May **2022**
White Paper

Digital Health by Wearable Blockchain

SIGNAL
VOCs

CONTENTS

1
Insight

Digital Healthcare

Digital healthcare refers to a new service that combines information & communication technology and healthcare. It provides healthcare products and services to promote the health of patients and the general public, as well as advanced personalized medical services using ICT such as big data and AI.

It has grown at an annual average of about 39% for the last six years (2014-2020), and the global market size is estimated at $ 152.5 billion in 2020, and the market size is expected to be $ 58.9 billion in 2027.[1]

The Innovative Growth Promotion Committee and the Federation of Korean Industries regarded healthcare industry(31.9%) as number one among promising new industries after COVID-19 pandemic.
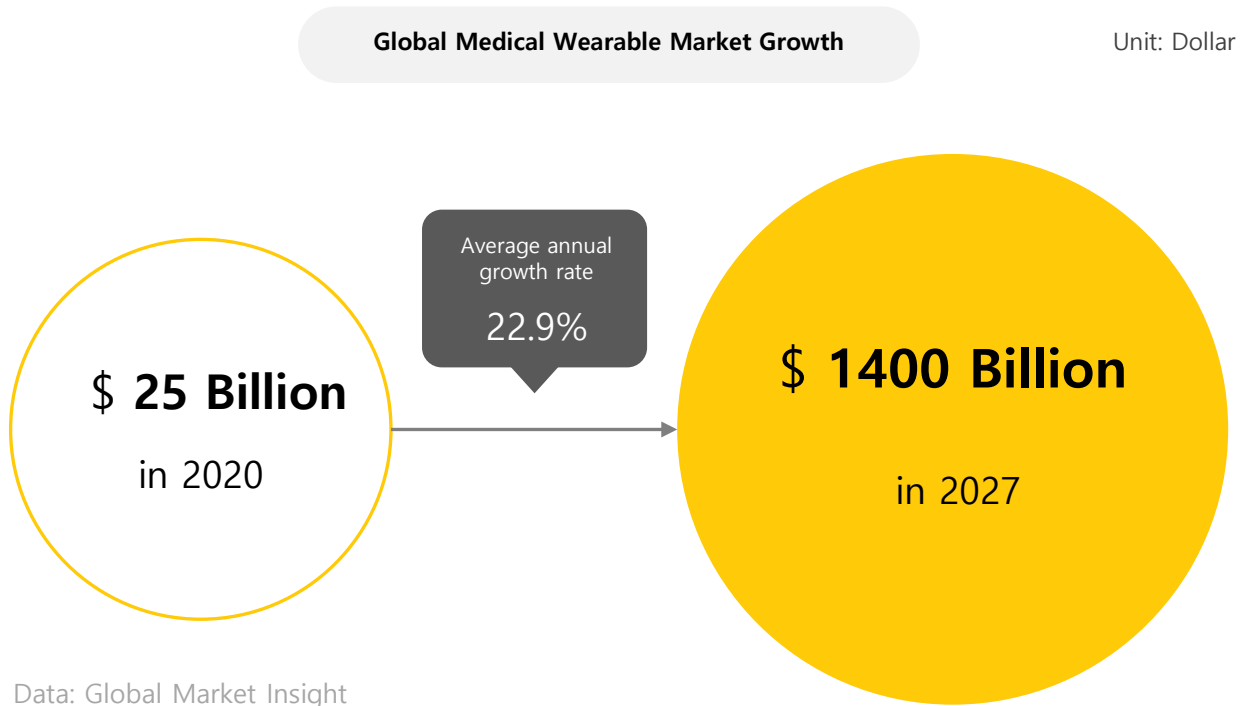
Wearables for Medical Use

Wearables are defined as miniaturized electronic devices that people can wear everyday. Wearable medical devices refer to devices that allow users to wear on their bodies, diagnose and monitor their health and behavior pattern, and finally deliver the information.

When these devices are connected to the Internet of Things (IoT) that can transmit and analyze the collected personal health data, it is possible to constantly collect, track, and analyze health data.
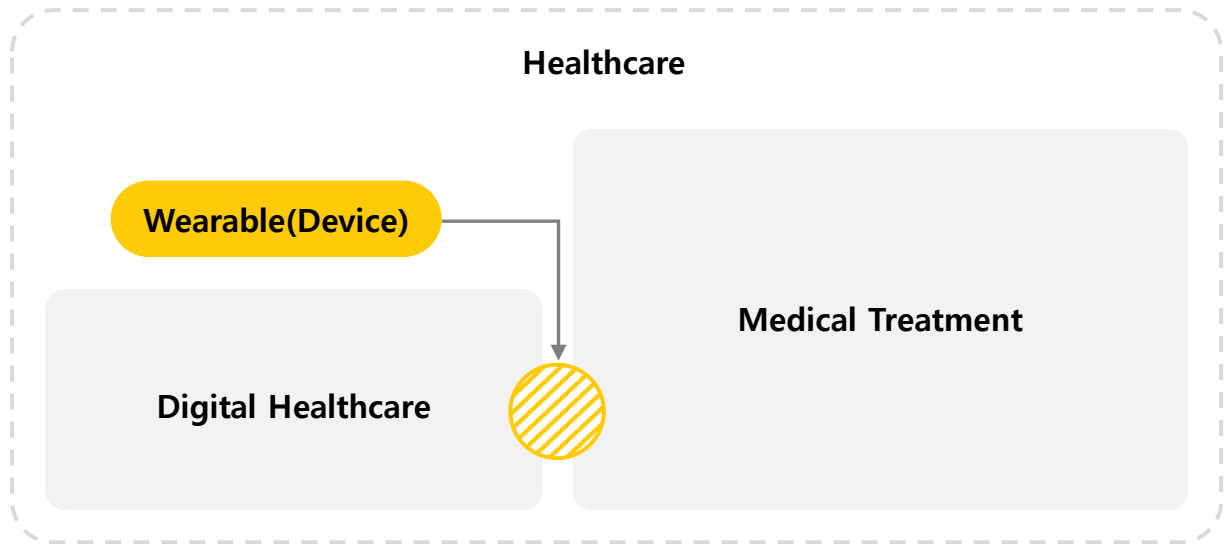
The integration of medical devices and Bio-signal sensing devices, as well as the development of micro electronics and wireless communication technology can make it possible to use wearable devices, and these devices are gradually applied to our health and life.

The medical wearable market, which is worth $ 25 billion in 2020 (about 29.34 trillion won), will increase an average of 22.9% annually, and is expected to reach $ 140 billion in 2027, which is more than five times.[2]

Global Medical Wearable Market Growth   Unit: Dollar

$ **25 Billion**

in 2020

Average annual
growth rate

22.9%

$ **1400 Billion**

in 2027

Data: Global Market Insight

Requirements for Conversion

Healthcare

Wearable(Device)

Digital Healthcare

Medical Treatment

The medical market has developed with a focus on face-to-face diagnosis and treatment, but now it is facing with the demands of change. The development of digital healthcare enables non-face-to-face services to be provided. The role of wearable devices that people can wear in daily life is essential for the growth and harmony of these two markets. Medical wearable devices can become a driving force for transforming both the healthcare market and the medical market.

✓ Medical checkup in the medical market is accurate and standardized, and it provides reliable results through professional personnel, but it is true that there is a limit to repeating checkups from time to time.

✓ Now healthcare market requires more data, but there are limitations in the versatility and standardization of data as well as the utilization of medical services.

Wearable will establish itself as a more data generating device, as digital healthcare grows. It is also important for the change of medical service that are shifting towards non-face-to-face and prevention.

⚲ Tasks to Achieve

✓ Aspects of Data

We need data essentially to develop remote medical service, artificial intelligence medical service, and digital healthcare. Apple has succeeded in collecting billions of healthcare data through its smart watch but has not pursued openness to innovate the market. Data which doctors and hospitals own has limited utilization due to medical laws, while analytical data integrated with fitness activity data, vital signs, and sensors through wearables must create interconnection and meet sufficient quantitative requirements for deep learning.

✓ Application Scalability

Biometric data that has been measured using specialized medical devices, including electrocardiogram and blood pressure, blood oxygen saturation, basic metabolism, body fat, muscle and skeleton amount, and total body water, can be collected through sensors mounted on wearable devices. More and more wearable devices are applied to medical sites as a remote diagnostic means.

✓ Technology Scalability

Wearable medical devices can monitor a user's clinical status in real time during daily activities. A specific device can also track the patient's location in real time, and it can monitor clinical data in real time wherever there is a user at home or in outdoors. The biometric data measured by the wearable medical device must obtain reliability in the process of monitoring in real-time and storing it as personal information in a portable storage device. When a device to guarantee reliability is introduced, it can be used for clinical diagnosis and prediction by medical professionals offline in the future.[3]

✓ Network Development

Many sensor arrays may be mounted on one or multiple wearable devices to detect various human bio signals. A wearable network, which can store, exchange and analyze bio signals detected by each sensor, must be formed, and a network design for encryption and forgery prevention are required. In order for individual sensors to exchange and analyze bio signals, wireless data communication technologies such as Bluetooth, Wi-Fi, LTE, 3G, 4G or 5G are used, and medical data sent to the Internet is automatically interpreted through artificial intelligence within the Internet network. The risk of infringement on the network should be prevented to get a treatment feedback on health conditions.

✓ Standardization & Certification

Medical devices are defined as all devices used for diagnosis, prevention, monitoring, treatment or relief of symptoms for diseases, injuries or disorders. Since COVID-19 pandemic, developed countries, including the European Union, are establishing the foundation for introducing medical devices and applying them to medical sites according to the MDD (Medical Device Directive). We need to achieve medical device certification requirements accordingly and must consider the data standard for connection with HIS(Hospital Information System), CDIS(Clinical Device Information System), and LIS(Laboratory Information System) according to international standards.

2

Wearable Blockchain

VOC is a blockchain network which protects, verifies data from wearables, and links with various service models.
Wearable devices transmit various health data derived from various human body and user activities through Wi-Fi, mobile Bluetooth, and 5G networks. In the first place the data is transmitted to the user's app, and the refined and processed data goes through the network of VOC to nodes and distributed storage of VOC. Medical organizations, health care companies, and other organizations will provide services using the data.

VOC-Signal is the operator of VOC blockchain, and it takes the lead in development, dissemination and utilization of wearable devices. Wearable medical devices will attract people's attention as a promising technology in the future because they can provide various medical solutions through convenient means of monitoring various physiological characteristics in real time. In order to apply the wearable medical device to the actual clinical trial, it is required to increase the accuracy of the sensor used in the device and the reliability of the accumulated data, transmit safely the accumulated medical data, and secure the verification, utilization, and security for personal medical data.

VOC solves several problems to connect the data of the user's wearable device to the data demanding organizations.

User	VOC Solution	Healthcare Organization
Health data input through wearable sensor and mobile	Provision of a format with a reliable level of accuracy and expertise	Analysis for data use, management, and filtering & feedback on reliability
Transmission via mobile Wi-Fi and 5G	Provision of safety and encryption of data transmission through VOC network	User's examination, monitoring, aftereffects observation, diagnosis and prescription
Protection request for data utilization	Establishment of data standardization and verification procedures, data access and leakage prevention system	Control of access to security data

Through the solution of VOC, user data can be connected to data demanding organizations via the VOC platform. The blockchain presented by VOC is reaching wearable services, and users can feel that their device attached to their body is connected to the blockchain.

Wearing Wearables
Providing personal
health information

Developing wearable
technology
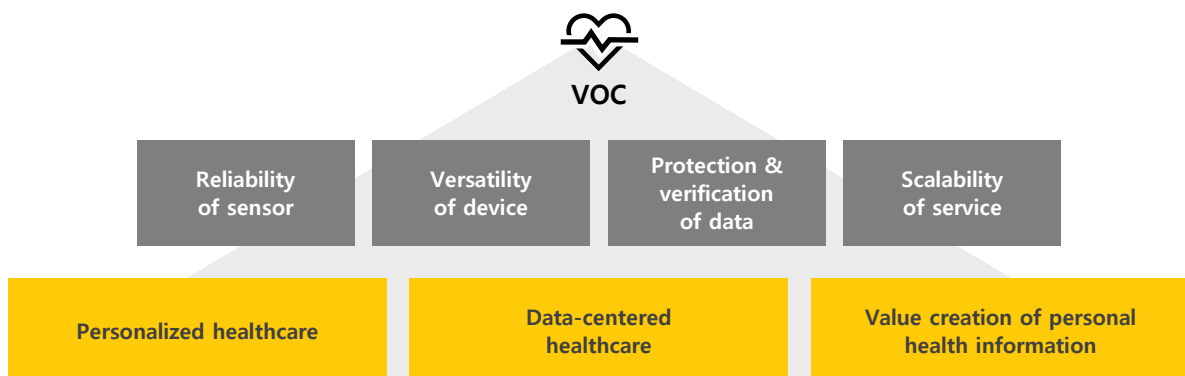Data transmission &
management

Data utilization

First of all, VOC provides meaningful data to users through sensors mounted on wearables. Users may need various necessary biometric information such as heartbeat and respiration for various purposes.

Secondly, it provides valuable data to medical institutions and healthcare & bio companies through the process of protection-verification-analysis. Thirdly, it creates valuable services and businesses for both users and data demanding organizations.

Through this process, VOC can make profits using the value of data and return it to the users.

Users

VOC
Platform

Healthcare
organizations,
enterprises

→ Health data   → Data revenue
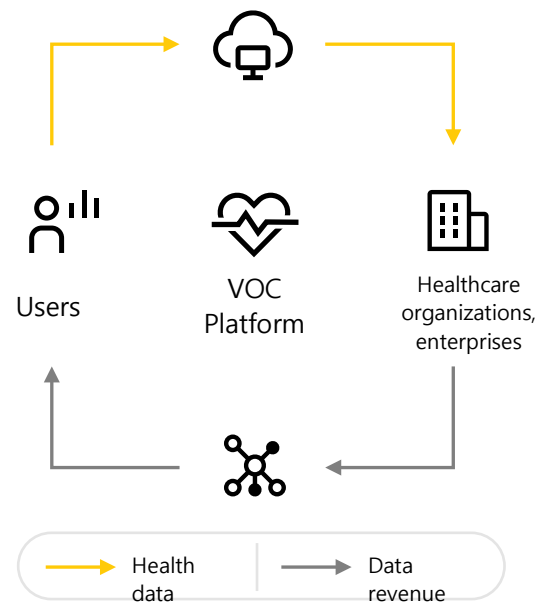
VOC connects data through digital devices, high-speed networks, and blockchains in the healthcare market, and it can provide the data for remote medical service, AI diagnosis, disease prevention & treatment, prognosis management, etc. To this end, it solved the problem of reliability & versatility, protection-verification, and scalability which can be connected to various services through health information.

VOC

| Reliability of sensor | Versatility of device | Protection & verification of data | Scalability of service |

| Personalized healthcare | Data-centered healthcare | Value creation of personal health information |

3
Duranta

Duranta is an electrocardiogram recorder attached to the human body which uses the biometric technology and constantly transmits bio signals to the hospital. It was approved as a medical device in Japan, and it is scheduled to register itself in Korea, FDA, and CE soon. It not only has the basic function of electrocardiogram, but also extends to functions such as snoring detection, sound analysis for predicting respiratory diseases, scream detection, monitoring senior citizens who live alone and patients.

Sensor Array

A sensor array is to distribute roles between sensors to identify and analyze human bio signals by synthesizing various signals. For example, when a user collapses due to shock, we can know the condition by combining changes in heart rate, breathing, screams , blood pressure, etc. Duranta has a total of 3 sensors.

- ✓ ECG (electrocardiogram) sensor that detects heartbeat

- ✓ Auditory & biological oscillation sensor for respiration and voice detection

- ✓ IR (infrared rays) sensor for oxygen saturation detection

It is essential to comprehensively analyze these sensors in order to make bio signals as data which are more accurate and have long-term utility value. It is difficult to secure reliability for various diagnoses with only one single sensor.

It consists of a detection unit that recognizes bio signals through the sensor formed in this way, and a network which converts the detected signal into data and sends it to the analysis terminal. It is made to be connected to a wearable network of VOC which can store, exchange, and analyze bio signal data detected by each sensor.
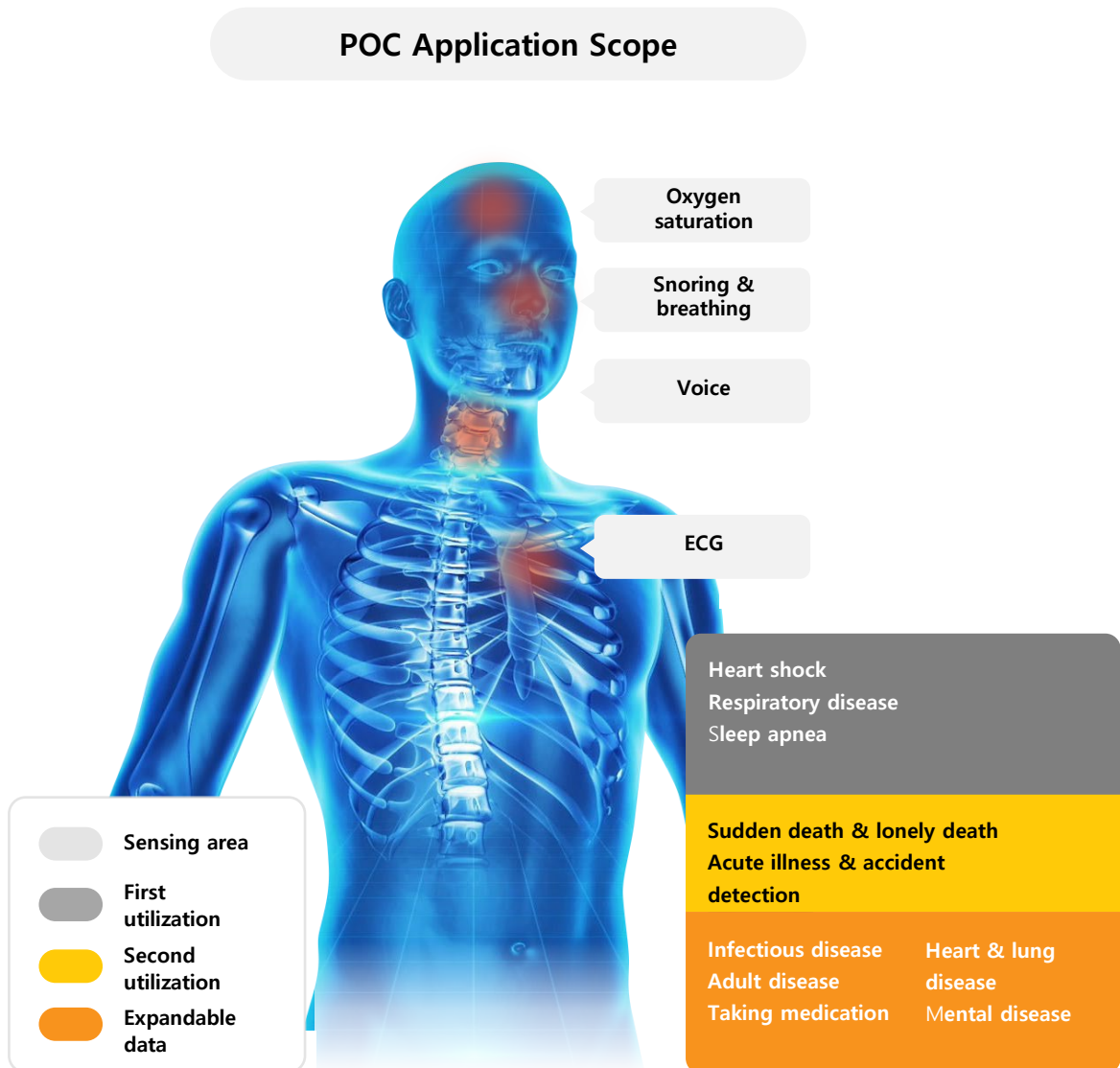
ASIC Chip

It uses AHMM's Transition Probability to replace the GMM sound model with a DNN sound model and analyze the sounds of the human body such as snoring, voice, and breathing.

It provides DNN (Deep Neural Network) operation to filter meaningless sounds from the human body and analyze data based on information that is directly related to the user's health. Users can determine whether there is snoring when verifying the operation result in real time using Voice Recognition System through DNN algorithm. It can determine and predict conditions that can cause a user's sleep apnea, and, if necessary, provide an alarm directly from the wearable device and an indirect alarm to dedicated medical staff.
SIC chip is a self-developed module of VOC, which was developed to analyze sound signals using an artificial intelligence server.

Point-of-Care(POC) Array

As it becomes more and more important around the world to manage various chronic and acute diseases, the demand for wearable medical devices in healthcare industry is increasing due to the rapid increase in the demand for real-time monitoring diagnosis and long-term health status through POC(point-of-care). Wearable medical devices have been widely supplied to a wide range of applications, from monitoring bio signals to medical diagnosis. They are being developed to measure important biomarkers for disease diagnosis, physiological health monitoring, and evaluation.

POC Application Scope

Oxygen saturation

Snoring & breathing

Voice

ECG

Heart shock
Respiratory disease
Sleep apnea

Sudden death & lonely death
Acute illness & accident detection

Infectious disease	Heart & lung disease
Adult disease	
Taking medication	Mental disease

- Sensing area
- First utilization
- Second utilization
- Expandable data

A technology to diagnose COVID-19 with only voice detection has already been developed and approved for medical treatment. A clinical trial on about 300 subjects showed an accuracy of 81.2%. In addition, it is becoming possible to diagnose drug use, depression, ADHD, etc. through artificial intelligence analysis of voice. This data analysis can be extended to infectious diseases as well as COVID-19. It can be used for research on adult diseases by synthesizing blood pressure, electrocardiogram, etc.
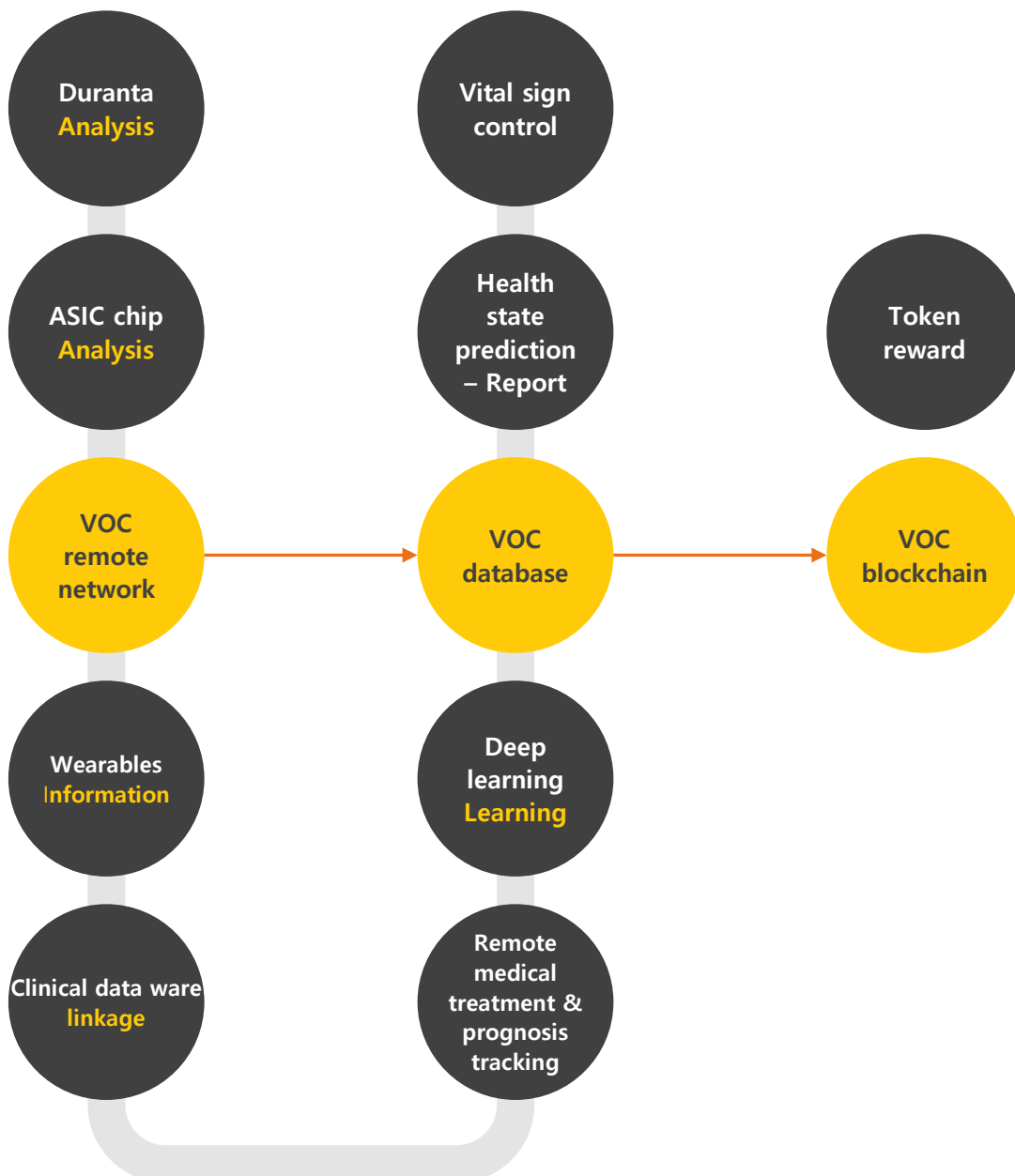
4

VOC Platform

The VOC platform consists of wearable hardware, artificial intelligence-big data servers, healthcare networks that connect and provide health information, and blockchain D-Application. Users can manage the service through the VOC app.
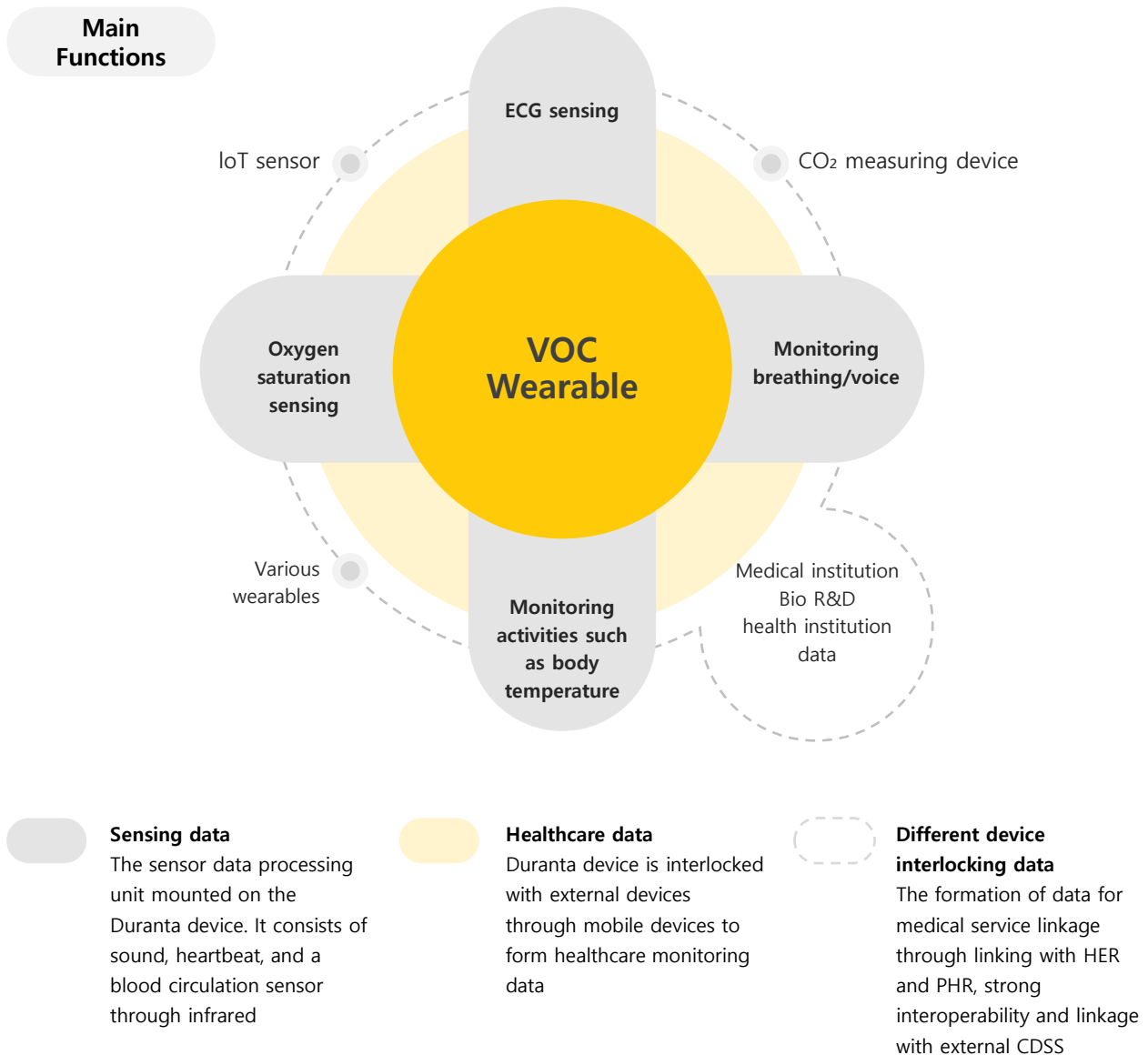
The wearable attached to the user through the VOC platform generates the measurement data through the sensor. The data is provided through a dedicated network and accumulated in the VOC healthcare DB. The users who contributed to the quantitative and qualitative increase of data are rewarded. VOC blockchain is building the core and complex system of the platform to encrypt the database.

VOC Platform Service

- Duranta **Analysis**
- ASIC chip **Analysis**
- **VOC remote network**
- Wearables **Information**
- Clinical data ware **linkage**

- Vital sign control
- Health state prediction – Report
- **VOC database**
- Deep learning **Learning**
- Remote medical treatment & prognosis tracking

- Token reward
- **VOC blockchain**

Function

Users can transmit various healthcare data through the device of VOC-Signal and link it with the diagnosis-prevention service through utilization of health care and professional medical staff.

Main Functions

Sensing data
The sensor data processing unit mounted on the Duranta device. It consists of sound, heartbeat, and a blood circulation sensor through infrared

Healthcare data
Duranta device is interlocked with external devices through mobile devices to form healthcare monitoring data

Different device interlocking data
The formation of data for medical service linkage through linking with HER and PHR, strong interoperability and linkage with external CDSS

① **Date Management**
Users can collect data through the sensor mounted on Duranta. Sensors for body temperature or exercise amount can be added. A comprehensive data network can be built by interlocking with external devices to collect in-depth health information. It includes IoT of home appliances, CO2 sensors to detect life signals, and other healthcare wearables. These data will be linked to be compared and integrated with big data of medical institutions for medical research.

② **Service interlocking function**
Users can set the service interlocking function through the interlocked mobile device. Beyond simply collecting, recording, and transmitting data, it is possible to provide various services in connection with healthcare services, remote medical services, and artificial intelligence diagnostic services. Counseling, warning, alarm, emergency actions, etc., for the elderly living alone or remote patients will be added.

Service

The development of data based on reliable bio signals is the basis for prevention and pre-service and follow-up service through health information. Duranta's diagnostic yield is officially recorded as 70%, and it is expected to bring more advanced results thanks to the artificial intelligence. Unlike conventional medical devices with wires connected, Duranta differentiated in portability, adhesiveness, and long-term monitoring enables various health care services. In addition, it leads to rewards that give users revenue and profits.

signalVOC

1 DIGITAL HEALTH CARE

Service that predicts diseases and connects vital sensing data such as heart rate and breathing with diagnosis and treatment

2 PREVENTION Service

Emergency accident alarm & acute disease monitoring, prevention-protection service

3 BENEFIT Service

Reward and benefits thanks to data sharing and wearable network activation

4 LINKED Service

Service linking health, medical treatment, and health care through data linked with smart watch and IoT in home
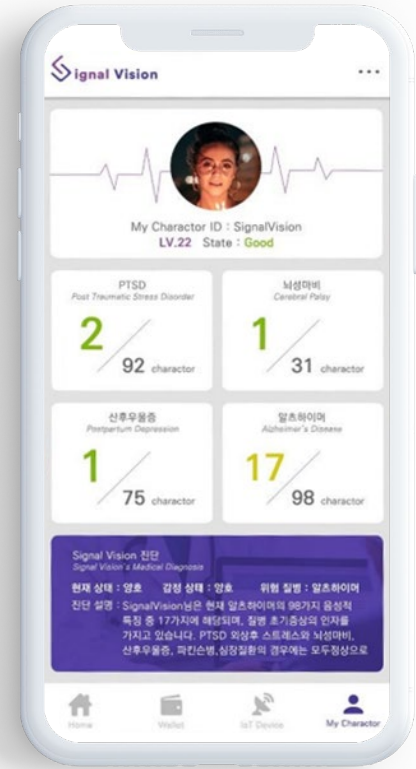
☆ Value

VOC healthcare devices are always connected to the user's mobile device, Bluetooth, and Wi-Fi. It is a factor that enables customers to use the data service that is most closely related to the daily life of users.
Users can frequently check their health information to manage their daily life more healthily, and the guardians can help users by observing and protecting them more conveniently.

Immediate and rapid information connection accelerates the transition to next-generation healthcare. Users who want quick and rapid action in an emergency will be more welcome it. As the number of device users of VOC increases, it becomes possible to collect, process, and analyze more diverse healthcare data. Through the active participation of the user, the value of data will be generated and the value of VOC containing more user's data will increase.

↗ Growth

VOC has a system for growing together with users and operates VOC reward policy. As the VOC platform grows, the entire business and asset value of VOC token ecosystem will increase. VOC returns it to its users and shares the fruits of growth with its users.

Users can participate in the reward policy by selecting and activating VOC devices starting with Durant. Activation refers to attaching a VOC device to their body and continuously transmitting verifiable data to the VOC network.

The reward may vary depending on activation level.

Division		Reward method
Device	Wearable A Type	Activation time criteria (a) x Reward grade(R)
	Wearable B Type	Activation time (a) x Quality level of data (b)
	Wearable C Type	Daily activation index of each sensor(c) x Verification rate (b-2) x Reward grade (R)
Users	Role Division	Application of role reward policy according to the user's expertise(to be disclosed later)
	Grade	(S x total cumulative reward) x (G x number of holding tokens) + activation benefits -S,G: Weight according to reward policy

5

VOC Token

🖵 Token Information

The total number of VOC tokens is 1,000,000,000. Token distribution is as follows.

10%
Team

5%
Partners

10%
Sale & VC

10%
Marketing

45%
Ecosystem

20%
R&D
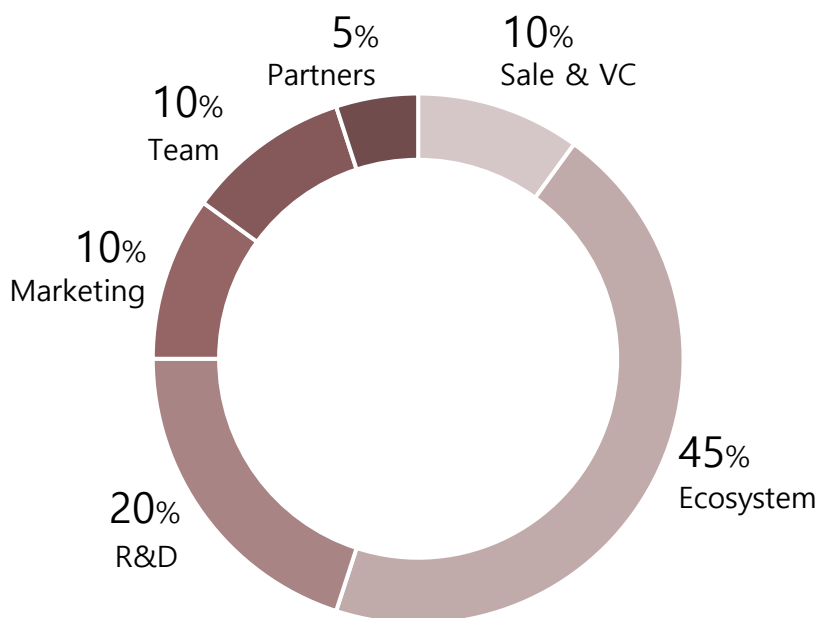
Items	Ratio	Number of token	Remarks
Sale & VC	10%	100,000,000	20% payment before listing, sequential payment for 24 months starting 3 months later after the first listing
Ecosystem	45%	450,000,000	Unlocking after official service open
R&D	20%	200,000,000	20% payment before listing, sequential payment for 40 months after lock-up for 6 months
Marketing	10%	100,000,000	20% payment before listing, sequential payment for 40 months after lock-up for 6 months
Team	10%	100,000,000	Sequential payment for 20 months after lock-up for 2 years
Partners	5%	50,000,000	Sequential payment for 20 months after lock-up for 2 years
Sum	100%	1,000,000,000	-

🏛 Foundation

signalVOC Corp focuses on the spread of digital healthcare through wearable devices. We have made efforts to increase the value of wearable data through cooperation with partners and medical institutions in Korea, Japan and other major advanced countries.

Details

- Token Contract Wallet   8H8HZgsLxGjqc496w5ejxPBzegZkM1NPjawmPbNtJygz
- White paper & Contract Release   2Q of 2022

Ecosystem

Big Data

VOC tokens can be used for sales and data interactions due to healthcare data interworking and AI analysis, and the usage place of VOC tokens can be expanded through medical and healthcare data.

Remote Medical Treatment

It is possible to share basic individual biometric data by using medical devices for remote medical treatment. VOC is expected to be available for various health services linked to remote medical treatment.

Medical Service Linkage

It is possible to analyze Korean people's respiratory diseases by region, sex, and age through the collection of wearable data. The procedure for VOC use will be implemented through the establishment of a national health life system.

Payment for only Healthcare

VOC payments will be applied for shopping of health products and quasi-drugs, fitness, Care & Healing, and healthcare services, and the usage place will continue to expand.

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👥 Main Members

The main personnel of VOC-Signal are as follows.

👤 CEO Han Chung-seok signalVOC CEO

Bachelor of Computer Engineering, Hanyang University
Yonsei University MBA
Ph.D., Seoul National University of Science and Technology

Samsung Electronics Dallas office and Israel branch, SW Engineer
AL Communication R&D Center Director
ERICSSON Mobile Platform
(Samsung Sales Manager & LGE Technology Sales Manager) Vice President of EGIS Technology (Taiwan Listed Company)

👤 Park Yong-ho signalVOC CTO

Bachelor and Master of Electrical Engineering, Seoul National University

LG Advanced Institute of Technology Senior Researcher (Communication Algorithm)
Technology venture start-up (SI) & operation (CEO)
Creative Economy Exchange Space, Ministry of Science, ICT and Future/Creative Economy Planning Bureau
Director of Dream Enter Center
Director of Seoul Creative Economy Innovation Center
(Former) CEO of Artificial Intelligence Research Institute for the 4th Industrial Revolution
(Lecture, corporate advisory, policy advisory , 4th industrial revolution consulting)
Signal Vision Co-CEO

👤 Chairman Lee Jeong-bae Adviser

Graduated from Kyungpook National University, Department of Electronic Engineering, Bachelor's and Master's degree
Graduated from the Department of Electronic Engineering, Hanyang University, Ph.D.

Vice President of Busan University of Foreign Studies
Professor/ Dean of Computer Engineering, Sunmoon University
Head of Information Technology Division of Yeosu Expo in 2012
Information and Communication Chairperson of Gwangju Universiade in 2015
Busan Expo Subcommittee Chairperson in 2030
Director / Vice President / President,
Department of Korea Information Processing
Signal Vision Advisor and President

CEO Ki Byeong-cheol Adviser

Master of Systems Engineering, North Carolina State University, USA
Bachelor of Science in Mechanical Engineering, Hanyang University

CEO of Real Design Korea
Duranta Korea Branch Manager
Samsung Electronics Wireless Division GSM Product Planning Part Manager
Microsoft Mobile Division (US Headquarters) Sr. Business Development Manager
MyWay Dynamics CEO (Wearable/Wireless Health Device Business)

Director Oh Jae-guk Adviser

Representative Director of Boas Otolaryngology
Director of Planning, Korean Association of Otorhinolaryngologists
Served as the academic director of the Korean Association of Otorhinolaryngologists
Academic Director of Medical Association of Jung-gu, Seoul, Director of Korean Otological Society
Opening director of the Korean Otological Society
Opening director of the Korean Society of Otorhinolaryngology-Head and Neck Surgery
Opening director of the Korean Society of Laryngology, Phoniatrics and Logopedics

Award of the Minister of Health and Welfare, etc.

Lim Dae-woo, International Attorney of Pyeongsan Law Firm Legal adviser

California International Attorney
International Attorney of Pyeongsan Law Firm

📊 Roadmap

The main schedule of VOC-Signal is as follows.

| Year	Period	Content
2022	Q1	VOC token design, Solarana development project started
	Q2	Release of VOC white paper website and completion of legal review
		and listing on a domestic exchange
	Q3	Announcement of wearable application plan of Duranta and voice recognition ASIC chip
		Construction of VOC Platform Algorithm and start of project development
	Q4	1st listing on global exchanges
		Technology alliance for medical data linkage and construction of infrastructure for data compatibility
2023	Q1	Completion of wearable development using Duranta and voice recognition ASIC chip
	Q2	2nd listing on global exchange
	Q3	Launch of Duranta exclusive medical service
	Q4	Start of mass production of wearable using Duranta and voice recognition ASIC chip
2024-25	Q1	Medical device and voucher exclusive online shopping mall open
		Release of Duranta 2.0 and completion of service linkage with VOC Platform
	Q2	Start of VOC Platform Beta Test
		Global service of healthcare data platform (by wearable)
		Duranta 2.0 global medical device certification (US, EU and other countries)
	Q3	Launch of VOC Platform official service
		Activation of VOC Token reward service
	Q1	Completion of online shopping mall VOC Token payment system development
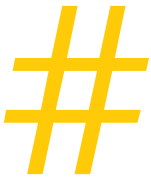
Declaration (Disclaimer)

Exemption Clause

Disclaimer & General Notice of Business of VOC token (below VOC)

This white paper was written only for reference purposes to provide specific information about the platform and team which Signal VOC Co., Ltd. (Foundation, its shareholders, and executives and staff members) is planning for. This white paper is not intended to recommend investment in the VOC team or platform. It has absolutely nothing to do with such investment. VOC Co., Ltd. does not guarantee that any content in the white paper, including the conclusions, will be accurate until a point in the future. VOC Co., Ltd. does not state or guarantee the accuracy of any matters related to this white paper and does not take any legal responsibility for it. For example, VOC Co., Ltd. does not guarantee the following things. In addition, the range of liability exemption is not limited to the examples below.

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2. Whether the white paper is commercially valuable or useful.
3. Whether the white paper is suitable for the achievement of your specific purpose.
4. Whether there is any error in the content of the white paper.
5. The market price steep decline due to the market situation after the token issuance.
6. Project stop due to government regulation.

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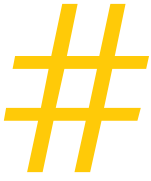
Reference

1   2020, Global Industry

2   Global Market Insights Inc. 2021

3   D Dias, and J. P S Cunha, "Wearable Health Devices. Vital Sign Monitoring, Systems and Technologies," Sensors, Vol. 18, 2018, 2414.)

4   European Union Medical Device Directive, MDD (Medical Device Directive)

5   EHR(Electronic Health Record), PHR(Personal Health Record), CDSS(Clinical Decision Support System) VOC's medical devices will contribute to innovation toward healthcare 4.0 by strengthening patient initiative in personal health records and returning data value to users.