Growing Digital Health Amid Thoughtful Innovation and New Technologies

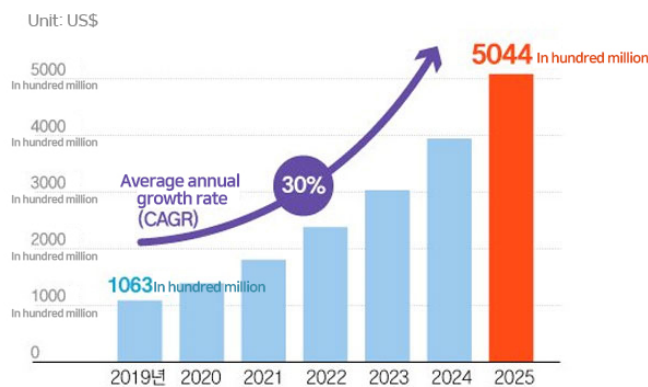Written by | Jeong In-hye, CEO, iCon Technologies

The Emergence of Digital Healthcare

The healthcare industry has faced rapid environmental changes due to COVID-19. With social distancing, the area of healthcare, which encompasses medical care, has naturally shifted to digital, and the medical industry is accelerating automation to prevent, diagnose, prescribe, and treat through virtual reality (VR) and augmented reality (AR) technology, artificial intelligence (AI) technology, and big data analysis technology. In particular, VR/AR content technology in the digital medical service field is attracting attention as an alternative to respond to the increase in demand for medical services, such as psychological diseases caused by the super-aging era and intensifying competition. By using VR/AR technology for psychotherapy and rehabilitation in a one-to-one, face-to-face treatment method, a small number of medical staff can efficiently respond to a large number of medical service demands.

Global digital healthcare market outlook

Unit: US$

5044 In hundred million

Average annual growth rate (CAGR)

30%

1063 In hundred million

2019년 2020 2021 2022 2023 2024 2025

Source: Global Market Insights

The JoongAng

Expectations for the Digital Healthcare Industry

As the digital healthcare industry faces an inflection point, the market continues to have a positive outlook. Global Market Insights predicts that the global digital healthcare market will expand by about five times to $504.4 billion by 2025, while the Institute of Information and Communications Technology Planning and Evaluation expects the domestic healthcare market to grow to 4.7 trillion won by 2024. In addition, according to KoreaBIO's (Korea Biotechnology Industry Organization) issue report, the global digital therapeutics (DTx) industry, which was valued at about US$4.2 billion, or 5 trillion won, in the Korean market in 2021, is expected to grow rapidly by 26.7% every year until 2030, along with the world bio market, which is expected to grow to US$17.3 billion, or about 30 trillion won.

Digital Health Improving Productivity in Healthcare Services

Among healthcare services, digital mental health solutions are attracting attention as demand for psychiatric treatment increases due to the prolonged COVID-19 pandemic worldwide. Korea has the highest suicide rate among OECD countries, one in every four Koreans have a mental disorder, and suicide is the number one cause of death among adolescents. It has been a long time since most indicators of mental health have begun flashing red. In particular, due to the COVID-19 pandemic situation that started in 2019, the entire nation is complaining of depression due to social distancing and isolation called the "corona blues." In the meantime, psychiatric treatment was only drug treatment and face-to-face psychotherapy, but by developing a solution in the form of combining digital technology such as VR and AR with existing psychiatric treatment, it has become possible to supplement mental health prevention, diagnosis, and treatment, and various medical institutions are already actively introducing it to improve the productivity of medical services.
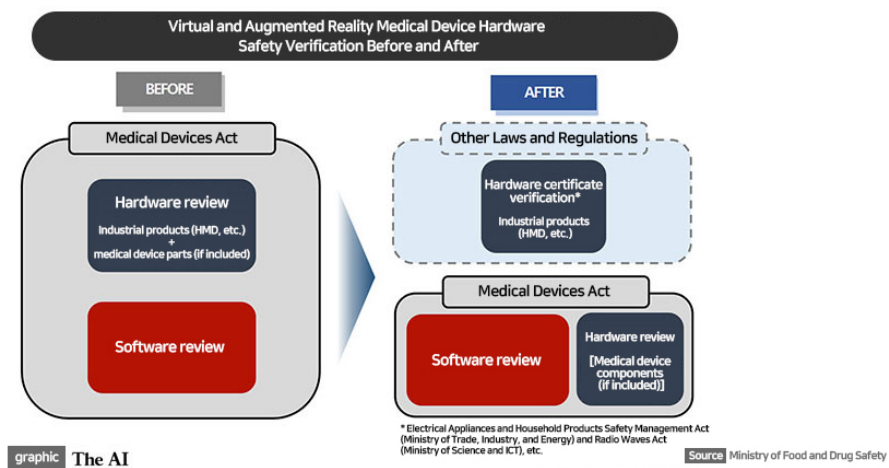
Digital Health in the Global Market

Major companies (Samsung, IBM, Google, Apple, etc.) leading the global ICT technology market are accelerating competition for leadership in the digital (smart) healthcare market by utilizing VR/AR technology with specialized technology. Overseas, Amazon, a representative IT company, supports digital checkups, diagnoses, prescriptions, face-to-face treatment links, and drug prescription services through Amazon Care, a telemedicine service. In terms of digital treatments, the number of products approved by the U.S. Food and Drug Administration (FDA) is gradually increasing. The FDA first approved Pear Therapeutics' addiction treatment application "Reset" in 2017, and has been actively growing in the market since then. In 2020, Akili Interactive's first product, video game "EndeavorRx," was approved as a digital treatment that can be used to treat ADHD in children.

Digital Health and Regulation in the Domestic Market

As such, the healthcare industry using VR/AR is growing overseas, but the domestic market is still at the "beginner steps" level. Korea is also technically competitive, but government policies are not keeping up with market trends. Various regulations and complicated procedures, especially various restrictions that cannot be easily resolved by the private sector, such as licensing, are becoming a major obstacle to industrial development. The Ministry of Food and Drug Safety recently announced guidelines for screening VR/AR-related medical device permits, and the guidelines are also significantly less effective in terms of medical device or software permits. In addition, under the current medical law, non-face-to-face healthcare solutions are classified as illegal in Korea, requiring doctors to treat patients face-to-face. Of the 37 OECD countries, 32 countries allow telemedicine. Although discussions are underway to revise the medical law in Korea, several domestic mobile carriers, including KT, are building their capabilities and know-how in telemedicine by establishing corporations overseas and partnerships with healthcare institutions and companies.

Virtual and Augmented Reality Medical Device Hardware Safety Verification Before and After

BEFORE

Medical Devices Act

Hardware review
Industrial products (HMD, etc.)
+
medical device parts (if included)

Software review

AFTER

Other Laws and Regulations

Hardware certificate verification*
Industrial products (HMD, etc.)

Medical Devices Act

Software review

Hardware review
[Medical device components (if included)]

* Electrical Appliances and Household Products Safety Management Act (Ministry of Trade, Industry, and Energy) and Radio Waves Act (Ministry of Science and ICT), etc.

graphic **The AI**

Source Ministry of Food and Drug Safety

Preparing for the Future of Digital Healthcare

In response to various environments in this changing market, companies have faced an important point in time to gain an advantage in the new era of personalized digital healthcare. The basis of "digital health" to move toward on-demand medical treatment is "technology." In particular, 5G transmits important information in real time so that medical staff can make timely and accurate decisions based on data, and VR/AR technology enables low-cost, high-efficiency services without time and space constraints. Although there may be many limitations in improving the healthcare environment at low cost while raising consumer experience standards and fulfilling the digital future, it is important to prepare for business expansion and drastic turnaround based on flexible market response and change on the premise that new technologies and hasty innovations are not unconditionally accepted from a medical perspective.

Cybersecurity: The First Step in the Safe Use of Medical Devices

As information and communication technology (ICT) in the medical industry develops and network-based medical devices increase, cybersecurity threats are increasing. According to a report, there have been 1,461 cyberattacks on US hospitals in the past decade. Among them, a patient waiting for surgery due to a ransomware attack died because he was not operated on at the scheduled time. Korean hospitals are also known to not be safe from cyberattacks.

Cyberattacks Threatening the Digital Healthcare Environment

Due to the recent development of information and communication technology (ICT), various types of digital healthcare services such as online treatment and remote health management are emerging due to the development of wired and wireless communication medical devices and increased interest in health.

Currently, many medical devices used at medical sites such as hospitals are mostly used through communications connected to networks. For example, surgical devices are controlled by using wired and wireless communication, and implantable medical devices also use wireless communication to transmit and receive medical device information or biometric signals and control the devices. The latest issue of u-Healthcare medical devices measure and collect personal medical information and biometric information outside medical institutions for telemedicine, and transmit and store it at medical institutions. With the continuous development of technology, it is expected that various types of medical devices for communication will be developed more diversely in the future.

However, hacking accidents targeting security vulnerabilities of these medical devices are also increasing, so the importance of cybersecurity in the field of digital healthcare is attracting attention. Cases of cybersecurity threats, such as hacking of medical devices and information leakage, can cause direct harm to patients' lives as well as property damage, unlike those that mainly target important confidential information of institutions and companies or information of users and customers.

In September 2020, at the University Hospital in Düsseldorf, Germany, the hospital system was paralyzed due to a ransomware infection caused by a cyberattack, making it impossible to treat patients. As a result, a patient scheduled for treatment was transported to a nearby hospital but died on the way. This incident was recorded as the first medical device death caused by a cyberattack.

Cybersecurity Threats for Medical Devices

Common examples of the modern smart medical system environment can be divided into areas where information is collected and transmitted from outside medical institutions, areas where information is collected and processed inside medical institutions, and areas where various medical information is transmitted to other medical institutions or external institutions (such as the Health Insurance Corporation). In addition, security threats to each of the medical devices, gateways, networks, and medical information systems constituting smart medical services are identified as follows.
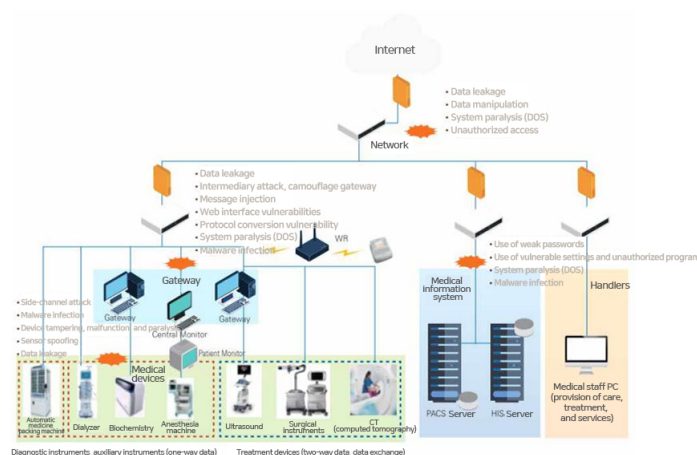
Security Threats Related to Medical Devices Can Be Classified into Software and Hardware Aspects.

<Software Threats>

-Third-party software vulnerability: Device malfunction and information exposure due to vulnerabilities included in firmware or operating system and application software (operating system, library, database, module, etc.) on medical devices.

-Inadequate software patching: Malware infection due to the latest version of a software security patch not being patched or through a patch that does not go through safe paths, medical device malfunction caused by not performing proper safety tests before patches.

-Malicious code infection (ransomware): Threats caused by structural problems in medical devices, such as difficulty in installing antivirus system or vaccine, and infection with malicious code through lack of verification of executable files.

<Hardware Threats>

-Loss or theft of medical devices: Physical loss or theft of medical devices poses the risk of data leakage in medical devices.

-Firmware acquisition using debug ports: Attack to acquire firmware, etc. from a medical device without removing the port from the debug used in the development of the medical device, allowing an attacker to identify internal source code and structure based on this, or to tamper with certain parts, and re-inject the medical device.

-Side-channel attack: An attack technique that infers an encryption key by analyzing the amount of electricity consumed and the amount of electromagnetic signals when the encryption algorithm operates on the information transmitted from the medical device.

-Malicious code infection through USB: Malicious code distribution or information leakage through USB ports

-Sensor spoofing: Causes malfunction of medical devices by interfering with data detection by spoofing attacks on sensors that do not have an authentication system.

Medical Device Cybersecurity Application Scope and Target

<Scope of Medical Device Cybersecurity Coverage>

- Medical devices that transmit and receive personal medical information such as patient biometric information using wired and wireless communication.
- Medical devices that can control devices using wired/wireless communication.
- Medical devices that maintain and repair firmware or software updates using wired/wireless communication.

Efforts to strengthen cybersecurity for safe use of medical devices

In order to strengthen the security of medical devices, the government amended the Medical Device Permission Notice in November 2019 to make it mandatory to submit cybersecurity data, while publishing guidelines for medical device cybersecurity permit review, and in April 2020, cybersecurity exclusive review started operating a digital health equipment task force.

As a result, medical devices that transmit and receive personal medical information such as patient biometric information using wired and wireless communication, medical devices that can control devices using wired and wireless communication, and medical devices that maintain and repair firmware or software updates using wired and wireless communication devices, etc. must be approved and reviewed.

The Ministry of Food and Drug Safety revised and published Cybersecurity Application Methods and Casebook for Medical Devices in October to better understand how to prove cybersecurity safety when licensing medical devices.

Examples of medical device hacking included in the Cybersecurity Application Methods and Casebook for Medical Devices are insulin infusion pump hacking to change the pump settings to confirm risks such as excessive injection or stoppage of insulin to a patient (June 2019) and rapid depletion of the battery or unauthorized change of the pacemaker function by hacking pacemakers (August 2017).

The major revisions include an explanation of how to apply cybersecurity for medical devices in accordance with internationally standardized requirements and examples of reviewing cybersecurity by communication configuration (LAN, Bluetooth, USB, etc.) and form (wired/wireless communication).

In this revised edition, examples of cybersecurity suitability verification and submission materials are specifically presented to enhance civil petitioners' understanding of medical device cybersecurity regulations.

For reference, the Ministry of Food and Drug Safety reflected the global medical device cybersecurity standards set by the International Medical Device Regulators Forum (IMDRF) in Cybersecurity Permit and Review Guidelines for Medical Devices in January, and detailed information on permit and review standards can be found on the Ministry of Food and Drug Safety's website (Laws/Data → Guidelines for Public Officials/Guidelines for Civil Petitioners).

How to Reduce Medical Device Cyberattack Damage

In order to reduce cyberattack damage, physical access control is a priority. Medical devices must be placed in a restricted area with physical access control to allow access only to authorized personnel, including restrictions on the use of removable media such as USB drives.

Next, network isolation and separation are also necessary. Firewall ports should be opened only for necessary network communications such as isolating medical devices from hospital networks and setting up virtual local area networks.

In addition, data backup and continuous monitoring are key. In order to minimize losses in the event of a disaster, backup and restoration procedures need to be continuously implemented, and vaccine programs need to be installed to monitor for suspicious activities.

References

- Medical device cybersecurity: To what extent should it be applied? 🔎

- Ministry of Food and Drug Safety. Efforts to strengthen cybersecurity for safe use of medical devices. 🔎

- KISA. Digital healthcare device and service safety verification. 🔎

In three years, I would like to spread UMS widely by becoming a specialist rather than as a rookie.

interview | Kim Jae-seok, M&Wise

A variety of notifications such as bank notification texts, credit card payment texts, and shopping mall advertising texts arrive on our smartphones countless times a day. This was made possible by the development of a system called the unified messaging system(UMS). How is a UMS sent? How far will it develop in the future? Let's listen to the story of Kim Jae-seok of the M&Wise Business Solution Team who wants to spread UMS around the world.A variety of notifications such as bank notification texts, credit card payment texts, and shopping mall advertising texts arrive on our smartphones countless times a day. This was made possible by the development of a system called the unified messaging system(UMS). How is a UMS sent? How far will it develop in the future? Let's listen to the story of Kim Jae-seok of the M&Wise Business Solution Team who wants to spread UMS around the world.

Q

Hello, please give a brief introduction of yourself to our readers.

Hello, my name is Kim Jae-seok of the Business Solution Team. I am still a new employee, as I have worked for the M&Wise for just six months. I did not major in IT, but I saw that the IT industry has a bright prospects and a bright future, so I joined M&Wise.
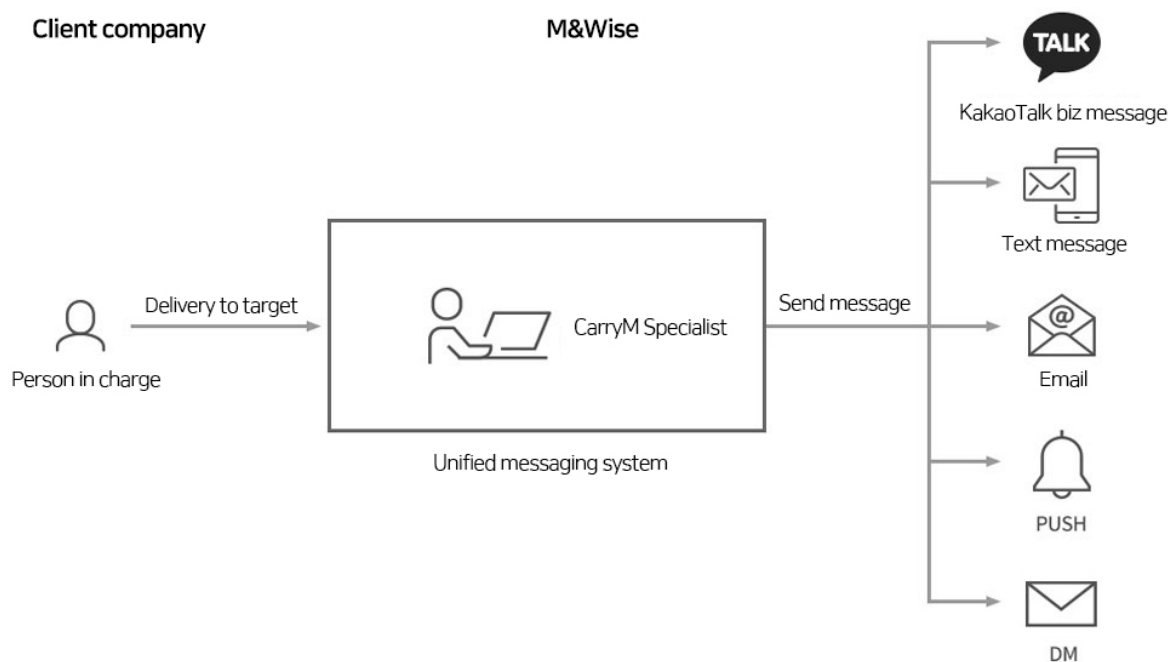
Q

What kind of work are you in charge of at M&Wise, and what is your current focus?

The work of the Business Solution Team is to showcase UMS (the unified messaging system) developed by M&Wise and to win contracts with other companies. Currently, I am working on introducing and explaining what UMS is to customers who inquire about it. UMS introduced in this way is planned to be delivered to customers' internal systems next year.

Q

What is M&Wise's representative product or service?

Client company   M&Wise

Person in charge — Delivery to target → CarryM Specialist — Send message →

Unified messaging system

KakaoTalk biz message
Text message
Email
PUSH
DM

M&Wise is a company specializing in total communication solutions and services. UMS, which I mentioned earlier, is the representative product of M&Wise, and it is a solution that effectively distributes messaging channels (email, text, notifications, push, etc.) in one place. In addition, we are an official dealer for the Kakao biz messaging services, Notification Talk, Friend Talk, and Kakao Sync, and we provide various types of messaging services as an official reseller of text services, Kakao Pay identity authentication, and electronic document delivery services.

Q

How is the UMS solution being used today?
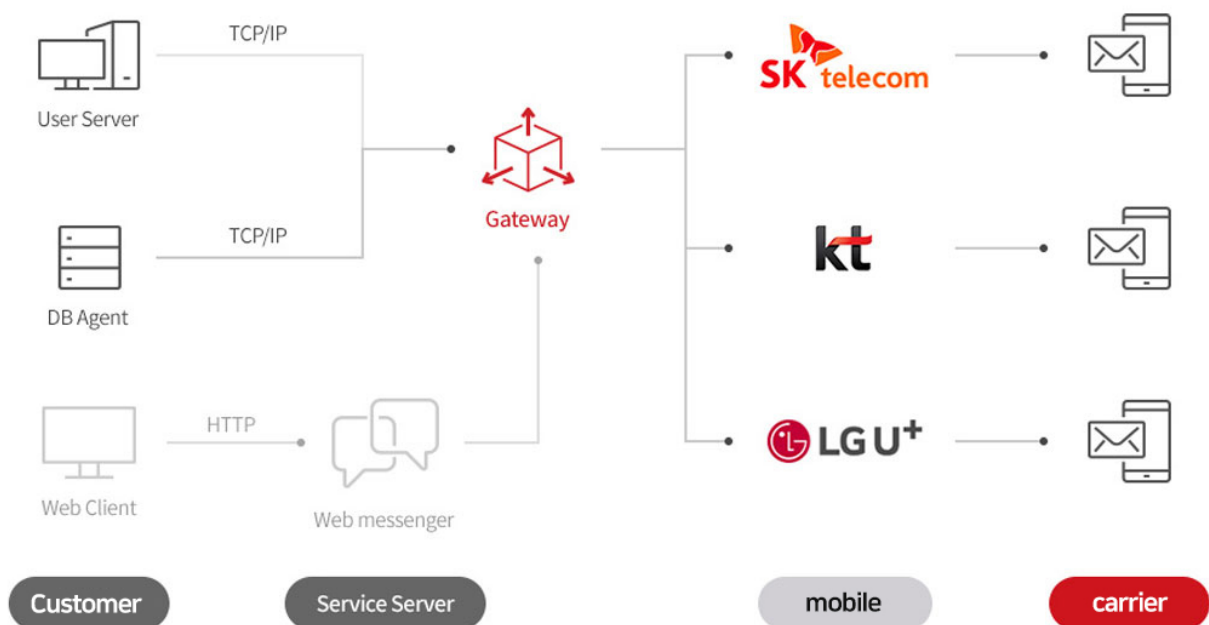
Currently, our UMS is being delivered to the entire financial industry, including banks, credit card companies, and insurance companies. Take K Bank as an example where we have completed the UMS project. One of K Bank's main goals was to advance its financial infrastructure through projects and provide real-time customized services across all channels. M&Wise provides real-time customized notification services through various channels through UMS and has also built electronic marketing tasks, including real-time floating banners and mobile direct messages (DMs), which were previously unavailable.

Q

What got you interested in working with UMS solutions?

It began when I started to wonder about how the notifications and text messages that I usually received were sent. Through this UMS solution, I was able to respond to inquiries from various customers. I think the biggest attraction is meeting people from various industries, including public, financial, service, and general companies, and to have various perspectives and insights through collaboration with practitioners.

Q

Could you tell us your company's top three strong points?

First, to become a leader in messaging, we constantly invest in better products or services. Second, large companies come and ask for cooperation because we have strong product technology. Lastly, ours is an employee-friendly company that strives to improve the welfare of its employees by creating a "pleasant workplace" organization.

Q

Are there any memorable episodes that you have from your work?

Not long after I joined the company, there was a big project announcement. I had to write a project proposal to win an order, but I was suffocated by RFPs (request for proposals), which I was seeing for the first time, and the work of writing proposals. I was at a loss as to how to write them, but I wrote slowly and completed the proposals one by one while receiving instruction from my team leader and fellow employees. Fortunately, we landed the big project, and the team leader praised me, saying, "Good job." And when my colleagues said, "Thank you for following our instructions so well," I felt confident that I could do this job well.

Q

What kind of employee are you in the company?

I still consider myself to be a rookie. As I do my job, I greatly feel what I lack. However, I want to learn more and grow like "a dog that can recite a poem if it spends three years in a village school." In three years, I want to become a specialist, not a rookie, and introduce UMS widely to the world.

Q

What skills does someone need to join M&Wise?

First of all, since it is an IT company, it is helpful to have an IT-related certificate. For example, a certificate such as information-processing engineer. Second, understanding Java, a programming language, is of great help in performing solutions or service tasks. And last but not least, it is important to have an attitude that corresponds to the core values of M&Wise: creativity, positiveness, passion, and commitment.

Q

What dream or goal do you want to achieve at M&WISE?

From the point of view of winning contracts with companies, my goal is to achieve sales of 100 billion won. I would like to contribute to creating luxury solutions by strengthening product functionality for customer needs. Ultimately, I want to help us grow into a company that everyone knows and wants to work for.

Q

Any messages to our ICT industry Hot Clips readers?

Thank you for giving me the opportunity to introduce M&Wise to you. We are a company that has grown by constantly moving forward and striving since the company's foundation to help customers succeed. We will continue to vigorously move forward so that one billion people and 10,000 companies can use our service. So, please take a lot of interest in us. Thank you.

Creating Enjoyable Content for Everyone

SMITH CO., LTD. CEO Kim Se-hun

SMITH

SMITH

☑ General Status

- **Implementing Agency**

  Korea Radio Promotion Associatio

- **Business Details**

  Broadcasting content promotion

☑ Company Status

- **CEO**

  Kim Se-hun

- **Business Type**

  Production of AD movies and videos

- **Year of Establishment**

  2016. 07

- **Homepage**

  www.smithcorp.co.kr

☑ Key Accomplishments

- Established digital entertainment company to generate new jobs by incubating and hiring creators.
- Contributed eliminating information gaps by opening channels for people in blind spots of new media contents.
- Eliminated information gaps and building a digital accommodating ecosystem by producing contents for socially disadvantaged classes, and various contribution activities to digital society.

Providing basis of new media with healthy contents
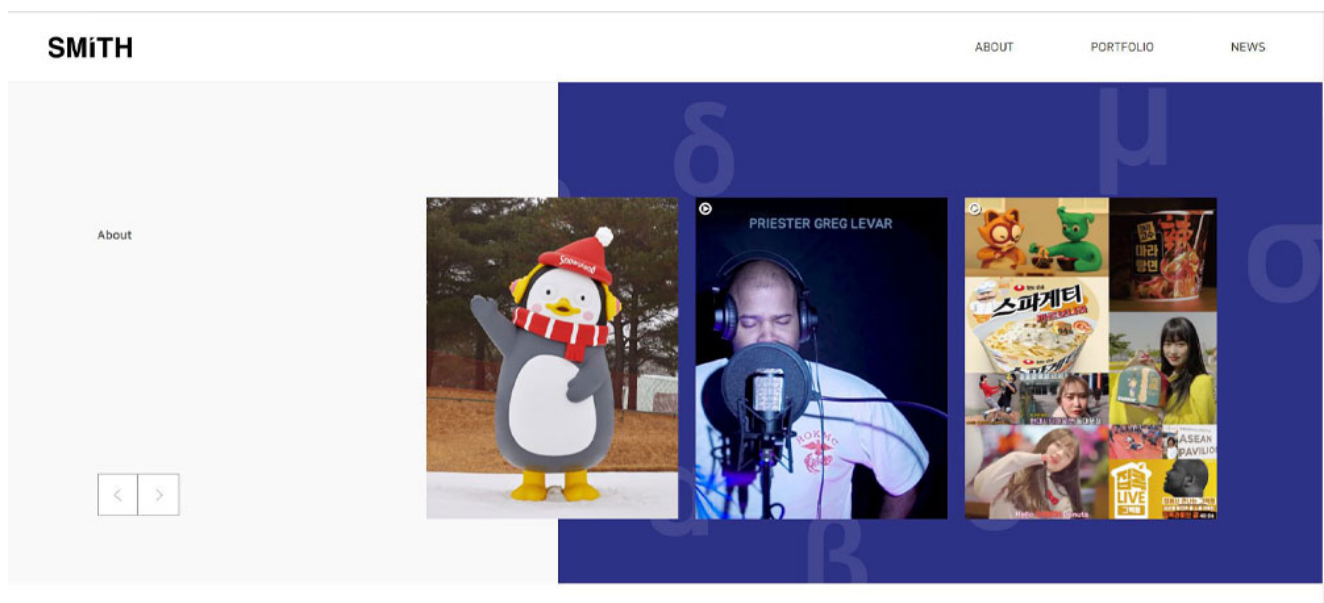
Since it was established in 2019, Smith, a digital entertainment company based on healthy content production, has created healthy content enjoyable for children, teenagers, and parents. This is all in the new media ecosystem filled with creative images, forming the foundation for a new media culture. Smith has advanced technologies utilizing marketing tools for its content production, creator management, and growth hacking.

The company predicts that the production of image content is not the end but a start, and anticipates that products of B2C will be created including fashion, music, and foods based on large areas and influencers capable of producing derivatives in diverse fields.

Smith also predicts high increase of demands for personal media according to the growth of K-contents market. Market fields in the future will be limitless because personal media will be capable of expanding to content in diverse fields such as virtual human, metaverse, and NFT.

Exploring global market and contents export

Smith is a company bearing sensitive image production capabilities and excellent content creativity that draw a wide range of audience. The company also boasts its significant advantages of image production capabilities, excellent production manpower, marketing manpower, and content creativity. ICTfunded project played the role of springboard for enhancing globalization and competitiveness of K-contents through personal media production. In particular, Smith achieved its purposes of exploitation of global markets and export of contents for satisfying needs of global launching of personal media creators through the ICT-funded project.

The company exported contents produced with Greg, a singer well known in the TV program 'South Korean Foreigners' to Vietnam and other Southeast Asian countries. The company made use of Greg's YouTube

Endeavoring to launch personal media content in overseas markets

The company experienced difficulties when it was targeting Southeast Asian countries. Most of the Southeast Asian countries prefer programs of broadcasting companies, and are reluctant to accept personal media contents, and export of such content was hard to achieve. It was difficult to export Korean content produced by personal producer; however, the company got the opportunity for the content market in Vietnam from a Korean company operated in Vietnam, and such opportunity led to the export of content to Vietnam. This success is recognized as an exceptional achievement in the content industry.

The company acknowledged that marketing via Facebook is higher than promotion via Instagram in the Southeast Asian countries, and maximized exposure of the media by promotion on large pages of Facebook, and pages relevant to K-pop in Vietnam to realize such achievement.

Smith, a personal media content business, indicated that the needs of image production manpower and creators for launching in overseas markets greatly increased. The company also promised its objective of continuously creating business models that can enhance OneSource-Multi-Use (OSMU)based on image content in the course of active export of Korean content.

On the road to producing content highlighting social values

Though Smith is a small business in the fields of content and MCN, it is confident in achieving content export to overseas markets. The company is going to make new attempts to systematically enhance cultures and organization of the company based on the achievements recorded so far.

Most of all, the company was elected one of the businesses with excellent achievement, and it's positive that it will realize a brighter and stronger future. The company will continuously grow by pondering success that was not imaginable at the time of establishment. The company will also promote selfesteem of its employees, and try harder to produce more content in the name of excellence. While the company has concentrated on export and content sales so far, the company will ensure brighter social values by

producing content for disadvantaged group, and small businesses that has experienced hardship caused by COVID-19.

TIME LINE

2016. 07.

Established Web Contents

2019. 02.

Company name changed to Smith, and incorporated

2020. 07.

Certified as an excellent enterprise in technology assessment

2021. 02.

Project of supporting reproduction of personal media for launching in overseas markets (RAPA)

2021. 06.

Certified as a startup business

2021. 07.

창업기업확인 인증

2021. 09.

Won K-WAVE award at Korean Wave Expo

2021. 12.

Won commendation of excellent venture business in Gyeonggi-do

2022. 01.

Registered copyright of character 'PIGGY'

Safe AI Learning Data Without Personal Information Leak

INFINIQ CO., LTD. Choi Gene Department Head

INFINIQ

INFINIQ CO., LTD.

☑ General Status

....

- Implementing Agency

  National Information Society Agency

- Business Details

  Knowledge base construction

☑ Company Status

....

- CEO

  Park Joon-hyung

- Business Type

  Applied software development and supply

- Year of Establishment

  2005. 03

- Homepage

  www.infiniq.co.kr

☑ Key Accomplishments

....

Possessing the largest volume of data in Korea.

Meeting customer needs through customizing suitable for customers.

Possessing infrastructure that enables INFINIQ's own technology development.

Construction of hand signal recognition data of police and traffic safety personnel (450,000 pieces of data, 2021).

Company with Korea's Largest Data Volume

One of the most important things in the research of big data and AI (artificial intelligence) is learning data. This is because AI learned with more diverse and vast data can find functions and variables that could not be predicted before. Nonetheless, the demand for personal information protection is increasing since sensitive personal information may be included in the AI learning data.

The EU adopted the General Data Protection Regulation (GDPR) to use citizens' data, and Korea unified the personal information protection system by amending three laws on data. While awareness of personal information protection gradually becomes mature, AI data service firm INFINIQ developed an AIbased non-

identifying solution. It is a mode for AI to identify and process automatically the area judged as personal information in the image and video footage by applying precise object recognition algorithm with high accuracy. The non-identifying function can be quickly and accurately applied to vast amounts of data.

INFINIQ is an AI data service expert company specializing in autonomous driving. As a firm with the largest volume of data in Korea, INFINIQ has core technologies in each process required for data construction. The company quickly sensed private and public markets' demand for the AI sector, which has been at the center of the Fourth Industrial Revolution since 2016, and it has expanded its business area to the AI learning data sector. Having established the AI Research Center, INFINIQ is actively investing in technology development by developing its own algorithms and currently carrying out collaborations with approximately 40 global autonomous drivingrelated firms including Hyundai Motors and Qualcomm. Moreover, the company is expanding its service to customer-tailored AI model development.

INFINIQ's major products are applied to various industrial groups such as data, retail, autonomous driving, healthcare, and industrial safety. Its strategic technology, namely computer vision-based core technology, is utilized in a wide range of fields including retail, medical, autonomous driving, healthcare, robotics, security/safety, and architecture, which have recently been transformed into digital service through convergence with AI.

Promoting Data Economic Development Through Data Opening
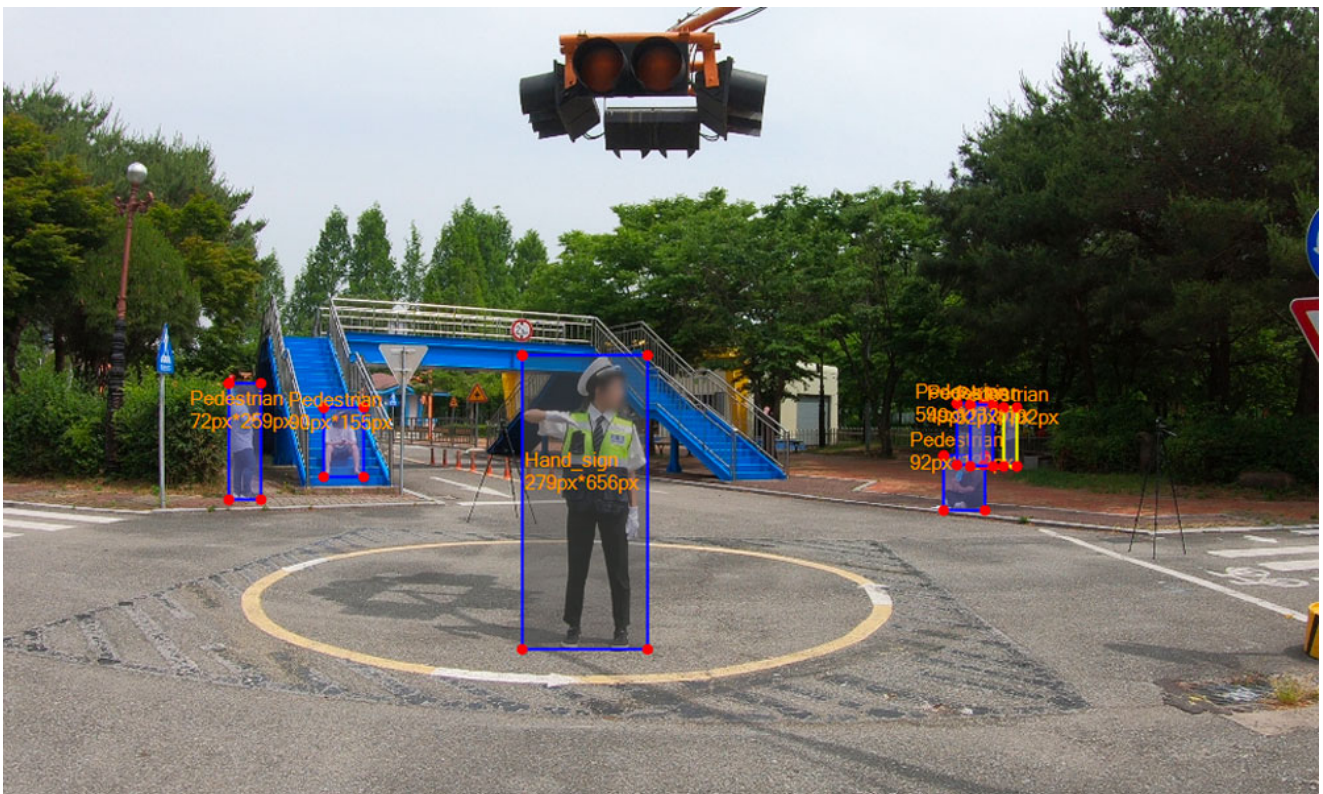
INFINIQ participated in MSIT's data construction project for AI learning and atypical feature cognitive information development database construction project on the road of the Ministry of Interior and Safety (MOIS). Through this, the company has constructed 12.64 million pieces of data of the sports image analysis data set and 31 types of 750,000 pieces of data for autonomous driving.

INFINIQ constructed 450,000 pieces of police and traffic safety personnel's hand signal recognition data for the first time in the world by participating in the project. The company secured 750,000 pieces of data in all including 100,000 pieces of data containing 60 traffic objects such as vehicles, traffic signals, and pedestrian crossings and 200,000 pieces of image data of pedestrians, policemen, and traffic safety personnel and opened them to the public. INFINIQ not only offered a data set for learning as required for AI technology development to small and medium businesses and venture businesses but also opened data that can serve as the core infrastructure of autonomous driving development to the public. Consequently, the company promoted data economy development.

As a data company specializing in autonomous driving, INFINIQ had an opportunity to improve its technological capabilities in atypical data collection and processing by participating in the Digital New Deal project. Having contributed to AI ecosystem diffusion through data by participating in the project, INFINIQ expects the following: construction of AI ecosystem wherein companies that can share data and those requiring data for AI learning can smoothly exchange data and deep learning models for various purposes; lowering of AI technology adoption barrier; and expansion of the market.

Lowering Data Work Environment Barriers

According to INFINIQ, the infrastructure built up by performing projects in the AI and data-applied fields such as computer vision, voice, and letter recognition and advanced management process can be key to success. Having built up extensive experience by doing business in the applied field for a long time, the company could respond to market change quickly. In line with the basis of the Fourth Industrial Revolution, the company plans to construct an environment where many people including vulnerable people can carry out data processing without time and space restrictions while lowering the data work environment barriers.

As Korea's largest AI data company, INFINIQ is expanding its status while growing into a global firm beyond Korea. Recently, the company entered the smart city field through retail store management system advancement that converged AI technology and the distribution industry and won the CES 2022 Innovation

Award for a related product, AI Counter. INFINIQ is expected to expand its business to diverse areas including industrial safety, sports, and smart city, not to mention autonomous driving.

TIME LINE

2005. 03.

Established INFINIQ Co., Ltd.

2013. 12.

Awarded the Gender Equality and Family Minister's Prize as a familyfriendly company

2014. 05.

Awarded a KBS President's Prize at the 3rd Familyfriendly Management Awards

2015. 05.

Received a Presidential Citation for equal employment opportunity

2017. 02.

Korea SW Corporate Competitiveness Awards Grand Prize in the job creation contribution category

2018. 04.

Established a subsidiary in Vietnam

2020. 05.

Ministry of Science and ICT (MSIT) Selected as an AI learning data construction project

2020. 12.

Set up a subsidiary in Europe Luxembourg subsidiary

2021. 05.

Attracted KRW 11 billion of investments from STIC Ventures, DSC Investment, and Korea Investment & Securities

2021. 06.

MSIT Selected as Digital New Deal Best Practice of the Month

2021. 12.

2021 SW R&D performance presentation of CEO Park Joon-hyung Received a cience and ICT Minister's Citation

CEO Roh Sung-yoon received a Science and ICT Minister's commendation at the Data-Star Awards

Achieving great success in metaverse markets with our web-based virtual prototype verification/exhibition platform

DIGIFORET CO., LTD. CEO Park Seong-hun

DIGIFORET

☑ General Status

- **Implementing Agency**

  National IT Industry Promotion Agency
- **Business Details**

  Activation of industrial ecosystem of digital contents

☑ Company Status

- **CEO**

  Park Seong-hun
- **Business Type**

  Development and supply of software service
- **Year of Establishment**

  2014. 01
- **Homepage**

  www.digiforet.com

☑ Key Accomplishments

Developed and applied concurrent access technology of diversified devices on cross-platforms.

Acquired multiple patents for virtual convergence technologies, and developed industrial metaverse solutions with localized (homegrown) technologies.

Developed AI analysis, convergence solutions integrated with the real-time linkage system of manufacture field data.

The growing market for industrial metaverse platforms

The current size of the local market for industrial metaverse platforms or digital twins saving on costs and reducing risks of companies beyond time and space is approx. KRW 69 billion, which is relatively small compared to those of major countries; however, is expected to grow fast at a 70-percent CAGR in the future.

The world markets are expected to grow 15 times larger from USD 3.1 billion in 2020 to 48.2 billion in 2026 at 58-percent CAGR. Global IT giants such as Microsoft and Google continuously launch and develop hardware, software, and solutions relevant to industrial metaverse.

There are multiple fields in the market for industrial metaverse, and the one targeted by Digiforet include 'XR Auto Studio (remote collaboration solution' based on connection technologies on cross-platform-equipped
metaverse, 'Manufacturing AI metaverse factory (data-based remote control solution in manufacture fields of small businesses),' and 'XR Maker Studio (branding solution making use of virtual exhibition)'.

It is not easy to make users of platforms geared to various devices such as VR, AR, and MR encounter each other in the same virtual space. This situation causes significant restrictions on users in diverse environments demanded. It is necessary to connect diverse devices to a single virtual space without restrictions on equipment to immerse at full-scale in the multiverse by connecting different metaverse environments. The core technologies of DIGEFORET such as cross-platform connection technology based on N-Screen convergence, and real-time data linking interface technology effectively support such a linkage and compatibility.

Metaverse solutions geared to prototype verification, demonstration, and promotion

Digiforet determined that platforms and services playing the roles as the foundation of the Web are the basic prerequisites for expanding augmentation technologies to full-scale industries, and has participated in the ICT-funded project. The objective of our company was to build a web-based server with our multiverse connection technologies, and roll out metaverse-enabled virtual platforms geared to prototype verification and exhibition to grow and advance our internal technologies.

Accordingly, Digiforet has leveraged cross-platform connection technologies based on our core technology, entitled N-Screen convergence, to develop 'XR Maker Studio.' By creating a virtual studio on the web through our product, and then uploading 3D data of the prototype, multiple online users can access, experience products, and exchange their opinions.

Up-and-coming or existing startups, and small businesses developing their prototypes are able to achieve cost, time, and energy-saving advantages by investing in prototype fabrication with this service during the product development process. Furthermore, startups can promote their products and services by availing of virtual exhibition halls in metaverse with just a few clicks.

Digiforet scored 93 points after the project's completion after the announcement of final achievements in Jan. 2022. The company won the IF Design Award in February, and received inquiries for a buildup and introductions from Wuerth, a Germanybased global tool maker. It also conducted an online meeting for the buildup of a metaverse-enabled virtual exhibition hall with employees of PRADA at its head office in Italy. In

particular, the Makerspace at a certain university in Seoul decided the introduction of 'XR Maker Studio,' to be used for the verification of prototypes of startups.

Owing to the dedicated and concerted efforts of DIGIFORET, these achievements were attained for the ongoing sales and advancement of our products, while we never rest on our laurels in technology development on the heels of the national project for technology development support.
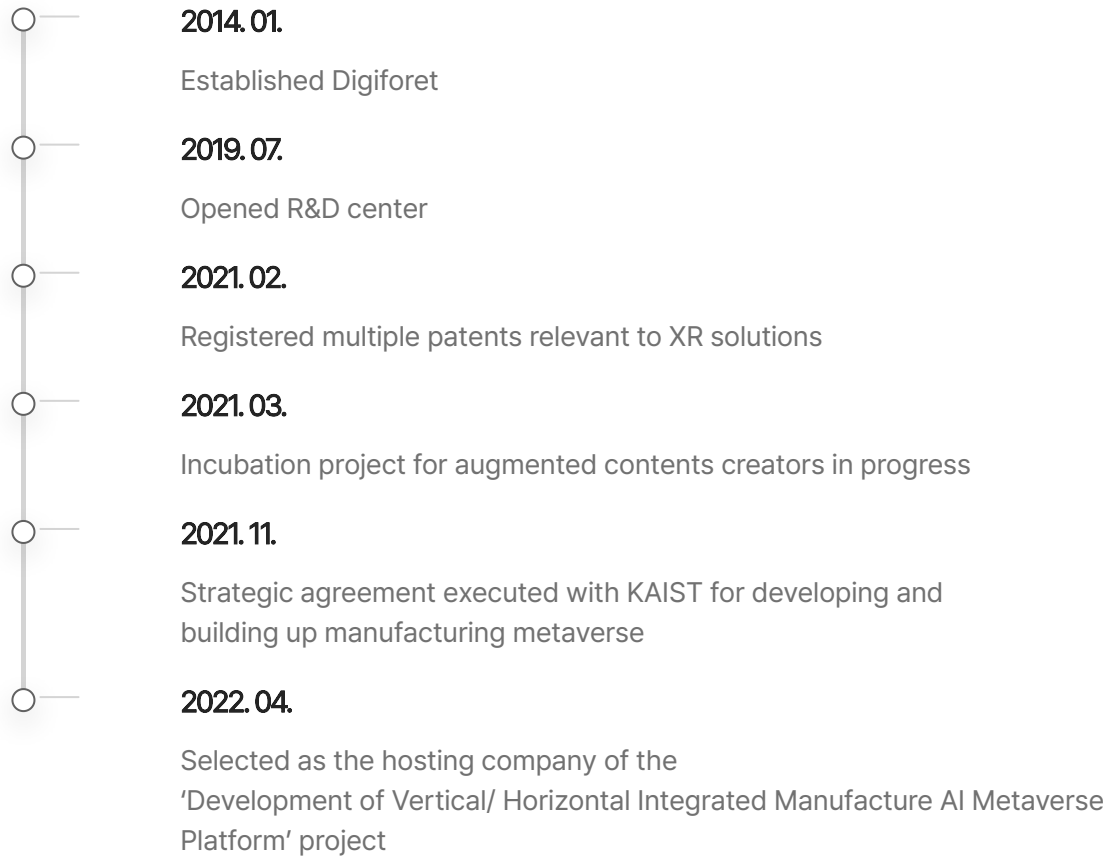
Concentrating on commercialization and expansion of XR platform

As a result of participating in ICT project, Digiforet builds a framework of the web XR-based service platforms, which Digiforet pursues ongoing advancement. We will concentrate our efforts on technology advancement and completing our tasks until the XR platform we developed is commercialized and brought to the market. In addition, Digiforet will keep on attracting users by providing our 'XR Maker Studio' with B2B and B2G subscription systems to Makerspaces and startup-focused institutes in Korea, thereby advancingthe services by reviewing and actively reflecting diverse feedbacks from each field.

Digiforet forecasts that our achievements and outcomes from the ICT-funded project are fully utilized on B2B or B2G as well as for services of metaverseenabled exhibition experiences, let alone prototype verification, education, and services. We will also participate in international conventions such as CES and MWC and collect feedbacks from many users, gaining overseas consumers. Digiforet will expand our technologies and products to various institutes and industries such as medical industries and smart farms that have shown high interest for a partnership and platform buildup.

TIME LINE

2014. 01.

Established Digiforet

2019. 07.

Opened R&D center

2021. 02.

Registered multiple patents relevant to XR solutions

2021. 03.

Incubation project for augmented contents creators in progress

2021. 11.

Strategic agreement executed with KAIST for developing and
building up manufacturing metaverse

2022. 04.

Selected as the hosting company of the
'Development of Vertical/ Horizontal Integrated Manufacture AI Metaverse
Platform' project

Leading Integrated Information Security with Advanced Technological Capabilities and Solutions

MARKANY, INC. CEO Choi Jong-wook, Choi go

*MarkAny**

MARKANY, INC.

☑ General Status

- **Implementing Agency**

  National Information Society Agency

- **Business Details**

  Construction of quantum cryptography communication infrastructure

☑ Company Status

- **CEO**

  Choi Jong-wook, Choi go

- **Business Type**

  Software development and supply

- **Year of Establishment**

  1999, 02

- **Homepage**

  www.markany.com

☑ Key Accomplishments

Developed the world's first DRM (digital rights management) (2000).

Completed forensic watermark technology certification for six Hollywood distributors for the first time in Asia (2018).

Constructed edge computing AI control that can conduct CCTV analysis in real time for the first time in Korea.

Security technology making safer society and nation
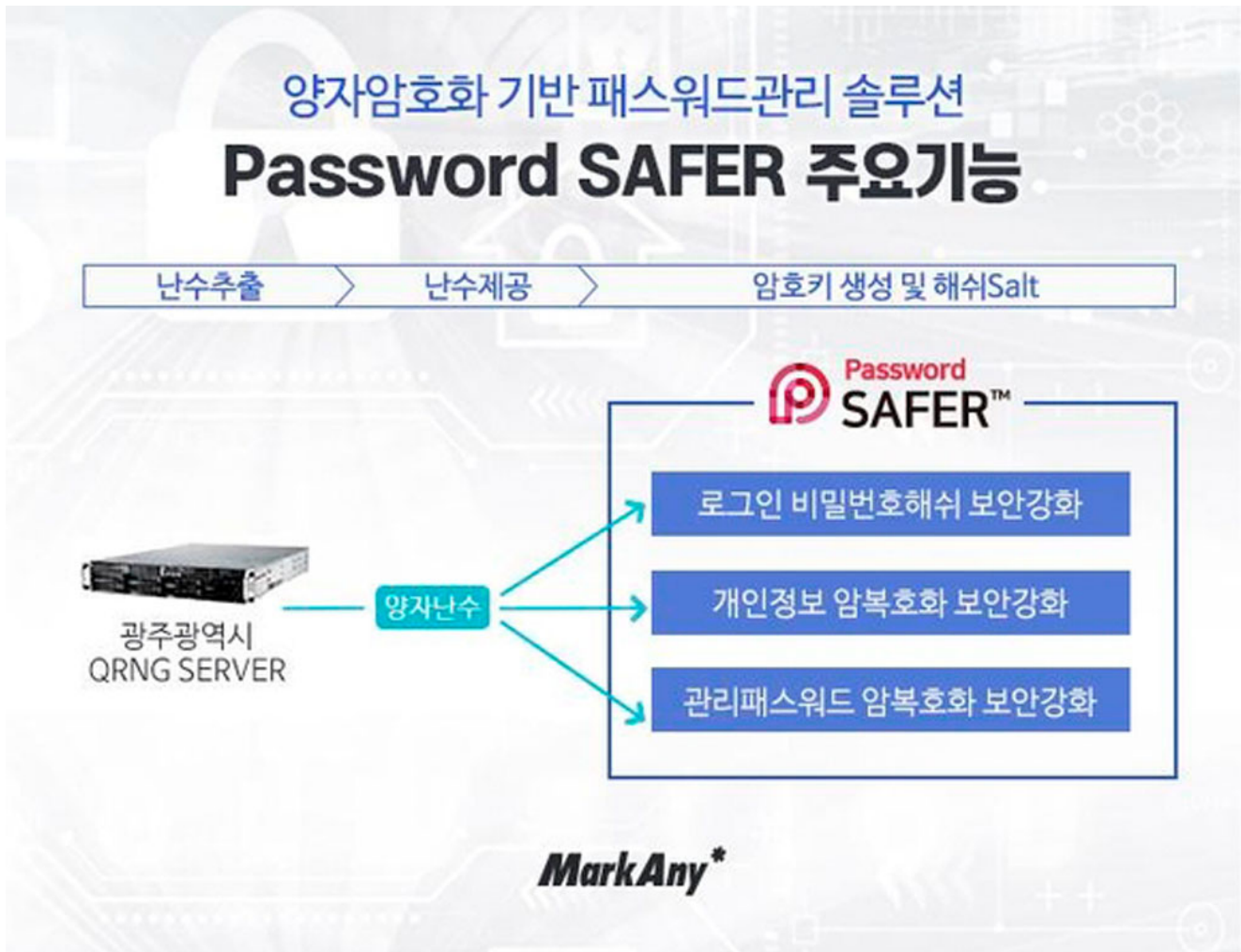
As the world enters the hyperconnected society according to the Fourth Industrial Revolution, the importance of converged security is also increasing. This is because ICT technology including AI, deep learning, big data, and IoT (Internet of Things) leading the Fourth Industrial Revolution is developing, and security problems are closely interconnected. As cyber security threats infiltrating IoT and cloud-type systems are widely diffused, technology development or innovation cannot be discussed without various

security problems such as negligence of data control and distribution of new malignant codes. Diverse problems such as phishing crimes, virtual currency, DDoS attack on vulnerable CPUs, online fraud, and personal information leak have emerged as tasks to resolve.

MarkAny plays a pivotal role in upgrading Korean security technology while constructing an integrated security solution that has combined security technology and system. Having focused on security solutions development including DRM (digital rights management), e-document forgery prevention, content copyright protection, CCTV security, and mobile security, MarkAny has been expanding its business areas in line with the rapidly changing technology trend such as block chain technology and AI-based selection and control since 2018.

Guided by its corporate vision of "There is no impossible technology, only difficult technologies," in the initial stages of its establishment, MarkAny developed DRM for document security for the first time in the world. It has built up robust technological capabilities through the first-ever commercialization of document forgery prevention. With all this, the company is developing new markets for safer nation and society including homomorphic encryption-based system, the only Hollywood technology-certified watermark in Asia, and its own AI-based CCTV selection and control technology. The Quantum Cryptography Communication Demonstration Infrastructure Operation project as part of the Digital New Deal project is based on its corporate vision. MarkAny participated in the project to lead security level improvement in the security industry as a case of construction using CCTV password security function fortification and new technology.

CCTV footage leak is connected to the invasion of citizens' privacy. To prevent this, the government is strengthening CCTV password regulations. However, a person in charge of thousands of CCTVs cannot manage all CCTVs' passwords as the number of CCTVs exceeds the thousands managed by each local government. Moreover, the risk of hacking is high. Bearing this in mind, MarkAny developed "Password SAFER for CCTV," a CCTV password encryption solution that applied random quantum number, and constructed it for Gwangju City. Through the solution, invasion of privacy and secrecy leak problems occurring due to CCTV hacking can be prevented in advance; thus contributing to safe society infrastructure construction. Companies are expected to attempt consolidated security solution development by developing a random quantum number technology and combining it with diverse areas such as document security and block chain.

No. 1 Security Solution Used by Korea's Major Public and Financial Institutions

Document rights management (DRM) is MarkAny's leading security solution that is currently used by approximately 600 public and financial institutions and manufacturing firms. The access rights can be controlled so that only authorized internal personnel can use all the files made internally such as documents, CAD, drawings, and source codes through automatic encryption. Through real-time monitoring of document use situations, prevention of capture, and history control of taking out documents, external leak of key data is fundamentally prevented. The e-document certificate forgery prevention technology is designed to prevent forgery of various documents and certificates including official documents, transcripts, and contracts issued online. The e-Page Safer applying the technology was developed by MarkAny for the first time in Korea in 2000. Currently, 85% of Korea's major public and financial institutions including the Ministry of Interior and Safety, Supreme Court, and Financial Supervisory Service are using the solution, which ranks No.1 in the Korean market in terms of market share.

As a technology tracking illegal duplication and diffusers by invisibly inserting copyright information, forensic watermarking can be used for various multimedia contents such as image, audio, and video. The technology has acquired certification from six Hollywood studios as the only company to do so in Korea.

An intelligent selection and control (Smart Eye) solution embedded with AI developed by MarkAny is a technology with which AI can detect specific incidents and accidents from CCTV videos in real time. A control center can check major events fast, and the relevant institution can quickly respond using the technology. MarkAny plans to launch New Smart Eye, which reinforced the technology. Network monitoring is supported by offering PTZ and GIS as basic provision including VMS function, as well as high-speed search function of accurate metadata.

Firmly Grows Tomorrow as a Data First Company

The winds of change have blown into the security market due to COVID-19. The spread of contactless culture has brought about a shift to quick business mode and has given rise to new technology development such as metaverse, AI, IoT, and My Data. However, rapidly increasing security threats exist on the hidden side of the contactless culture.

MarkAny is investing over 10% of its sales in R&D each year by reflecting the market situation and is applying for more than 10 patents annually. Its continuous R&D and knowledge accumulated over the long term have become assets for the company to grow as a leading company for over 20 years. MarkAny enjoys the biggest market share in the DRM, e-document forgery prevention, CCTV footage security, and watermark

fields. MarkAny won the new blockchain project as well as over 10 government projects. The AI-based CCTV selection and control solution has been constructed in 15 local governments since its launch. Thus, MarkAny is making significant achievements every year.

For the CCTV security solution, MarkAny is preparing to improve the company-developed AI-embedded selection and control solution. Through this, the company plans to construct an integrated CCTV safety security solution by which everyone can trust and live safely in hospitals, operation rooms, schools, and public transportation as well as streets and public places. As a leading firm in the security industry, MarkAny is determined to grow as a data first company providing significant insight and new values through data utilization beyond data security R&D that the company has focused on.

TIME LINE

1992. 02.

Established MarkAny, Inc.

2000. 09.

Selected as an excellent venture business

2001. 11.

Won the Presidential Prize in Korea Software Awards

2004. 10.

Excellent research center Awarded the Science and ICT Minister's Prize

2005. 02.

Won the Information and Communications SME Prize of the Year (Grand Prize)

2008. 02.

Won the Excellence Prize at the 7th Korea SW Enterprise Competitiveness Awards

2016. 05.

Won an ASOCIO (Asian-Oceanian Computing Industry Organization) Award

2016. 11.

Awarded the Science, ICT, and Future Planning Minister's Prize for MDM technology development

2018. 07.

Completed watermark technology certification for six Hollywood distributors for the first time in Asia (Disney, Sony, Universal, Fox, Paramount, Warner Brothers)

2020. 12.

Won the Prime Minister's prize at the New Software Product Awards (intelligent selection and control solution)

2021. 01.

Password management solution for CCTVs Quantum security technology applied to Password SAFER

2021. 05.

Ministry of Science and ICT Constructed and operated demonstration infrastructure for quantum cryptography communication

2021. 11.

Selected as the best practice of Digital New Deal of the Month by MIST