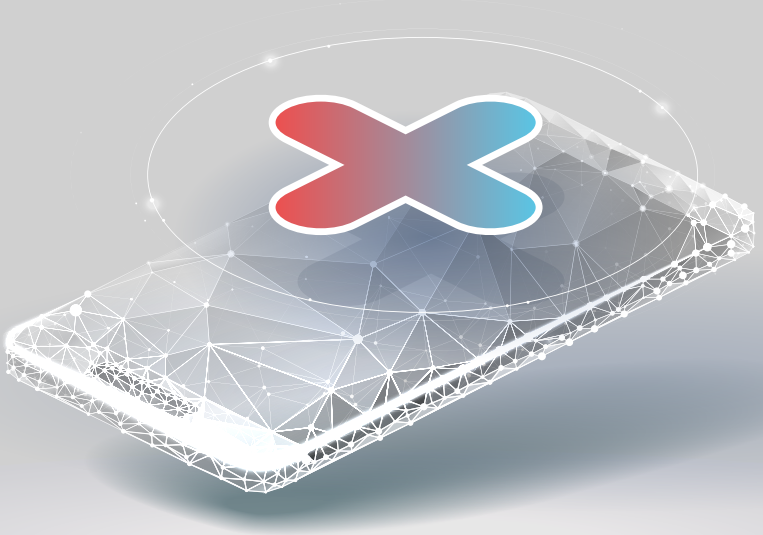
MISBLOC

Medical Information Service with Blockchain

White Paper Ver.1.0 2020



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1 Overview

MISBLOC (Medical Information Service with Blockchain) is a medical service ecosystem, which is based on blockchain technology. In short, MISBLOC offers a sustainable medical service ecosystem, by utilizing selected medication information in a combination with a blockchain technology in the MyData era, which is the era of big data of individual lifelog, that connects telecommunication-medical-financial spheres.

According to the trend analysis conducted by the KHIDI (Korea Health Industry Development Institute), as of 2018, the market size of the Korean Medical Service was worth 105 trillion KRW (around $90 billion) equivalent to 5.9% of GDP value of the Republic of Korea, which has increased to 0.1% (115 trillion KRW) in 2019. In fact, the medical service industry is generally being recognized as an industry with a high "value-added" and "highly potential" domain, that can highly contribute to the reduction of the unemployment rate (job creation), and as one that can accelerate overall economic growth. In the future, the market of medical services is expected to develop and grow in the direction that will obtain the features, such as efficiency and diversification of medical services, through the strengthening of market mechanisms. This will establish a policy direction, which will be purported to seek the development of medical services in the face of industrialization and commercialization of the healthcare system, which had previously been approached under the recognition of "public goods".

The medical service industry is at the edge of the consistent growth and change given the emergence of the MyData industry, the introduction of the Electronic Medical Record (EMR) system, and the further globalization and growth of the telemedicine market and the inbound medical tourism. However, there are several significant issues found within the developing medical service market, such as 1) Fragmentation of the EMR system, 2) Lack of telemedicine system 3) Lack of reliable medical information content.

The MISBLOC team presents three primary missions in order to address the relevant issues found within a medical service system, by implementing a healthcare ecosystem that benefits all participants and by building a delicately designed platform based on the blockchain.
First of all, 1) The Medical Institutions shall be provided with a platform that will boost its profitability through transparent and efficient data management. Secondly, 2) The Patients shall have access to their personal medical information, which will contribute to the enhancement of the stability obtainment, convenient utility, and even monetization. And lastly, 3) The new advertising tool shall be introduced, immune to forgery or counterfeit, which will utilize medical information of the users.
In order to successfully achieve its mission, the MISBLOC team proposes a blockchain-based medical service platform - "ANAPATALK". ANAPATALK is an efficient ecosystem that will alter the existing sophisticated UI applications exploited in the healthcare industry, which will be provided for 1)Patients 2) Medical Institutions 3) Third-party users 4) Government/Public Institutions. The following are the features and functions, that will be presented by the "ANAPATALK":

- **Medical Data Decentralization**
  Personal medical data shall be recorded in an unmodifiable state (immune to forgery and counterfeit), that further be transparently distributed with a direct application of blockchain technology.

- **Medical Data Interoperability**
  Based on medical data stored in the blockchain, medical services can be freely received anytime, anywhere with no time or spacious constraints

- **Reliability of Medical Content**
  The members of the community, both patients and medical service providers will be able to share and provide reliable content.

The ecosystem participants can easily find the right hospital and reserve a visit to a doctor through the ANAPATALK platform, while keeping medical records safely with security-specific blockchain technology. Designing the service in a way that the patients can utilize the exclusive and discrete medical information, and using the medical service to write a review with the reward system for obtaining real "value-added" tokens encourages the patients to share reliable medical reviews with others. Besides, medical institutions here can receive services that both patients and medical institutions will be content with, as the hospital's profits will be generated due to the post-care period, which in fact doesn't require a separate marketing campaign to be conducted.

As a matter of fact, medical institutions have more government restrictions and comply with strict regulations, than any other given area. Provided that, not only communication with the governmental institutions is critical, but also cooperation among medical associations and medical institutions is substantially important. Only, when there's a full understanding of the keynote of the policies, that are kept in pace, the likelihood of success of the project will be increased. In fact, MISBLOC has been designed in order to provide practical, useful, and feasible services to healthcare consumers, and to do that, it will encourage an active participation of medical personnel and institutions that are recognized as influencers or opinion-leaders within the medical community.

2 Introduction

Medical Service Market

The Fourth Industrial Revolution has uplifted the idea of the integration of “value-added” concepts to innovative technologies and creative ideas. In particular, it emphasizes the need to foster the service industry, which focuses on such concepts as convergence, new technology, and strengthening competitiveness. This logic is certainly applicable to the medical service industry. In fact, the medical service industry is being emphasized and recognized as a new driving force of the future mainly due to the rising income levels and life quality, aging population and the emergence of next-generation technologies (Big Data, Blockchain, AI and etc.) and surely due to the changing systems and policies. Thus, the market is destined to be highly potent in terms of the growth due to the inter-industrial linkage effects, job creation potential, and due to the growing social tendency to lead a healthy lifestyle.

According to the trend analysis conducted by the KHIDI (Korea Health Industry Development Institute), as of 2018, the market size of the Korean Medical Service was worth 105 trillion KRW (around $90 billion) equivalent to 5.9% of GDP value of the Republic of Korea, which has increased to 0.1% (115 trillion KRW) in 2019. In fact, the medical service industry is generally being recognized as an industry with a high “value-added” and “highly potential” area, that can highly contribute to the reduction of unemployment (job creation), and as one that can accelerate economic growth. Given the fact that the major advanced countries are already actively pursuing strategies to nurture the medical service industry by selecting it as the next-generation growth engine industry and investing in it heavily, Korea should also enhance its national competitiveness by revitalizing the medical service industry in the same strain.

Figure 1.
Medical Service
Industry Size

Estimation of the size of the medical service industry (Unit: %, Million)

Year	The proportion of the Medical Service Industry as of GDP	The proportion of the Medical Service Industry as of GDP(upper bound)	The Medical Service Industry Size	The Medical Service Industry Size (upper bound)
2000	2.6	.	16,693,617	.
2005	3.2	.	29,621,846	.
2006	3.5	.	33,820,846	.
2007	3.7	.	38,236,643	.
2008	3.8	.	41,653,611	.
2009	4.2	.	47,884,652	.
2010	4.2	.	53,578,012	.
2011	4.3	.	57,418,430	.
2012	4.5	.	61,809,487	.
2013	4.7	.	67,142,176	.
2014	4.9	.	72,463,222	.
2015	5.1	.	79,973,448	.
2016	5.4	.	88,504,618	.
2017*	5.8	6.0	96,852,728	98,260,699
2018*	5.9	6.2	105,478,747	107,757,549
2019*	6.0	6.4	114,821,065	118,531,499

* Note: * is the approximated forecast

A. Market Trend

1) (MyData) business is an innovative growth project that systematically supports the expansion of personal data provision, diversification of services, and enhancement of awareness in order to establish a safe personal data utilization system centered on the information owner. MyData business is a paradigm in which the information owner directly decides the right to use personal data, scope of provision, and approval of access to personal data, thereby guaranteeing the right to utilize personal information and establishing data sovereignty.

Personal Information Utilization Support (MyData) Verification Service Emergence

(MyData)[1] business is a safe way to utilize personal information within the current legal system. It has been created in order to change the personal information utilization system by returning the original right to manage and utilize personal data back to individuals, and it serves as a key factor for the people to realize the benefits of using their own information and establish a personal-centered data distribution system.

On May 16, 2019, the Ministry of Science and ICT (hereinafter referred to as the "Ministry of Science and ICT") announced that it defined eight primary tasks for MyData verification service targeting areas closely related to people's lives, such as medical care/finance/distribution/energy. The Ministry of Science and ICT is propelling a MyData project (hereinafter referred to as "My Data Project") so that individuals can simply access personal data utilization services in various fields by directly downloading their information or agreeing to provide it to third parties. "In 2018, we carried out pilot projects in two areas, finance and telecommunications, and in 2019, we will expand into the medical services, distribution, and energy fields to promote verification services", delivered the representative of the Ministry of Science and ICT. In 2019, the medical community is pushing for projects in which patients can receive benefits by reworking MyData with the consent of patients.

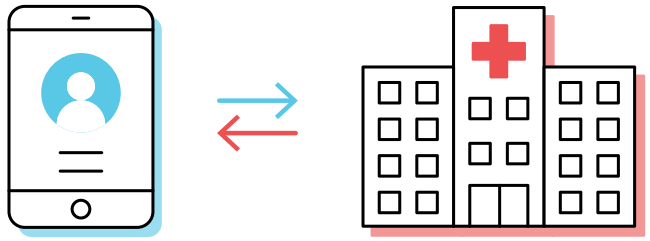
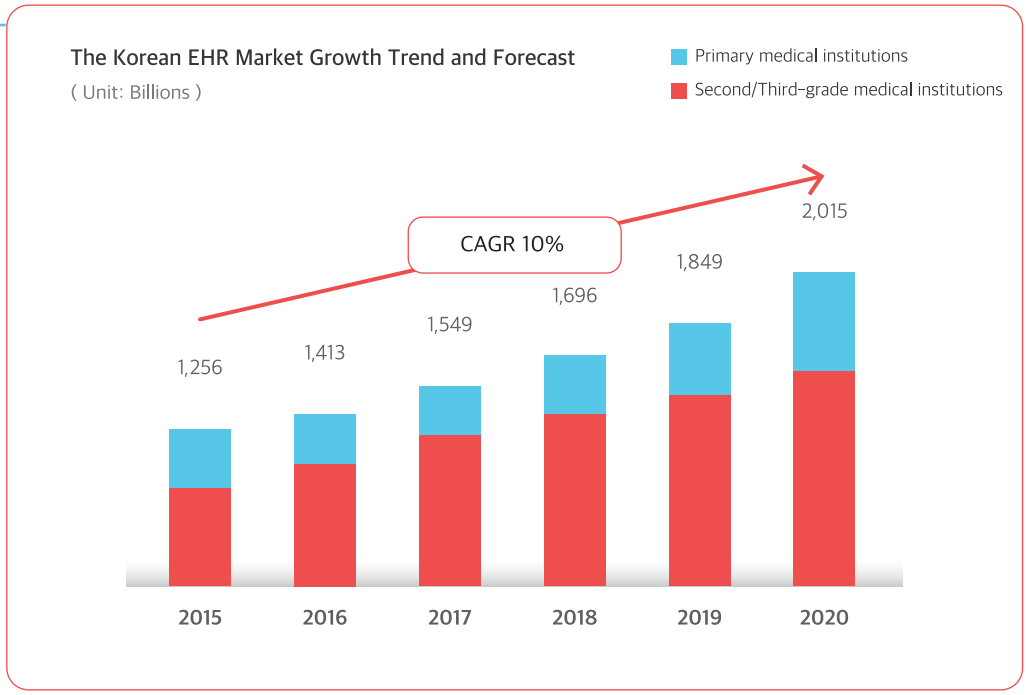


Figure 2.
MyData data distribution

EMR(Electronic Medical Record) System Introduction

In the early 2000, the majority of the Korean medical institutions adopted the EMR (Electronic Medical Record) system, abolishing the traditional and uncomfortable paper-based medical recording system. This happened primarily due to the EMR system being incomparably superior to paper medical record systems, basically in terms of simplicity of recording process, storage and utilization, accuracy of health insurance claims, and cost-effectiveness. EMR, often called EHR (Electronic Health Records), is commonly referred to as the general patient care system used primarily in hospitals. Currently, as Korea goes through a full-fledged EHR building process, the EHR market penetration rate exceeds 70 percent of the total market size, whereas the penetration rate to the superior hospitals composes 90%. For more than 20 years, EHR has been used to collect millions of medical data from Korea's largest hospitals, which is an unprecedented precedent in the world. Korea's EHR market is expected to grow by 10 percent annually and reach 2 trillion KRW by 2020.

Figure 3.
Korean EHR Market Growth Trend



The Global EMR Market in 2018 was estimated to be worth approximately 28 billion USD and was estimated to grow at 8.8% CAGR over the next few years. Around 40% of the market is accounted for in the U.S market. According to the report delivered by the Kalorama, there are 3 main U.S based dominant companies,, which are Cerner (possesses 17% of the global market share), Epic (accounts for 8.8% of the global market share), and Allscripts (6.1% of the global market share).

Globalization of the Telemedicine Market.

Telemedicine, which enables you to pay a visit to a doctor anytime, anywhere, is de facto the biggest beneficiary of digital healthcare transformation. Currently, the global telemedicine market is growing at an everlasting pace. According to the statistics portal for market data, Statista, the global telemedicine market is expected to grow to more than $41 billion (about 48 trillion KRW) in 2021, at a whopping CAGR of 29.3 percent.

The United States is a leader in the telemedicine area, which has adopted telemedicine and started implementing R&D experiments extensively since 1997. In the U.S., the number of telemedicine users has already exceeded 20 million and user satisfaction has reached 95 percent, making it an essential part of the daily life of people. In 49 U.S. states, insurance coverage is available for certain parts of telemedicine, and in 2019, it is also applicable for remote image diagnosis.

In Japan, the government is pushing to establish not only telemedicine but also delivery of tele prescription and prescription drugs by 2020. Japan, which introduced "Pocket Doctor" using mobile phones since 2016, removed most of the regulations related to telemedicine in April. In the past, telemedicine was carried out mainly in areas where the population was small and the number of doctors was scarce, but it has recently spread to downtown areas. Besides, Korean company Naver penetrated into the telemedicine business in Japan through its Japanese subsidiary Line. In January 2019, Line established a joint venture called 'Line Healthcare' with Japanese medical platform company 'M3'

In fact, with the popularization of tele-counseling, the psychological barriers of the patients will be lowered and the fear of treatment will also be diminished, and the medical institutions that conduct the tele-counseling services will benefit from it not only by gaining profits, but they will also benefit from forming a connection and bond with its clients and other hospitals and clinics.

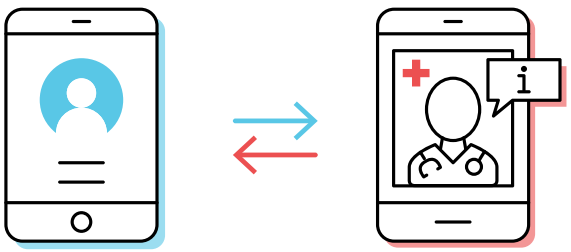


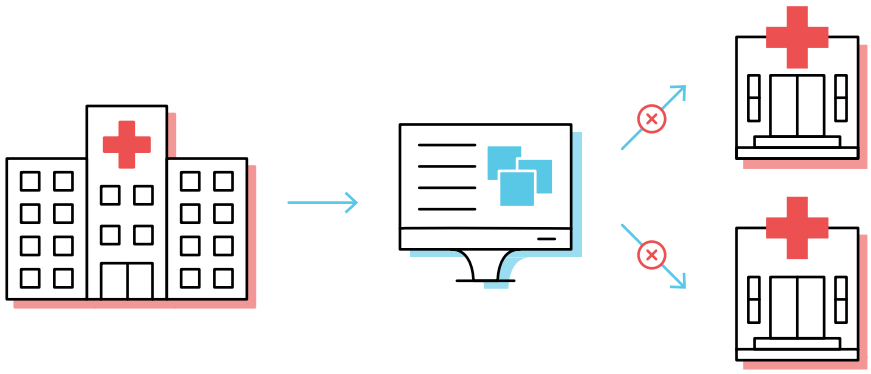
Figure 4.
Telemedicine & Remote Consultation

B. Market Issues

Fragmented EMR Systems

Currently, the EMR systems exploited in Korea are severely fragmented. This is mainly due to the chart programs of the leading companies in the market that are not standardized and use totally different standards. Although the content of mandatory records is standardized, the operating methods, databases, and human interfaces of the programs for storage and utilization vary from company to company, resulting in different medical record systems. The fragmentation of the EMR systems is in fact causing a totally adverse effect on the compatibility of medical records. Namely, given the fact that medical institutions do not utilize standardized recording systems, patients cannot move or transfer their medical records when they change their medical institutions, since they use different standards. Every time, when a patient changes a medical institution, he has to issue a paper chart that he has to submit to another medical institution, which is further entered back into the EMR system of the new medical institution through the scanning or manually entered. Although the EMR systems were introduced mainly to automatize the medical recording processes, comprehensive compatibility of diagnosis or healthcare information transfers were not enabled, thereby leaving the linkage of medical records between medical institutions and the continuity of healthcare at the same spot, which is no different from the paper medical recording method. Besides, unnecessary medical expenses are incurred as new medical treatment is provided whenever medical institutions are altered, which adds to the burden of medical expenses for patients and society as a whole.

Figure 5.
Lack of interoperability between medical institutions



In fact, the cost of issuing an EMR printed copy paper is also not a cheap practice. For example, you may be charged between 2,000~3,000 KRW per sheet of medical records, and up to 10,000 KRW to receive a medical certificate, from 50,000 KRW up to 100,000 KRW to get an injury diagnosis, and you will be charged around 20,000 KRW for the issuance of a doctor's note. On top of that, a paper-printed EMR copy cannot be submitted repetitively, which means you can use it only once, and if you need it again, you will have to reissue those copies once again incurring the same expenses, which is a huge monetary burden indeed. It is imperative to maximize socioeconomic utility by addressing the problems of the current fragmented EMR system and by seeking ways to safely and effectively utilize the rapidly spreading EMR systems.

Centralization of Medical Data System

Currently, medical data is managed by a system that is thoroughly centralized by the medical institution. This makes medical data less transparent and reliable, thus more vulnerable and prone to data loss and hacking issues. This in turn jeopardizes accessibility and proper utilization of data and implies to the fact that it is always exposed to the risk of sensitive data leakage. In fact, according to FireEye, a cybersecurity company, several medical-related databases were sold for less than $2,000 during the period from October 1, 2018 to March 31, 2019, signaling that such data exposures could be abused for criminal purposes.

Unreliable Medical Information Content

In fact, patients seek objective evaluation and receive reputable experts' advice in order to get safe medical services. According to a survey of 17,822 individuals conducted by the National Health Insurance Service, 58.89 percent of the respondents claimed that they have consistently been obtaining information through internet surfing, which happens to be a primary way to obtain health-related information among people. Following that, 23.74% accounted per advertising and media, 6% to e-mails, 5.34% consisting of recommendations from family members, and only 4.65% of recommendations from doctors, which implies the fact that the credibility of direct recommendation by doctors and other experts are significantly lower. As you can see, the figures illustrate that people do not rely on the recommendations obtained from the doctors directly, rather they would approach the internet to access the healthcare-related information, therefore the information floating on the internet should certainly be verified. Given the fact that the internet usage is only increasing with a passage of time, there's an urgent need to establish a community that benefits both health care providers and patients, primarily to prevent the major problems associated with the reliability of the medical information content and to prevent further spread of false medical information on the internet surface.

The presence of the unreliable medical information content creates an environment where illegal brokers become extremely active, who pursue nothing but large fees. A medical institution or an individual, who wants to attract overseas patients to Korea should register with the Ministry of Health and Welfare as a "foreign patient care institution or business operator." However, there are illegal medical brokers, who do not register and correspondingly are not supervised by the Ministry of Health and Welfare, that collect introductory fees from hospitals as a charge for arranging and attracting overseas patients. However, it is difficult for overseas patients to receive proper medical services because illegal brokers introduce hospitals based on the amount of fees that they can collect, regardless of the quality of medical care. Thus, patients often receive expensive, yet low-quality medical services while paying 30-70 percent of fees to illegal medical brokers, and that happens mainly due to the absence of reliable medical information content on the internet surface. As a result, overseas patients' confidence in Korean medical services is diminished precisely due to

mischievous and hazardous activities carried out by illegal brokers in this sphere, which deals a heavy blow to the medical tourism industry. In fact, in 2018, there were problems raised by the government audit that illegal brokers were rampant, including excessive fees and excessive medical treatment, but the results of the crackdown were insufficient and the punishment for the crackdown was not properly carried out. If the quality and price of Korean medical services cannot be trusted, it is going to remain difficult to attract overseas patients in the near future. Thus, the government should strengthen its preventive measures on illegal brokers and come up with proper metrics and KPIs to actively protect overseas patients.

3 MISBLOC Insight

With the special insights in the blockchain technology, MISBLOC's team applies its expertise in combination with the blockchain technology to the medical service industry and proposes to construct an effective medical content ecosystem in the following way:

3.1. Why Blockchain?

Blockchain is a distributed data storage technology that stores the accumulated data in blocks and replicates it to a multitude of computers simultaneously, which is also known as a distributed ledger. The concept of the blockchain is contrasted with the concept of centralization, thus P2P transactions can be carried out without the presence of intermediaries. The validation process is carried out in the exact order in which blocks are created, that is by the unit of information storage, which limits and prevents the cases with the falsification or forgery of the data. The data manipulation or counterfeit is virtually impossible, since in order to manipulate information within the blockchain one must hack information from a majority of participants and falsify all subsequent blocks, which is indeed a very complicated thing to accomplish. In other words, the core value of blockchain technology is the establishment of a P2P trust-based network without intermediary agencies, and it is a technology that is currently being developed continuously.

A. Medical Data Interoperability

MISBLOC Team proposes a global medical service platform that can effectively connect patients and hospitals through interoperability between hospitals, which will enable transparent management of medical information data using the blockchain. Currently, due to the fragmentation of the medical information systems, the entities dealing with medical information, such as government, medical institutions, and patients are faced with a situation in which they have to endure substantial inconvenience since the devices they use are not equipped with interoperability features. Thus, due to the absence of organized communication and connection of the information, an inefficient data management system has been formed. To address the issue of interoperability, the MISBLOC team uses blockchain technology to store the ID values and EMRs of ecosystem participants such as medical institutions, doctors, and patients at hash value, and then the data is checked for forgery or counterfeit by comparing the hash values. The data that has been identified and checked for the absence of forgery and alteration suspicions is further used for hospital treatment, that is placed on patient personal devices, and convenient mobile medical treatment between hospitals thereafter becomes possible.

B. Medical Data Decentralization

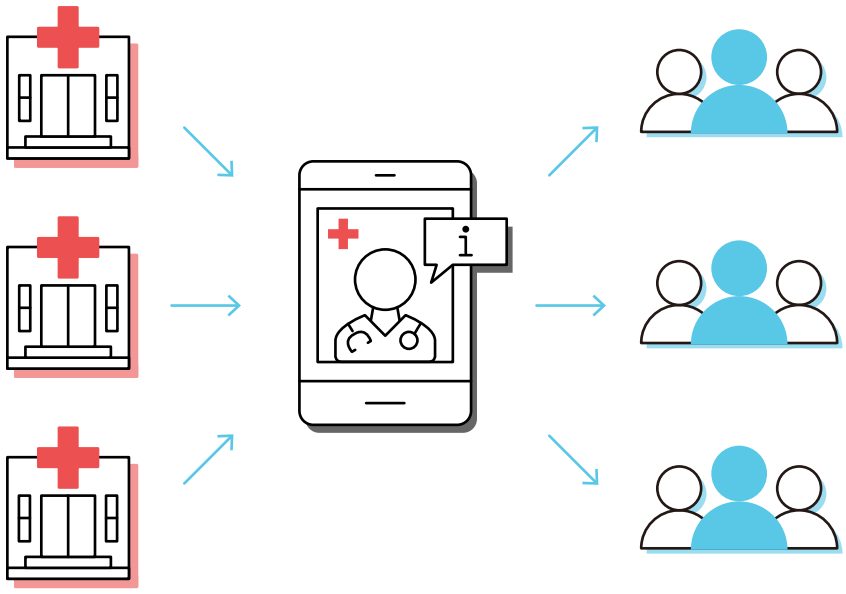
In fact, the medical data, which is managed by a centralized system, is often found to be nontransparent and unreliable. Let's look at this phenomenon looking at an example of plastic surgery sphere. The authority over the information is concentrated on medical institutions when it comes to the plastic surgeries, where the botox and filler treatment occur with the highest frequency. To be more clear, the information about the background of the brand of botox and filler under which the patient is treated is not provided, thus the patient cannot access any information certified by the product development company, thus data such as expiration date and manufacturing date is not available, in the result he or she receives the treatment only based on the information provided by the medical institution. MISBLOC's team can manage and share various medical product information related to the manufacturing and expiration date and distribution process in a transparent manner, which is always kept in an unmodifiable state (immune to forgery and alteration) using blockchain technology. The patient's MyData is stored on the hospital's servers and the patient's unique devices with the help of the blockchain technology. The stored medical data turns into big data, and through this, the MISBLOC team completes the medical information blockchain ecosystem that serves as an integrative solution to all medical institutions, patients, and third parties.

Figure 6.
Transparent Distribution
of Medical Data

C. Reliability of Medical Content

MISBLOC team provides a medical SNS platform, which is based on blockchain technology. The contribution compensation system, which ensures transparency and reliability of medical content is carried out with the usage of smart contracts. The availability of reliable medical content invigorates the SNS community and provides a foundation for maintaining the ecosystem in a smooth way. Participants who contribute to the healthcare community ecosystem by meeting the needs of patients who need reliable medical information are rewarded for their brilliant contributions. The community will upload content covering the entire area of medical services and establish a virtuous cycle structure that benefits both medical service providers and patients.

Figure 7.
Activization of Medical Content



3.2. Team Mission

MISBLOC's Team aims to implement a healthcare ecosystem that benefits all participants by establishing a well-designed platform based on the blockchain, thereby addressing the medical industry service problems. The MISBLOC team produces and releases an efficient blockchain ecosystem that will replace the current sophisticated UI applications utilized in the existing medical service industry. The MISBLOC ecosystem includes 1) Patients, 2) Medical Institutions, 3) Third-Parties, 4) Government/Public, and presents an efficient platform that can satisfy and meet the requirements of all participants in the following way:

1) The Medical Institutions shall be provided with a platform that will boost their profitability through transparent and efficient data management

2) The Patients shall have access to their personal medical information, which will contribute to enhancement of the stability obtainment, convenient utility, and even monetization

3) The New Advertising tool will be introduced, immune to forgery or counterfeit, which will utilize medical information of the users.

MISBLOC defines these three milestones as a primary mission and proposes “ANAPATALK” to realize them successfully. ANAPATALK is a blockchain-based medical service platform, which will provide the following functions and features:

Figure 8.
According to the
Participant "As-Is & To-Be"

Participants	As-Is	To-Be
Patients	• Medical records, such as physical charts are usually issued at a very high cost, that requires visiting directly a hospital whenever necessary (in cases like transferring to another medical institution or submission of records to a third-party institution) • There is a persistent concern over leakage of sensitive personal medical information, through the hacking.	• Patients will be able to easily download, store, and submit EMR sources to their smartphones • The commission fees will be lower compared to the existing practice of physical record issuance • Privacy protection of personal information will be guaranteed • Diverse information acquisition and compensation benefits through the community will be introduced in the future
Medical Institutions	• Low inter-hospital compatibility due to the absence of system standardization. • The cost burden over the medical data storage & reliability of this process	• The cost reduction will be provided with secure and efficient data management tools • Additional revenue model and customer growth will be enabled with the further invigoration of the ecosystem • Efficient marketing channels will be provided • Efficientl method of attracting inbound overseas customers will be provided
3rd Party	• Presence of the likelihood of falsification of the medical records.	• Obtainment of immune to forgery and alteration medical records will be provided • Improved customer conviniece
Government /Public	• High cost and time expenditure promoting standard projects, such as certification systems • Effectiveness due to the low participation	• Participation in the private sector will be activized through the provision of incentives via token economy. • Addressing the medical service industry-related issues with low cost and highly efficient platform

4 MISBLOC Platform

The functionality of MISBLOC will be carried out in the “ANAPATALK” application. Starting with the beta testing of ANAPATALK in the Q4 2019, the post-written functions will be added according to the development plan mentioned in the road map.

Figure 9.
Blockchain-based Medical Service Platform, ANAPATALK

4.1. Medical Data Creation

A. MyData

The EMR that the patient receives on their personal devices has changed to the concept of PHR (Personal Health Record), which is the patient's personal health information, also known and called MyData. My data PHR, in fact does not entail any sort of legal problems upon its exploitation, since it collects the consent of its users pre-conditionally. Thus, even if you post your PHR on the internet community or use it for commercial purposes, it is not legally-binding matter, since it's considered as an act of personal free will.

MyData applies blockchain technology so that it enables the storage of data on the medical institutions' servers and on patient's personal devices, which is kept in the unmodifiable state (immune to forgery and alteration). The EMR is sent to the patient's phone when the patient requests to download EMR records, reflecting the current general information delivery system as much as possible, rather than indiscriminately sharing the medical records of the first EMR records. However, information related to distribution, such as medical devices, medical products, and medicines, which are not EMR records, is automatically sent to mobile devices with the consent of patients so that information about which products were treated can be easily checked on mobile devices.

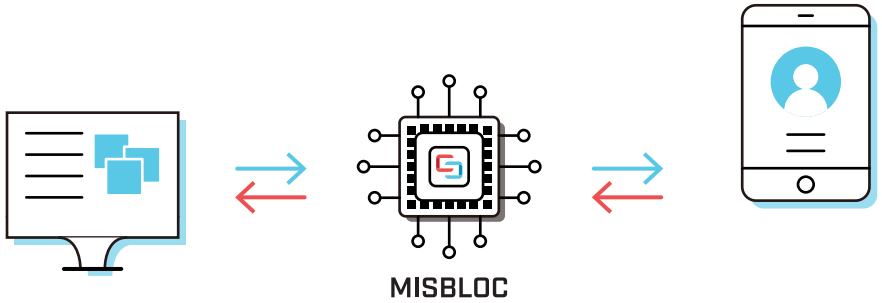


Figure 10.
Using a platform
with a personal device

The medical institution will be compensated for providing healthcare information to the patient. When medical institutions issue EMRs to patients' mobile device apps, they compensate them with tokens equivalent to the actual medical number, and whenever the number of views on this record rises, compensation is added to encourage the voluntary participation of medical institutions.

Figure 11.
Compensation for providing patient information

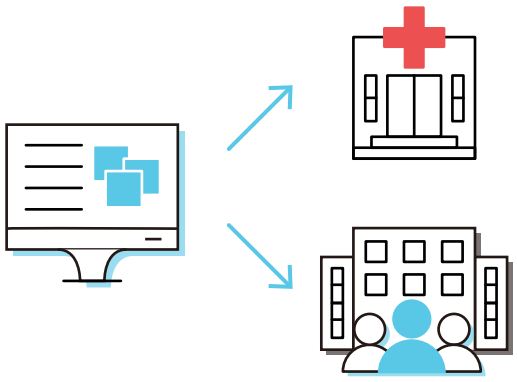
4.2. Medical Data Usage

Patients can submit their medical records to various third-party institutions, medical institutions, and insurance companies via email using the platform “ANAPATALK”. This in turn enables practicing telemedicine, counseling, and prescription when establishing a teleconference system, and it is de facto an essential function for the establishment of a global medical service platform.

A. Electronic Record Submission

In the existing paper medical record method, patients lose ownership upon submission, however, the patient's medical data stored in the app does not disappear with a single submission, which in turn enables permanent and continuous usage of the medical records. For example, in the past, if a patient wanted to issue an X-ray record, it was stored in Compact Disc, which was issued for 20,000 KRW per disc, which resulted in additional monetary and timely burden every time, when the patient needed it. However, patients participating in the ANAPATALK ecosystem can minimize unnecessary time and cost burden, such as receiving CDs at medical institutions, by just paying MSB Token as a fee and downloading X-ray records through the app. In addition, patients can easily send their medical records to other medical institutions by designating and clicking the desired part of their medical records.

Figure 12.
Concurrent Medical Data Usage



B. Telemedicine Support

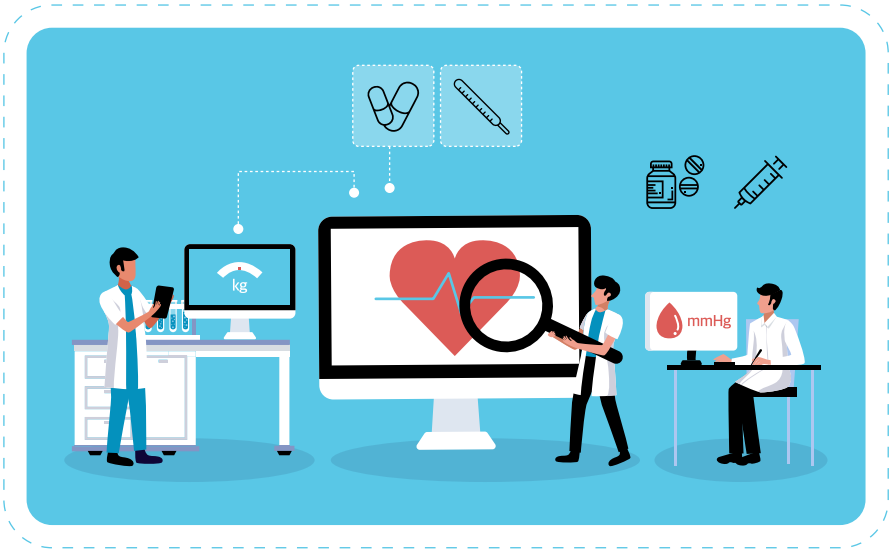
Generally, the MISBLOC implements the telemedicine system and enables the further implementation of telemedicine, counseling, and prescription functions, which is going to be an essential pillar to tap the global medical services market. In this remote counseling system, medical staff will stay motivated to provide their services by receiving tokens as fees for counseling practices. The frequency of exposure to hospital and clinic information in the application will be increased in proportion to the degree to which a particular hospital participates in remote counseling. Hospitals and clinics will have effective promotion channels, and patients will be able to access the services provided by medical staff more easily, which will contribute to the integrated solution provision of meeting their mutual needs.

After implementing EMR (electronic medical records), the medical platform, and remote counseling system that will be stored in mobile devices of patients, the global market will be targeted and further tapped. MISBLOC's mobile application will be delivered with three language provisions, in Korean, Chinese, and English in the future, which will provide maximum benefit to medical institutions participating in the MISBLOC's ecosystem in terms of enabling overseas marketing channels, through which the attraction of overseas patients will be facilitated. The medical platform, supported by the telemedicine system and token ecosystem that MISBLOC is building, will be able to draw sufficient positive responses from overseas. Thus, the MISBLOC platform will become not a mere platform for Korean Medical Institutions and consumers, but will also become a platform for overseas hospitals and patients living abroad.

On the MISBLOC platform, patients can remotely obtain medical records and doctor's notes, and submit these documents to multiple institutions very conveniently without incurring payment for duplicating. Moreover, past records of the issued doctor's notes and other medical certificates are consistently kept on mobile devices, so previously practiced action of revisiting medical institutions for the same purpose (reissuance of records) will be eliminated. On top of that, if a patient is out of his healthcare area or region, and the patient is in urgent need of medication, he won't need to visit a new medical institution to conduct a new examination, and then pay for it, instead, he can request a prescription from a medical institution that already holds his or her own medical history to issue a prescription in the nearest medical institution. In this strain, with the invigoration of the MISBLOC Blockchain platform, the overall medical expenses can be reduced not only for individual patients but also for the entire country.

Using MyData, patients can organize their own healthcare schedule and receive push notification services such as "regular checkup after half a year or a year" after the termination of the treatment period. Besides,
If the patient configures the settings by defining personal areas of interest, new healthcare information can be provided in mobile applications according to simple artificial intelligence algorithms, and services by local hospitals and clinics that perform such care will be recommended

Figure 13.
Telemedicine Support



C. Medical Information Community

Plastic surgery is one of the most active communities in the Korean medical community. The majority of community members are formed around women in their 20s and 30s who are interested in beauty and healthcare. Patients can easily find a hospital with the characteristics they want through mobile applications. In addition, the patient-centered community in the mobile device app is activated, allowing patients to easily exchange numerous questions and access desired information such as photos before and after treatment.

ANAPATALK is used to form a mobile device community and upload photos before and after treatment. As the number of views increases and comments are posted, the author will be rewarded with tokens. On top of that, the community imposes guidelines, illustrations, and images on the entire treatment process to play the role of ALL in one to enhance the understanding of the treatment, and creates a professional community in which doctors participate to meet the needs of patients.

This 'killer content' makes patients have fun, induces them to spend time on the app, and provides easy access to hospitals such as plastic surgery. Store mobile devices in these community applications and electronic charts in one place, and remote counseling could draw a very good response. In addition, the activated community will serve as a foundation to keep the token ecosystem smooth.

4.3. Additional Services

A. Insurance Linkage System

Given the fact there's an asymmetry in information dispersion especially in the medical information, most of the insurance companies are biased or indiscriminate towards establishing their policies. The solution for the issue will be the medical blockchainization of the MyData. MyData is sent to a third institution with the patient's consent and the information is reprocessed and returned to the patient with practical benefits. For example, multiple treatments for a particular disease prevent reckless insurance coverage by allowing them to receive specific disease-oriented insurance coverage, including there related disease coverages. This will have the effect of substantially lowering the social costs spent on healthcare.

B. Forensic Medicine Linkage System

Identity authentication through the dental records is a very reliable method. If MISBLOC gains popularity in the near future, the DNA testing in violent criminal cases, which is indeed very time-consuming and monetarily expensive, may become an unnecessary practice. For example, if the suspected criminalist comes by the hospital, he will get arrested immediately, since when the body of the unidentified person is found, the data will be matched with the MISBLOC's records, which will accelerate the process of the identity authentication. Certainly, if the governmental authorities see this function, the combination of forensic science and MISBLOC will yield a very positive social utility, that will enhance the quality of lives of many people.

Most people have a total of 32 teeth, including wisdom teeth. One of the unique characteristics of dentistry, which makes it excel among other medical services, is that there are always records of treatment kept in storage. Let's assume a case, where someone receives three dental treatments (cavity treatment, tooth extraction, implant therapy etc.), the probability that another person will also receive the same dental treatments on exactly same teeth is going to equal (1/32)*(1/31)*(1/30) = app. 0.003%, which is close to 0. Well, if the number of treatments increases to four, the probability will further drop to 0.00001158%. For example, in the case of the body of the late Ferry Sewol owner, Yoo Byung-eon, the body of the white bone, was first diagnosed as Yoo Byung-eon by a legal doctor (dentist) at the National Institute of Scientific Investigation before DNA tests came out.

C. Big Data Linkage Service

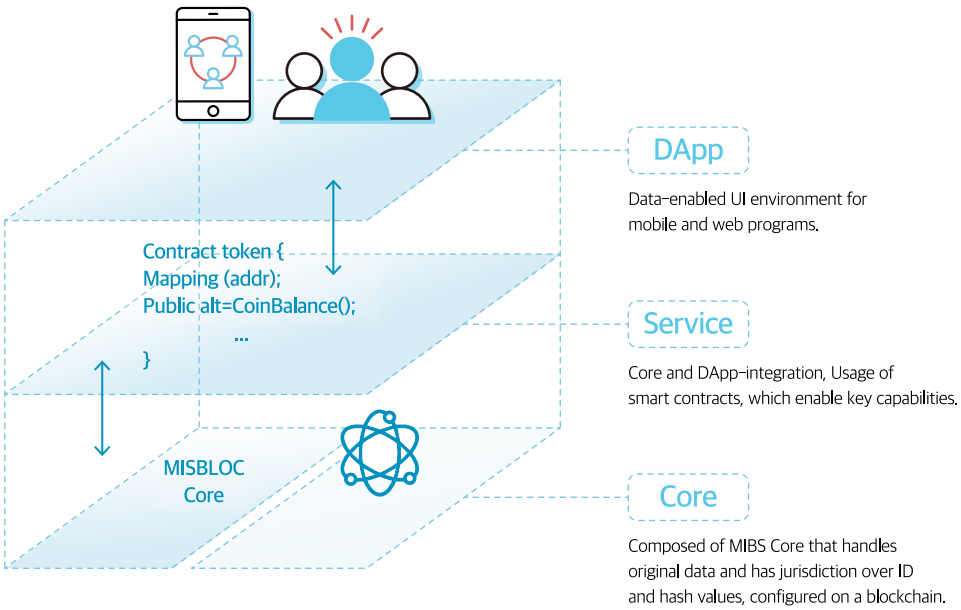
Given the sensitive nature of medical records, that require data to be protected from forgery and tampering, blockchain and medical platforms can be seen as very closely related domains. Over time, the blockchain market will become deeply entrenched in the medical community, which will allow the collected information to be used as big data in the future. For example, the incidence of certain systemic diseases in patients with high tooth loss or periodontitis can be predicted using big data, and in contrast, dental diseases in patients with certain systemic diseases can be predicted. In addition, as the information on dental care patients in each region turns into a single big data, customized dental services will be provided to each local government.

5 Architecture

5.1. MISBLOC STRUCTURE

MISBLOC is structured in 3 primary layers, which are Core, Service, and DAPPs.

Figure 14.
MISBLOC Architecture



A. Core

The core layer is the fundamental part that forms the foundation of the entire system, consisting of the MISBLOC CORE part and the Blockchain part. The MISBLOC CORE ensures that sensitive personal medical information, Electronic Medical Records (EMR) original data, is securely encrypted and stored, and only users who are qualified through digital signature functions using asymmetric cryptographic keys (personal/public keys), upon DApp request. In the blockchain section, the identity value of participants such as hospitals, doctors, and patients and hash values of EMR are stored, and data can be checked for forgery and alteration through a comparison of hash values.

B. Service

The service layer is a layer that connects core and DApp, and implements the core functions of the platform through smart contracts. It communicates with the blockchain data network to manage I/O of data and implements key services that the platform wants to provide by utilizing smart contract technology.

C. DApp

It is a layer that includes the medical data available on the MISBLOC platform, various applications that utilize it, and all user environments such as mobile, web, and app. Through the MISBLOC platform, implemented and provided in the form of DApp, users will enjoy various benefits such as downloading EMR to mobile devices and providing them to third institutions, safe personal information management, convenient remote counseling services, and token compensation based on the acquisition and participation of informative information through the community, while other participants, such as hospitals and operators, will also be able to implement a token ecosystem in which rewards are based on their roles in the ecosystem.

6 Token Model

6.1. MSB (MISBLOC Token)

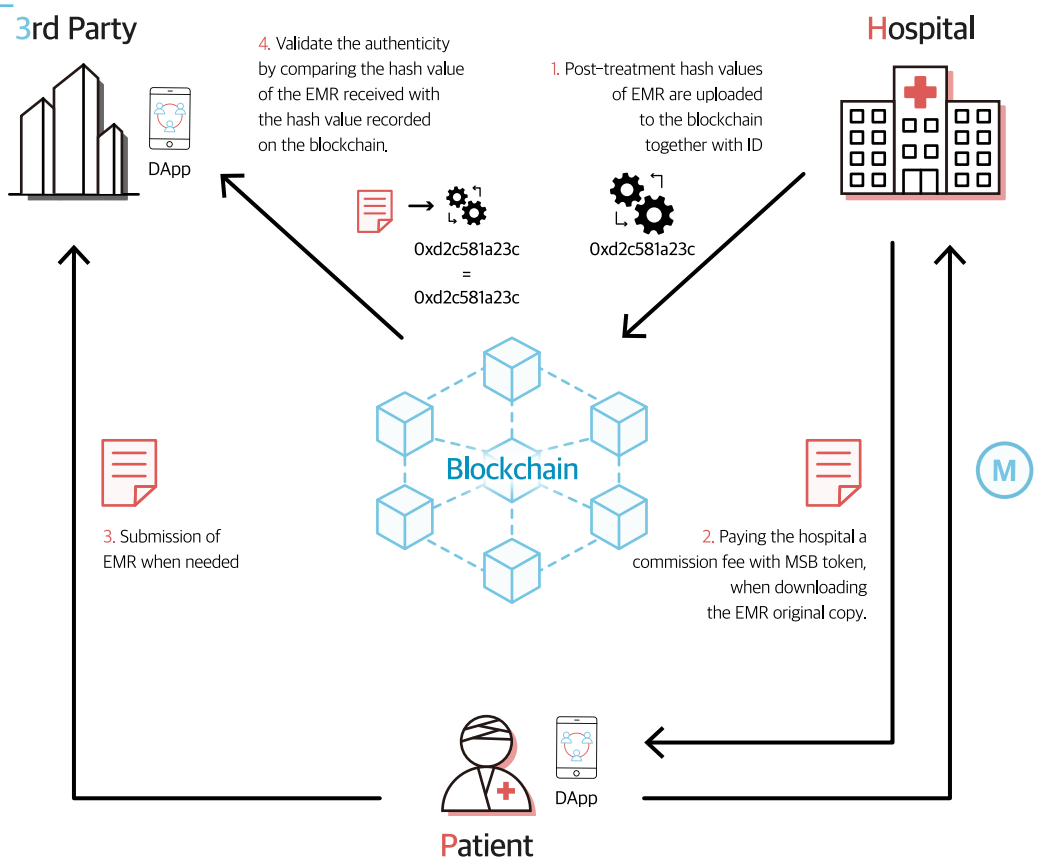
- ERC 20
- In-platform payment unit of the “ANAPATALK”
- A payment unit per access to the personal medical data
- A payment for the issuance of medical records
- A payment unit for remote prescription
- Community participation reward unit

MSB Tokens are Ethereum-based utility tokens that are primarily used in the ANAPATALK platform. MSB Tokens can either be acquired as a reward through activities within the ANAPATALK platform or can be purchased on the cryptocurrency exchange platform. MSB tokens are not only commonly used in token ecosystems within mobile applications, but are also available in MISBLOC partnership hospitals and clinics for payment of medical bills, thereby maximizing usability. By utilizing MSB tokens, users can use a variety of hospital services at a lower cost than traditional hospitals require. By utilizing the blockchain, token usage is transparently managed, while at the same time securing the reliability of personal medical data and strengthening security.

6.2. Token Economy

A. Medical Data Usage

Figure 15.
Medical Data
Token Ecosystem



Issuing medical records

On the mobile device app, patients can easily request their personal medical records without any obstacles. When a patient purchases MSB tokens and pays a certain number of it and requests his or her medical records, the doctor issues the electronic medical record of the patient and places it in the electronic app. Here, a certain portion of the fees incurred will be used as expenses attributable to the maintenance of the blockchain network, and the major portion will be allocated to the doctor who created the first copy of the medical record. Existing paper charts cost 2,000 to 3,000 KRW per sheet, which is why patients can own their own medical records only permanently, however, if the electronic medical record is registered in the blockchain, MSB tokens should be paid at a certain date to receive a permanent record ownership.

Under the existing method, if a patient wants to issue an X-ray record, it will be stored on CD and will be issued at a cost of around 10,000 ~ 20,000 KRW per copy. Besides, re-issuance will also impose additional monetary and timely burden, yet in the new method, if a patient uses MSB token as an alternative, the doctor will directly send an X-ray record to the patient's app, which reduces an unnecessary time expenditure and re-issuance cost.

Using medical records

It is in fact very useful to use MSB tokens when special records such as diagnosis certificates, doctor notes, and medical certificates are needed, in case the patient was originally treated outside the area. When purchasing and paying with tokens, the medical institution sends the necessary EDocuments to the patient's mobile device app. Here, a small portion of the tokens will be paid by the patient to each medical institution, that is distributed to nodes in the network retention, and the major portion will certainly be paid to the corresponding medical institution that issues the document.

If a patient submits a medical record to another medical institution after changing a medical institution, the additional fee will not be charged. At this time, the patient can designate the desired part of his medical record and simply send it to the medical institution with a simple click. If the data you send is MyData, not a general medical record, the data will be stored on another blockchain-based server and compensated for tokens. MyData can be reprocessed at a third institution and based on this processed data, patients can receive health-needed services.

B. Telemedicine

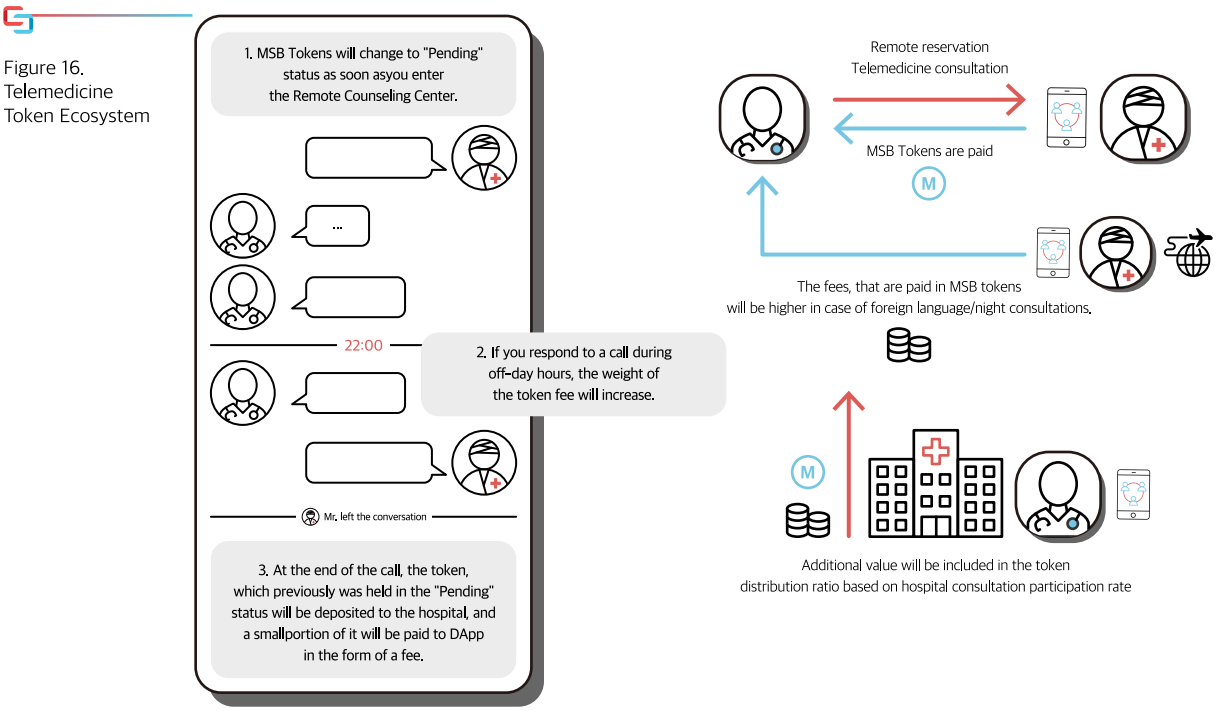


Figure 16.
Telemedicine
Token Ecosystem

When a patient is out of the area, where he usually gets a medical treatment and he is in need of urgent medical care in order to cure the pain or injury, the patient will not need to visit a new medical institution to conduct a new examination, and then pay for it, instead, he can request a prescription from a medical institution that already holds his or her own medical history, and then pay MSB tokens to medical institution issues a prescription. The usage of the MISBLOC blockchain platform will significantly reduce costs expended to healthcare not only for individual patients but also for the entire country. This part will be implemented after further teleprescription is legally allowed.

Fundamental Telemedicine Token Ecosystem

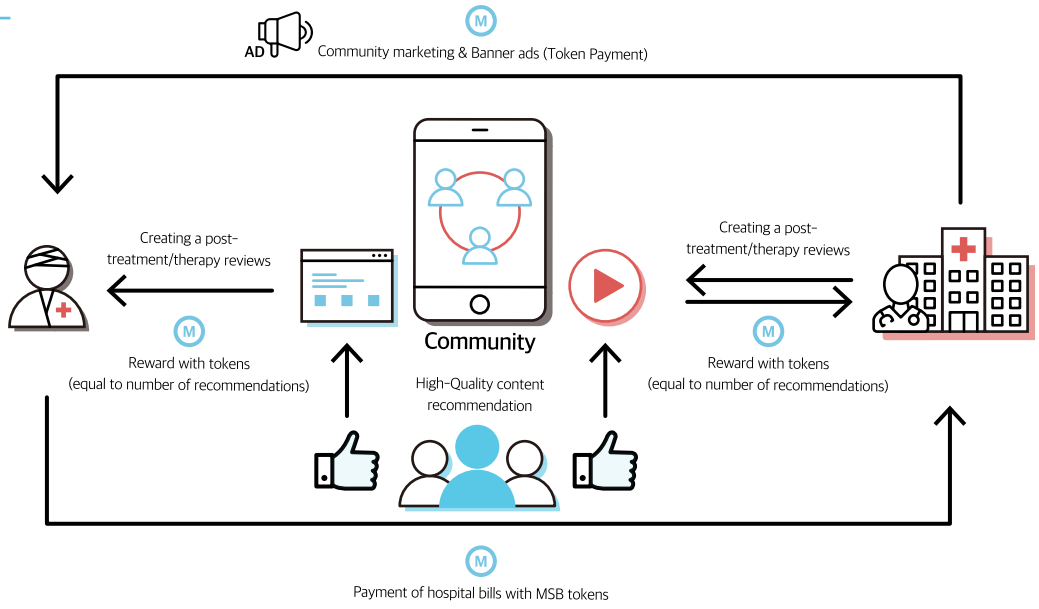
Paying a certain fee with MSB Toke, you can enter the Remote Counseling Center. Once the patient enters the center, the MSB tokens used as fees will be held in “Pending” state. The conversations with the medical staff are conducted in a Q&A manner, but in a format similar to text messages rather than real-time chatting. The real-time chatting method may not be appropriate considering the medical staff's medical conditions and efficiency, and it is expected that the method of leaving questions and leaving future replies will be efficient given the abovementioned premises. This approach is actually used primarily by major telemedicine companies such as TelaDoc in the United States. Here, after the Q&A ends, the patient leaves the session, whereas the previously held in “ Pending” status tokens are allocated to the medical institution’s wallet, whereas the small portion of it used as expenses for the operations of the MISBLOC’s token ecosystem.

Foreign Patient Consultation

In the case of overseas patient counseling, which should be conducted in foreign languages such as English and Chinese, the number of tokens required for counseling will be higher in order to encourage and attract consultation participation by medical institutions. Those patients residing overseas will be able to receive teleconsultation by Korean medical staff in English and Chinese versions of MISBLOC's software app, Anapatok, and visit the hospital to pay for the treatment using MSB Token. In the case of medical tourism patients, the amount of treatment is significantly higher than that of ordinary patients, which is expected to contribute greatly to the utilization of MSB tokens and vitalization of the ecosystem.

C. Community

Figure 17.
Community Token
Ecosystem



Operating SNS Medical Review Board

When the public writes in a community through a mobile application, they get rewarded with MSB tokens. Rather than simply receiving tokens consistently by writing a lot, it's better to have more valid metrics such as the viewers, likes, and comments under the post, since the more tokens will be rewarded for this kind of posts. The rewards will also be weighted more depending on the MSB holdings of users who press 'like'. The writer's MSB reserves are also used as a weighting criterion for the number of tokens he or she will receive in the future. The system is designed to receive more weight when posted with photos before and after treatment.

Operating Influencers Community

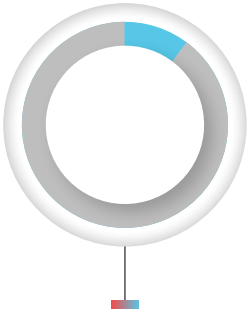
The medical community operates a separate activity bulletin board for influencer medical experts and doctors. Doctors that position themselves as influencers may also link their videos posted on YouTube and Google. These posts are weighted according to the user's MSB holdings, 'like' and designed to receive a certain weight based on the number of comments, and also increase the amount of tokens paid according to the doctor's MSB holdings. These activities will not only reward tokens but also promote hospitals, which can encourage doctors to participate voluntarily. The influencer, which leaves many articles and is highly popular with the public, is designed to reduce promotional costs on hospital and clinic marketing pages.

Community Advertisement

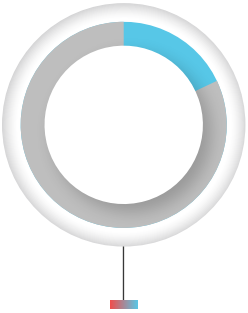
In MISBLOC's mobile application, there is a corner where each medical institution can place a banner, and each banner can be clicked, and after the click, the visitor will be directed to the product detail page. The detailed page can include the location of each medical institution and the introduction of medical staff. In order to use the hospital marketing section, we encourage the purchase of tokens by having them pay for actual marketing expenses, thereby enhancing the value of tokens. A significant proportion of tokens generated by revenue from marketing corners are redistributed to the community and to each service to design a virtuous cycle structure in which the token ecosystem can be sustained.

6.3. Token Distribution

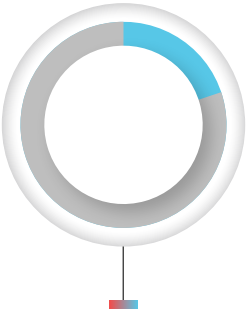
- MISBLOC Token
- Ticker: MSB
- Total Supply: 300,000,000



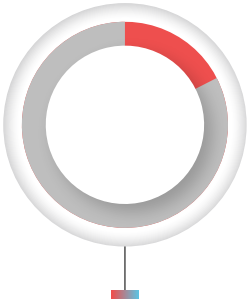
Token Sale : 15%



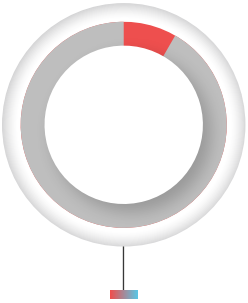
Development : 20%



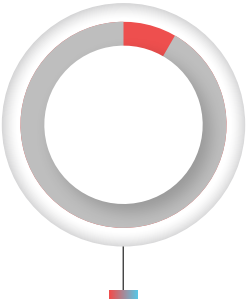
Marketing : 22%



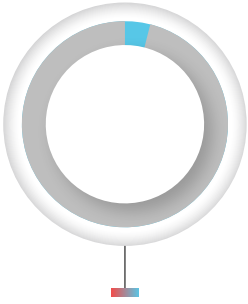
Ecosystem : 18%



Reserve : 10%



Team : 10%



Advisor : 5%

7 Team & Advisor

7.1. Team

Dohee Kim
CEO

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- Dental School of Busan National University Graduate

JunSung Lee
CTO

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- Fine App (CTO)
- Appnapps (CEO)

Jin Hai Jing
CMO

- Business School of Seoul National University Graduate

Pf. Hyungjung Kim
strategic manager

- Professor of School of Cybersecurity, Korea University
- Dean of Cryptocurrency Center, Korea University

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Senior Developer

- Golfzone (Development & Business General)
- eINS S&C (Team Leader)

JinKook Im
Marketing Manager

- Osstem Implant (Senior Researcher)
- Dentis Implant (Team Leader)
- BIO3D (Team Leader)
- DSM Holdings (CTO)
- Ichthys Dental (CEO)

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Marketing Manager

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- Pusan National University (Graduate School of Dentistry)

Byeongcheol Jun
Marketing Manager

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- Head of SBS entertainment baseball club
- Honorary ambassador for Korea Social Contribution

Taegyu Kang
Community Manager

Jinju Choi
Web & App Designer

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- Former Dean, Graduate school of Publich Health, Inje university
- Former Dean, Reseach Department, National Health Insurance Service

Taeon Koo

Advisor

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- Former CEO of Tek & Law
- Vice president Korea Blockchain Start Association

Myungsoo Lim

- President of Korea P2P Finance Association
- Former CEO of Bitbank
- Former strategic manager of IBK Bank

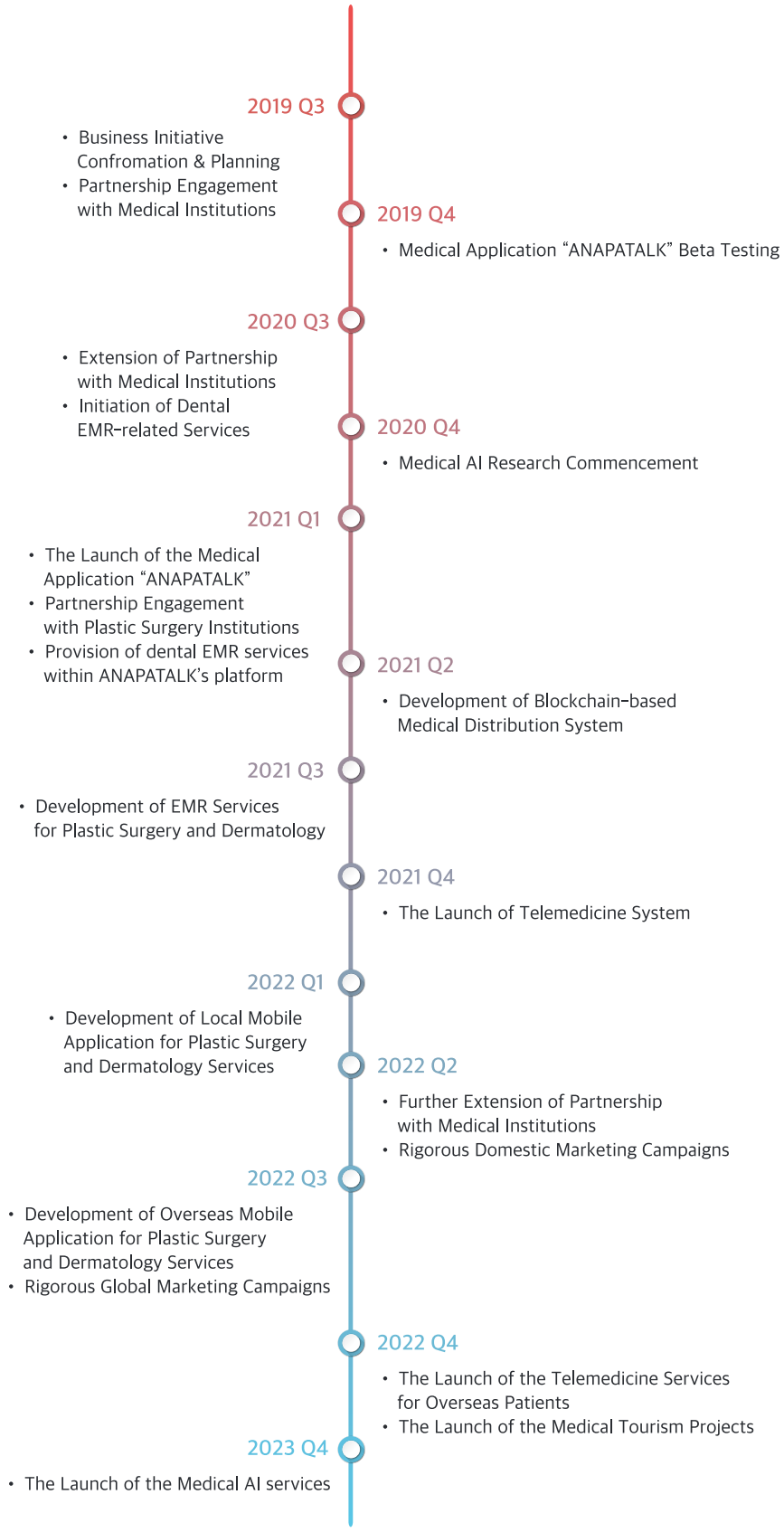
Yangdong Park

- Chief of Seoul Children's Hospital President of Korea Children's Hospital Association

7 Partners


루덴치과
LUDEN DENTAL CLINIC
서울녹번치과
SEOUL NOKBEON DENTAL CLINIC
리더스치과
미소 플러스치과
misoplus dental clinic
"아름다운 미소를 찾아드리겠습니다"
나노치과의원
NANO DENTAL CLINIC
Seoul ARA TMJ Clinic
서울아라치과
서울모두치과
SEOUL MODOO DENTAL CLINIC
서울은치과
Seoul Eun Dental Clinic
아름다운 미소, 편안한 치료
예인치과
Dental Clinic
I M A G E
이미지치과
Hayan Dental Clinic
하얀치과
친절한홍치과의원
Kind Hong Dental Clinic
이에 담은 진심 Edem Dental Clinic
이담치과
뿌리부터 건강하게
TTE Dental Clinic
SKY
SKY 스카이치과
서울제이치과
SEOUL J DENTAL CLINIC
Dr. 진치과의원
DOCTOR JIN DENTAL CLINIC
E&Mi
이앤美 우리들 의료법인 예인의료재단
치과병원
서울 THE 안치과
SEOUL THE AHN DENTAL CLINIC
서울 S 치과
SEOUL S DENTAL CLINIC

8 Roadmap


2019 Q3
• Business Initiative Confromation & Planning
• Partnership Engagement with Medical Institutions
2019 Q4
• Medical Application “ANAPATALK” Beta Testing
2020 Q3
• Extension of Partnership with Medical Institutions
• Initiation of Dental EMR-related Services
2020 Q4
• Medical AI Research Commencement
2021 Q1
• The Launch of the Medical Application “ANAPATALK”
• Partnership Engagement with Plastic Surgery Institutions
• Provision of dental EMR services within ANAPATALK’s platform
2021 Q2
• Development of Blockchain-based Medical Distribution System
2021 Q3
• Development of EMR Services for Plastic Surgery and Dermatology
2021 Q4
• The Launch of Telemedicine System
2022 Q1
• Development of Local Mobile Application for Plastic Surgery and Dermatology Services
2022 Q2
• Further Extension of Partnership with Medical Institutions
• Rigorous Domestic Marketing Campaigns
2022 Q3
• Development of Overseas Mobile Application for Plastic Surgery and Dermatology Services
• Rigorous Global Marketing Campaigns
2022 Q4
• The Launch of the Telemedicine Services for Overseas Patients
• The Launch of the Medical Tourism Projects
2023 Q4
• The Launch of the Medical AI services

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Purchasers are deemed to have consented to the purchase and sale of a MSB to be aware of and purchasing a MSB as is, without any warranties of any kind whatsoever.

1. Blockchain Risk: Blockchain system congestion may cause transactions to be processed late or invalidate. In particular, smart contracts responsible for issuing and distributing MSBs 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 MSBs are lost. Also, monetary damage may occur to MISBLOC Team and MISBLOC ICO participants due to those problems of the Etherium Blockchain.

2. Transaction privacy leakage: Your personal information is required to distribute and control MSBs in the purchasers' electronic wallet. MSB 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 MSB leakage from the purchasers' e-wallet.

3. 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 MISBLOC Team or MISBLOC and steal millions and billions of MSBs in one go.

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

5. Force majeure: MISBLOC in now under development process, and MISBLOC Team makes every attempt to ensure to develop and maintain the MISBLOC 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 MISBLOC Team either failed to adhere to regulatory requirements for the specific use case and technology, or new laws or regulations may conflict with current MISBLOC project functioning. MISBLOC Team will be exempted from any liability for damages and losses of value and/or liquidity of MSB 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 MISBLOC Team or MISBLOC, the lack of market interest, or others.