, omissions or inaccurate information in this document;

3: Any act resulted from this document.

The team will make efforts to achieve objectives mentioned in the document, however, considering the existence of force majeure, the team cannot completely promise to accomplish all objectives.

DHT Token is a tool functioning effectively in DHC ecosystem, rather than an investment. It is neither a kind of ownership nor control. Control over DHT Token does not represent ownership of DHC or DHC

applications. DHT Token does not delegate any individual any right to participate in, control or make any decision concerning DHC and DHC applications.

DHT Token is digital Token using DHC as one of its usage scenarios. We cannot ensure that DHT Token will appreciate, because its price may also decline in some cases.

To the maximum extent permitted by applicable law, the team is not responsible for damage and risk arising from participation, including but not limited to direct or indirect personal damage, loss of commercial profit, loss of business information or any other economic losses.

DHC platform clearly conveys the possible risks to participants, whose participation in DHT's first presale represents that they have confirmed that they understand and recognize the terms and conditions in the rules, accept potential risks of this platform and take the consequences on their own.

11.2 Risk prompts

You will face a variety of risks once participating in the DHC ecosystem, so you need to prudently assess risks and your own risk tolerance.

- **Regulatory risk**

Blockchain is still in early development, therefore, there are not relevant regulatory document in respect of precondition, trading requirement, information disclosure requirement and locking requirement in the process around the globe, including China. Besides, it is unclear how the current policy will be implemented. All of these factors may have an uncertain impact on investment in and liquidity of the project. Blockchain technology has become the main target of supervision in all major countries over the world. If the regulatory bodies get involved or exert

influence, DHC applications may be affected by it. For example, laws and decrees may restrict, impede or even directly terminate the development of DHC applications.

- **Competing risk**

With the development of information technology and mobile Internet, digital assets represented by “Bitcoin” are gradually emerging, all kinds of decentralized applications continue to spring up, hence, competition in the industry is increasingly fierce. However, with the endless emergence and continuous expansion of other application platforms, the community will face constant operating pressures and certain market competition risks.

- **Brain drain risk**

DHC gathers a number of technical teams, consultants and experts with leading edge and rich experience in their respective professional fields, including professionals engaged in the blockchain industry for a long time and core teams with broad experience in Internet product development and operation. Stability of core teams and consultant resources have important significance for DHC to maintain core competitiveness in the industry. Loss of key personnel or consultant team may affect the stable operation of the platform or adversely affect the future development to some extent.

- **Risk of capital shortage making development impossible**

Insufficient funds prepared, development time exceeding expectation and other factors may cause development capital shortage to the team and thus brings the team to a extreme lack of capital, so that the team will be exposed to the risk of unable to achieve original development goals.

- **Risk of losing private key**

User is responsible for protecting relevant keys to sign transactions certifying the ownership of assets. User understands and accepts that if his private key files or passwords are lost or stolen, then obtained DHT related to user account (address) or passwords are unrecoverable and lost for ever. The best way for purchasers to achieve safe storage and login credentials is to store keys in one or more places for safety and better not to store keys in public computers.

- **Risk of hacker or thief**

Hackers, other organizations or countries are probably to attempt to interrupt DHC applications in any way, including but not limited to denial of service attack, Sybil attack, smurfing, malware attack or homogeneity attack.

- **Risk of uninsured losses**

Unlike account of a bank or other financial institutions, there is usually no insurance protection for storage in DHC account or relevant blockchain-based network. No public individual organization will underwrite your losses in any case.

- **Risk related to core agreement**

DHC platform is now developed based on ethereum. Therefore, any failure of ethereum, unexpected function problems or attack may cause shutdown or function loss to DHC platform in unpredictable ways.

- **Systematic risk**

Systematic risk is caused by neglected fatal flaws in open source software or massive failures of global network infrastructures. Some risks will be greatly mitigated over time, for instance, fixing vulnerabilities and breaking through calculation bottlenecks, but other risks remain

unpredictable, such as, political factors or natural disasters which may cause partial or global Internet interruption.

- **Risk of vulnerability or accelerated development of cryptography**

Accelerated development of cryptography or technological development, such as development of quantum computers, may crack risks brought to DHC platform, which may lead to loss of DHT.

- **Risk of lacking attention to applications**

DHC applications are probably not to be used by a large number of individuals or organizations, which means that the public is not interested enough in exploring and developing these relevant distributed applications. Such a phenomenon of lack of interest may bring negative impact to DHC applications.

- **Risk of lacking recognition or users**

First of all, DHT should not be considered as a kind of investment. Although DHT may have some value after a certain period of time, this value is likely to be very little if DHT is not recognized by the market and thus lacks users. It is likely to happen that DHC platform will not succeed in subsequent operation due to any possible reasons, including but not limited to failure of business relationship or marketing strategy. If this is the case, there will be no or fewer subsequent follower without this platform. Apparently, this is very unfavorable to this project.

- **Risk of application failure**

The platform may break down (such as, large-scale node downtime) due to known or unknown reasons in all aspects, thus becomes unable to provide services as normal and even leads to loss of user’s DHT in severe case.

- **Risk of applications or products falling short of their own or participants' expectations**

DHC applications are currently under development and may go through significant changes before the official version is launched. Hence, any expectation or imagination of DHC itself or participants about DHC applications or forms (including participants' behaviors) may not be met. Among others, any wrong analysis or a change in design is likely to result in such a case.

- **Other unforeseen risks**

Cryptography-based Token is a brand new and untested technology, for which there are still some risks yet not mentioned or predicted by the founding team, in addition to those mentioned in this white paper. Furthermore, other risks are also likely to arise suddenly or in combination of many kinds of mentioned risks.

12 Contact information

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