HEALTH CHAIN US

HealthChainUs white paper
(version 1.0)
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HealthChainUs is a blockchain based decentralized data platform that retrieves patient’s data on their behalf from centralized units. As we move into the data economy era, the medical data has become one of the most promising resources where business potential and opportunity reside with an estimated 30 trillion won-worth market growth by 2021. While interests in medical data explode, the patients whose medical data has been subject to sales by 3rd parties are alienated from the market. However, patients are the only victim who takes the consequences caused by data leakage for which they are not liable. Health ChainUs is a blockchain based service to manage medical data in the form of “a certified copy of real estate register”. In HealthChainUs, every event regarding personal medical data is thoroughly recorded chronologically in a safe and tamper-proof manner. Most importantly, this is where “patient’ control who can view their records, how much they see and for what length of time.
1 Problems in Medical Data Market and Possible Solutions
1. Problems in Medical Data Market and Possible Solutions

Despite its sensitivity and criticality, the medical data is computerized and fragmented in different institutions with various management issue and leakage problems (Table 1).
About

HealthChainUs
2. About HealthChainUs

1) What We Are
HealthChainUs is a blockchain based data platform, where patients can control their data in the form of “a certified copy of real estate register”. For patients, it gives patients control over their medical records and distributes profit from the provision of the data. For data users, it reduces the cost and risk of getting illegal and poor data since the data listed on the platform should go through a consent procedure and systematic verification.

2) How We Work
HealthChainUs empowers patients with the capability to provide differing levels of access to data users, by assigning a set of access permissions and designating who can view their data and for how long. Otherwise, data users should make a request for access with a detailed statement of use. After access is granted, they can use sophisticated tools for data analysis other than just simple data download offered exclusively by HealthChainUs. HealthChainUs satisfies all the interested parties in the medical data market. Most importantly, it proves its greatest value by empowering patients with a redistribution of data control.
3 Medical Data & Blockchain
3. Medical Data & Blockchain

1) The Nature of Medical data

Medical data consists of personal and health information. The abuse of the data causes much damage to one’s privacy, especially when a patient wants to hide their health condition. Although it is for the public good, there is a growing tendency to monitor the purpose of data use even in scholarly research by Institutional Review Board. Meanwhile, patients are not aware of or indifferent to their right on medical data. Probably they understand the sensitivity of the medical data, but most of them do not know what to do but to suffer from data leak.

2) The Value of Medical data

Every year, more than a million of researches using medical bigdata are being published at $10 billion costs. Everyone agrees that this is a fair amount of investment for the sake of people’s health. This equals the value of medical data. The market size of the medical data itself is valued at more than $20 billion. Besides, the convergence between industries makes it as bigger as about 20 times the value of the semiconductor market. Given the fact that its use is limited for some issues, medical data is a golden goose.
3. Medical Data & Blockchain

3) The Reality of Medical Bigdata

Currently, the size of medical data held by Korean national institutions is estimated to be about 6.4 trillion cases. However, major data consumers, pharmaceuticals or insurance companies, purchase the data from other countries because only 1.2 million cases are open to the public in Korea. Genetic bigdata is also restricted in a governmental level in comparison with the country like the U.S. whose government is planning to gather one million set of genetic data by 2022. Considering the fact that Korea has the highest rate of EMR(Electric Medical Record) adoption in the world, it is a wonder that Korea seems far off from a favorable environment for medical data usage. That is mainly because it is high on the agenda of the government and society for the increased sensitivity. The data security is a significant component of the challenge we face today. Therefore, the top priority is to design the best system to prevent both privacy infringement and waste of data.

4) Blockchain for Medical Data

The major problem in medical data market is 3rd party’s acquisition of medical records without patient consent. Blockchain is a solution to overcome this issue. Decentralization is what blockchain technology offers in this challenging situation. It redistributes the data to each patient and safely locks it up. In this way, patients control their data directly and avoid further security breach with minimum care. Furthermore, blockchain technology creates a reward system in exchange of data, which facilitates the supply and demand cycle between patients and data users.
How to Use HealthChainUs
4. How to Use HealthChainUs

1) Patient

A patient joins HealthChainUs through affiliate hospital or a website. He/She can manage his/her medical data on the personal account like an e-mail. Each data can be set to different scope of disclosure (full or partial) contingent on the patient’s permission. Any interactions with patient’s data are recorded as transactions on the network in chronological order. Every contribution is followed by rewards that can be redeemed for actual products or services at HealthChainUs mall. A patient can delete the data as well as withdraw approval of data disclosure at any time.

2) Data User

   a. Insurance Company
      uses various analysis tools on HealthChainus whose results can be reflected in customized products or marketing

   b. Medical Industry
      (Medicine, Bio Device, etc.)
      seeks out patients who have opted into being contacted by researchers so that these institutions can interact directly with the patients.

   c. R&D
      selects clinical trial candidates using HealthChainUs in-depth analysis (statistical analysis, disease risk assessment, etc.) which increases efficiency instead of the burdensome process of forming research groups and going through health providers for access to health data.

   d. Ads & Research
      pulls relevant data from a large pool for microtargeting.
5 Technology and Ecosystem
5. Technology and Ecosystem

1) Data Collection
   a. General information: personal information, name of the hospital, visit date, department, doctor
   b. Medical history: type of insurance, payment method (credit card company)
   c. Receipt: payment date, total cost, reimbursement fee, non-reimbursement fee
   d. Detailed medical cost statement: copayment type of revenue, Insurance number code, reimbursement /non-reimbursement, unit price
   e. Diagnosis: diagnosis code, name of the disease
   f. Test results: blood, radiography, genetic test, etc.

2) Data Collecting Process
   a. Hospital: HealthChainUs starts collecting data from 5 specialized hospitals, 1 teaching hospital and 1 examination center. HealthChainUs registration is made during patient reception and registration. The patients can take advantage of HealthChainUs program (automated insurance claim, issue of patient transfer form, etc.) in return for providing data and every contribution will also be rewarded with HealthChainUs token.

   b. Campaign: As HealthChainUs easily digests a large amount of data, the campaign will target some groups (family, school or work) for participation at one time. The campaign is mainly about "You not only unlock the monetary value your health data holds, and also be more engaged with your actual health conditions." Anyone who provides their data would be paid every time their data is accessed with HealthChainUs token.

3) Data Processing: HealthChainUs aims to develop sophisticated models like health prediction model by repeating data analysis. The data from medical scholarly journals are subject to routine analysis and process and will be also open to the public.
5. Technology and Ecosystem

4) Architecture

HealthChainUs Network consists of 1) User Application, 2) Middleware, 3) Certificate Authority, 4) HUC-Point System and 5) Blockchain (Picture 1).

- **User Application**
  - Web Application
  - Mobile Application
  - Wallet

- **Middleware**
  - RESTful API
  - Auth Service
  - Database
  - HCU-P System
  - Transaction Monitor

- **Blockchain**
  - Certificate Authority
  - Chaincode
  - CouchDB
  - MongoDB
  - Consensus
  - Ordering Service

a. **User Application**
   User Application refers to various applications (Web application, Mobile Application, Wallet) which connect users and HealthChainUs network. The users take advantage of services offered by HealthChainUs via this interface.

b. **Middleware**
   Middleware offers two-factor authentication throughout the whole system in the user application, and invoke a smart contract to generate transactions, only if no concern is identified.

c. **Certificate Authority**
   Authority Middleware implements authentication to verify all the users and every transaction in HealthChainUs network.

d. **HCU-Point System**
   HCU-Point System is an essential part of HealthChainUs ecosystem also subject to authentication process. It rewards user’s contribution and is redeem for actual products or services.

e. **Blockchain**
   Blockchain is the core layer of HealthChainUs network. It instantiates different chaincodes for multiple groups in the network to call different functions and saves transactions on the distributed ledger under a set of pre-agreed conditions.
5. Technology and Ecosystem

5) Network (Hyperledger) HealthChainUs uses a permission-based private network for access, which means there is little chance of intentional attack. The network is enhanced by simpler consensus method compared to the BFT (Byzantine Fault Tolerance) method that considers a large number of cases (functional issue on system components or the possibility of malicious attacks). The peers, participants in HealthChainUs network, confirm if blocks meet the warranty policy, or the ledger is deformed. After a new block that passes security checks is added to the chain, the existing copies of the blockchain are updated.

6) Token (HCUT, HCUP) HealthChainUs offers two types of token: HCUT (HealthChainUs Token) and HCUP (HealthChainUs Point)

   a. HCUT (HealthChainUs Token) HCUT is mainly used as a means of participating in the economy of the platform. It is a tradable token that can be bought on an exchange and also convertible to HCUP.

   b. HCUP (HealthChainUs Point) HCUP is paid as a reward for productive behavior within the platform. It is used as a means of payment settlement in the platform’s affiliates and can be transferred between individuals.
HealthChainUs
Token Sales
6. HealthChainUs Token Sales

1) Token Distribution Plan

- **Total Supply**: 10,000,000,000 HCU (ERC-20)
- **Standard Price**: 1 HCU = $0.0042

a. Token Sales: 20%
   - 20%
b. Platform Ecosystem: 20%
   - 20%
c. Business Development: 9%
   - 9%
d. Marketing: 5%
   - 5%
e. Advisor: 10%
   - 10%
f. Partner: 20%
   - 20%
g. Team: 6%
   - 6%
h. Reserve: 10%
   - 10%

Sales Plan & Bonus Table

<table>
<thead>
<tr>
<th>Sales</th>
<th>Period</th>
<th>Minimum Supply</th>
<th>≤17,000</th>
<th>≤42,000</th>
<th>≤84,000</th>
<th>≤126,000</th>
<th>≤168,000</th>
<th>≤168,000 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Sale</td>
<td>6/28 ~ 7/9</td>
<td>6 ETH</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
<td>40%</td>
<td>45%</td>
<td>50%</td>
</tr>
<tr>
<td>Pre Sale</td>
<td>4 ETH</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>8%</td>
<td>9%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

*Schedule and Bonus Rate can be changed with prior notice.

If it fails to reach the target amount of sales at private sale, the remainder goes on to the pre-sale. Tokens unsold on pre-sale will be provided to the users of the platform as a reward in the future.

2) Intended Use of Token Revenue

- **a. Decentralized Platform Development**: 30%
- **b. Ecosystem Development & Business Expansion (Genetics, Insurance, Clinical Trial)**: 20%
- **c. Network Operation**: 20%
- **d. Marketing**: 10%
- **e. Listed**: 10%
- **f. Legal Contingency**: 5%
- **g. Reserve**: 5%
7 HealthChainUs
Scenario Planning
7. HealthChainUs Scenario Planning

HealthChainUs will use 5% of tokens sales revenue to help grow an ecosystem on its blockchain by educating others, supporting participants, bringing partners onto its platform.

HealthChainUs creates a virtuous cycle of data accumulation, growing consumption, and health promotion through the following steps.

1) In the early stage, we collect patients’ data from other countries. This is a pilot version before launching a domestic one. The data will either be stored or be incinerated in medical institutions and every provision will be rewarded.

2) The overseas patients spend the rewards mainly on medical tourism (transportation, accommodation, etc.). The more members we have in this project are expected to attract more affiliates. This is the starting point of a desirable cycle in this ecosystem.

3) A fair amount of data sufficient enough to conduct a relevant analysis attracts major demand-side users from various industries

4) This platform facilitates microtargeting, candidate selection for clinical trial, pharmaceuticals or advertisers in medical industries

5) The more data are accumulated in this platform, the more benefits can patients enjoy. This underpins virtuous cycle of HealthChainUs ecosystem.
8

What Differentiates HealthChainUs
8. What Differentiates HealthChainUs

<table>
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<th>Existing projects</th>
<th>HealthChainUs</th>
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<tr>
<td>Project's background</td>
<td>IT (Cryptocurrency-centered)</td>
<td>Hospital/Patients</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Public Network</td>
<td>Private Network</td>
</tr>
<tr>
<td>Data management</td>
<td>Autonomous</td>
<td>Accountable</td>
</tr>
<tr>
<td>Quality of Data</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Data Movement</td>
<td>Compulsory</td>
<td>Selective</td>
</tr>
<tr>
<td>Industrial Relevance</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>Slow</td>
<td>Fast</td>
</tr>
<tr>
<td>Commercial Service</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>
Roadmap
9. Roadmap

2018

April · Foundation of a Medical Bigdata Analysis Company
June · Investment from angel investors
August · Launch of MyresearchNote, a platform with the integrated R&D process
August · Contract for developing a consulting platform based on public bigdata (KIMS Co., Ltd.)
September · Launch of Patient-Map, integrated data solution (hospitals & HIRA)
September · Launch of a platform for the rare disease patients (Korea University Medicine)
December · Kick-off of HealthChainUs project

2019

January · Development of HealthChainUs MVP
February · 1st Private Sale of HealthChainUs
April · 2nd Private Sale of HealthChainUs
April · Development of Machine-Learning Solution for Data Analysis (Yonsei University Health System)
May · Release of White Paper & Foreign corporation establishment in HongKongt
May · Development of the map of Metabolic Syndrome Alerts (Yonsei University Health System)
June · Launch of MT-ChainUs, a Solution for overseas patients care
June · Partnership Agreement with 5 hospitals
June · Membership Registration of 4,000 patients for MT-ChainUs
June · Contract of joint R&D partnership (Yonsei University Health System)
June · Pre-Sale of HealthChainUs
July · Expansion of HealthChainUs Partnership
July · Contract of 'GradeHealthChain', Development of Health Status Rating and Insurance Product
August · Overseas expansion of MT-ChainUs
August · Expansion of Token Ecosystem (Accomodation&Transportation)
September · Beta Testing of Medical data Self-management Solution
December · Beta Testing of On-site Hospital data analysis and utilization

2020

January · Partnership Expansion (50 clinics/hospitals, 10 overseas hospitals)
February · Launch of a domestic version of HealthChainUs
    May · Partnership Expansion (70 clinics/hospitals, 50 overseas hospitals)
    June · Target scales to collecting data of 70,000 membership
Members
10. Members

William Choi
CEO
Posture 360 CEO
BackJoy Korea Founder
London Business School

Kim Ho
CFO
CEO of 2bko
formerly Legochembion
Woordul Hospital
Graduate School of Public Health
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Sergei Ten
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Medicine
Chief of munmak Hospital
11. Advisory

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Bae Jung Sik  I Chief of Gangnseo Nanoori Hospital Neurosurgery
Min Cheon Ki  I Chief of Miso Dental Clinic
Lee Sang Joon  I Chief of Jium Pain Clinic
Baek Jun Hyuk  I Chief of Ebaek neuropsychiatry
Oh Kyung Ju  I Chief of No.1 Dental Clinic
Park Jong Min  I Chief of No.1 Orthopedics Clinic
Yang Yoon Seok  I General Manager of Chungdam Malgun Dermatology
Lee Jea Chang  I Medicine doctor of Jasan Medical Foundation Neurosurgery
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Im Geun Min  I Administrative Director of Bucheon Geriatric Medical Center
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Park Hee Jung  I Manager of the China National golf team, Director of Korea Ladies Professional Golf Association
Kim Hyun Soo  I Cuepharma
Lee Choong Hee  I Managing Director of Legochembio, formerly LG Life Sciences
Kim Nam Joong  I CEO of Jungwon Medicine
Hwang Young Bae  I CEO of OceanPharMedi

Law & Ethics

IT

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Na Il-Soo  I CEO of BIZBUCKET
12 Disclaimer
12. Disclaimer

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a. Blockchain Risk

Blockchain system congestion may cause transactions to be processed late or invalidate. In particular, smart contracts responsible for issuing and distributing HCU are based on the technology known as Etherium Blockchain. The Etherium protocol may have weaknesses and vulnerabilities, and also may cause various bugs, including bugs where HCU are lost. Also, monetary damage may occur to HCU and HealthChainUs Project ICO participants due to those problems of the Etherium Blockchain.

b. Transaction privacy leakage

Transaction privacy leakage: Your personal information is required to distribute and control HCU Ts in the purchasers’ electronic wallet. HCU stored in the wallet may be changed or lost due to an internal or external factor such as attack from malicious code, software bugs, blockchain networks error, and more. Transaction privacy leakage can facilitate the leakage of confidential information, theft of cryptographic keys and therefore cause HCU leakage from the purchasers’ e-wallet.

c. Security vulnerabilities

Like all other cryptocurrencies, Etherium blockchain faces its security flaws as hackers can exploit these systems by ‘Double spending’ or ‘51% attack’. These vulnerabilities in Etherium blockchain thus may lead hackers to attack HCU or HealthChainUs Project and steal millions and billions of HCUs in one go.
12. Disclaimer

d. E-Wallet compatibility risk
Participants must use an electronic wallet that is technically compatible with the HCU to purchase or store a HCU. If a participant is using a different wallet, the participant may not be able to access the purchased HCU.

e. Force majeure
HealthChainUs Project is now under development process, and HCU makes every attempt to ensure to develop and maintain the HealthChainUs Project as it is described on this Whitepaper. However, the policy and regulatory framework around blockchain is in its infancy and therefore there is a risk that HCU either failed to adhere to regulatory requirements for the specific use case and technology, or new laws or regulation may conflict with current HealthChainUs Project project functioning. HCU will be exempted from any liability for damages and losses of value and/or liquidity of HCU subject to force majeure factors such as changes in regulatory frames required licenses and taxation policies, the emergence of platforms or open source that adversely affect the HCU or HealthChainUs Project, the lack of market interest, or others.