Journal of Engineering, Electrical and Informatics
Vol.2, No.2 June 2022
e-ISSN: 2809 - 8706; p-ISSN: 2810-0557, Page 72-90

MediVerse : Challenges And Development Of Digital Health Transformation Towards Metaverse in Medicine

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Abstract. *The development of telemedicine and telemedicine to digital health applications, the trend in cyberspace is the use of digitally virtualized social networks. Metaverse is based on the use of technology that enables multisensory interactions between virtual, digital objects and humans. Metaverse is supported by the use of Augmented Reality, Virtual Reality, Cloud Computing, Artificial Intelligence, Health Information Systems technology. This research aims to analyze, evaluate, and test the role of MediVerse in the challenges and development of the transformation of digital health services to the Metaverse in Medicine. This research used 624 informants in five regions of Indonesia with the highest Covid-19 cases, namely DKI Jakarta, West Java, Central Java, East Java and East Kalimantan in the period July 2021 to January 2022. The conclusions of this research are: (1) 624 respondents expressed that they are very satisfied with the current digital medical scenario and the need to implement Metaverse in medicine. This issue shows the potential benefits and importance of the application of Metaverse in Medicine in medical diagnosis, patient monitoring, healthcare training, surgery, medical therapy, and Theranostics. (2)The government is expected to support the progress and development of virtual digital systems in the Metaverse in Medicine in facing the challenges of the second stage of the Covid-19 pandemic, because it does not rule out the possibility that the Covid-19 outbreak will occur again in the next 3-4 years.*

Keywords: *Augmented Reality, Virtual Reality, Cloud Computing, Artificial Intelligence, Health Information Systems, Metaverse in Medicine*.

A. INTRODUCTION

The Covid-19 pandemic is the biggest disaster in the world, according to data from the Covid-19 Task Force (SATGAS) as of March 31, 2022, the total number of positive Covid-19 cases in Indonesia is 6.012.818, and as many residents have been declared cured of Covid-19 infections. 5.750.802. The spike in Covid-19 cases means that hospitals, hotels, and guesthouses that have been transformed into isolation rooms can no longer accommodate patients. One solution recommended by the government and the World Health Organization (WHO) is self-isolation. Every asymptomatic or mildly symptomatic Covid-19 patient is advised to self-isolate at their respective residences. Self-isolation is an action taken by people who have corona symptoms to prevent

Received April 30, 2022; Revised May 30, 2022; Accepted June 22, 2022
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transmission to other people.

Self-isolation requires someone who has a fever, cough or other symptoms of Covid-19 to stay at home, and not go to school or work. Even if you feel well, if you test positive for Covid-19 you will still need to self-isolate for at least 14 days or your test will show a negative result. Self-isolation does not mean not getting treatment. Covid-19 patients had to consult doctors remotely and several health workers came to self-isolation sites. Of course, if someone has to self-isolate due to exposure to corona, they must report to the Covid-19 Task Force or the nearest community health center.

Indonesia's success in controlling the Covid-19 pandemic shows Indonesia's ability to turn serious challenges into opportunities for progress. Indonesia is also very careful in issuing policies to control the Covid-19 pandemic and at the same time restore the community's economy. Indonesia with more than 17,000 islands, has succeeded in injecting the public with 411.5 million doses of vaccine. This has led to a sharp reduction in daily Covid-19 cases and economic growth holding up well. With a population of 270 million people spread across tens of thousands of islands, Indonesia only has 2,900 general and specialist hospitals, most of which are in urban areas. The limited number of medical personnel to serve public health, and the unequal distribution of medical personnel in remote areas of Indonesia, is a challenge faced by health services in Indonesia, namely inequality in health service access.

The gap between this study and the phenomenon of the Covid-19 pandemic is that health infrastructure is limited, especially in rural areas, which is a challenge in itself. Not only is it difficult to find workers who can be placed in sanitation facilities, the cost of building sanitation facilities is also not small. Then, the emergence of digital technology reduces the problem of information asymmetry in medical services. For patients, digital technology maximizes information about physical conditions and health service options to encourage patient participation in maintaining health (self-care skills).

Advances in digital technology cannot only increase the efficiency of health services, but also help service providers allocate resources according to needs. The presence of health technology can open access to health, improve health outcomes, create more personalized services that are community-centered, and have the potential to reduce health costs. The important role of 4G services has opened the door to the emergence of video services (telemedicine, distance education, online working at home, etc.), from YouTube to Zoom, so the presence of 5G is expected to have a major transformation in

health services.

Real-time communication between patients and doctors, more efficient telemedicine, remote surgery, and medication delivery are all forms of 5G technology being applied to healthcare. Better communication between doctors and patients can result in more efficient care and better health outcomes, which in turn can reduce the time needed to stay in the hospital. Digital health is divided into five major clusters, namely telemedicine (monitoring, prevention, treatment), assisted living (sensors/robotics), mHealth, e-prescribing, data-driven (predictive, automated) and electronic health records. The Covid-19 pandemic and Indonesia's success in dealing with Covid-19 are phenomena raised in this research, as well as several problems and challenges which are gaps raised in this research. This study aims to analyze, evaluate and test the role of MediVerse in the challenges and developments of transforming digital health services into Metaverse Health using telemedicine and telemedicine.

B. LITERATURE

1. Technology Acceptance Model

The Technology Acceptance Model (TAM) is an individual's attitude towards understanding the acceptance of information technology during the Covid-19 pandemic, and determines whether they use it or not. The attitudes of respondents in this study are determined by several components, namely, Perceived Usefulness, Perceived Ease of Use, Intention to Use, Actual Use, User Satisfaction, Social Facilitation, Trust in Technology, Ease of Learning, Compatibility, Ease of Access, Prior Experience, and Perceived Uncertainty. As new vaccines and drugs are developed, some institutions and countries are focusing their knowledge on the latest treatments and discoveries to combat Covid-19. Digital health is a new step for everyone to provide input, submit a protest, or simply give an opinion on the pandemic, because almost everyone is staying at home and maintaining social distance.

In the era of industrial revolution 4.0, health workers are required to be more familiar with digital health technology, which is divided into five parts, namely Telehealth (monitoring, prevention, treatment), Assisted living (sensors/robots), Mobile health, e-prescription, Data-driven (prediction, automation), and Electronic health records. In this era of digitalization, we only need to use the online doctor application from our smartphone and can chat via the online doctor application to get consultations on disease symptoms. Just by relying on a smartphone, we can immediately consult a

doctor online. The following are several types of online doctor applications, namely Halodoc,YesDok, KlikDokter, Alodokter, Go-Dok, SehatPedia, PakDok, SehatQ, ProSehat, Pulse, SehatQ, ApaSakitKu (ASK), Lokadok, Practo, and Dokter Diabetes.

2. MediVerse (The Medicine Metaverse)

MetaVerse is a merger of metaverse technology with medical technology to develop innovative digital solutions that can be used in healthcare. Metaverse is an internet-based 3D virtual world that enables social and economic interactions in an immersive virtual environment. With Metaverse, patients can more easily access health services without geographic restrictions, virtual health and wellness, and only connect with people who have the same complaints. Mental treatment or some kind of counseling is also possible in the metaverse, no matter how far the patient is from the doctor. Doctors and patients can communicate through virtual spaces to simulate real-world situations. The Covid-19 pandemic requires everyone to adapt more quickly to technology to survive. This is why many innovations are useful in replacing direct interactive activities. Metaverse is the universe in digital form. Some of the technologies used in implementing health service technology are Telemedicine and Telehealth Applications, Health Information Systems, Augmented Reality (AR) and Virtual Reality (VR), Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning, and Cloud Computing.

3. Health Information System

A health information system (HIS) is a technology system design used to digitally collect, store, manage, and retrieve patient health information. HIS can provide many benefits, namely increasing the efficiency and accuracy of health data processing, improving coordination between health professionals, and improving the quality of health services. HIS can increase the availability of patient health information to be accessed online and centrally, making it easier for health professionals to make clinical decisions. A health information system consists of several components, namely, HIS database, HIS application, HIS network, HIS hardware, HIS data security, and training and support for health professionals.

Development of health technology and increasing public understanding and awareness of health technology to improve accessibility and quality of health services for the community. Health Service Technology is a set of arrangements consisting of data, information, indicators, procedures, devices, technology and human resources that direct

actions or decisions in supporting the development of health services. Health Service Technology is a health data processing technology that contains value and meaning to increase knowledge in supporting health development and decision making in the management of health services and health systems.

4. Telehealth

Telehealth is the use of information technology to provide health services to the public, where service providers or service recipients can provide information from a distance or near. Telemedicine allows service providers and recipients to use live video, send voice and messages remotely using certain platforms. Telehealth refers to the delivery of services that use information and communications technologies such as telephone, video conferencing, electronic messaging, or digital monitoring to improve health care. With the improvement of the internet and infrastructure, video conferencing in particular has gained ground to increase the prominence of telehealth delivery in Health care. Telehealth is a solution for patients who cannot reach health services directly or can be reached by patients who live far from health services. Some examples of telehealth practices are video conferencing, store-and-forward, remote patient monitoring (RPM), and mHealth. Telehealth is an alternative service delivery mode that allows people living in rural and remote areas to access health care.

5. Telemedicine

Telemedicine is a service limited to clinical care and direct consultation with doctors. Telemedicine services provide medical practice using long-distance telecommunication's technology. Telemedicine is multifaceted as interpreted by people based on how it is used and the combination of technologies and applications used. Telemedicine is used for electronic processing, storage and exchange of information. In this study, telemedicine is defined as remote clinical services by doctors to patients in Telemedicine. Telemedicine practices can be divided into two different categories namely real time and store-and-forward. Realtime telemedicine involves synchronous interaction between the parties concerned. For example, healthcare professionals and patients might interact by video conferencing.

6. Virtual Reality (VR)

Virtual Reality Medicine is a concept that combines Virtual Reality with the

world of medicine and health. This issue is a concept where Virtual Reality is used to create a virtual medical environment that functions as a metaverse, that is, an integrated digital world that can be accessed by many people at once. Virtual Reality is used to improve treatment, medical education, diagnosis, and patient experience. Medicine in Virtual Reality refers to the application of Virtual Reality technology in the context of medicine and health. This issue can cover a wide range of applications, from medical education and training to rehabilitation therapy and medication. In the context of the Metaverse, Medicine applications in Virtual Reality can be accessed and integrated with virtual environments. Users can enter Virtual Reality environments designed for medical training or consultations with doctors and health professionals in a virtual room format. Metaverse with Virtual Reality is an exciting area for further exploration in improving healthcare and medical education. Some forms of application of Virtual Reality (VR) in MediVerse are Medical Education and Training, Virtual Therapy, Surgical Simulation, Remote Consultation, Pain Management, Psychotherapy Training, Medical Research and Drug Development, Better Patient Experience, Patient Education, and Diagnosis and Medical Visualization.

7. Augmented Reality (AR)

Augmented Reality (AR) is a technology that allows users to see the physical world around them with the addition of digital or virtual elements by using devices such as smartphones, AR glasses, or special headsets. AR can expand real-world experiences by adding digital information, objects, or interactions into a user's view. MediVerse is a concept that integrates Augmented Reality technology with the medical world in a metaverse context. This item includes various AR applications in the field of health and medical care that can help users, health professionals and the health system as a whole. Metaverse has the potential to encompass a wide variety of experiences, including social communications, entertainment, shopping, education, and more. Several forms of Augmented Reality that can be implemented in MediVerse are Medical Education and Training, Virtual Surgical Simulation, Diagnosis and Treatment, Rehabilitation and Therapy, Remote Consultation Services, Health Data Management, and Medical Research.

8. Artificial Intelligence (AI)

Artificial Intelligence in the context of MediVerse refers to the application of

artificial intelligence technology in the world of health which is connected to the metaverse or a vast and connected virtual world. Metaverse is a concept where people can interact in a digital environment integrated with real and virtual world elements. Artificial Intelligence refers to the ability of computers to execute tasks that normally require human intelligence, namely, machine learning, natural language processing, computer vision, and so on. AI memainkan peran besar dalam mengembangkan dan mengimplementasikan aplikasi metaverse. Kecerdasan edge diimplementasikan untuk infrastruktur edge dan tingkat aplikasi. Infrastruktur edge menggunakan AI secara efisien untuk optimalisasi sumber daya dan proses dalam fungsi utama seperti komunikasi, komputasi, jaringan, dan penyimpanan

Figure 1. AI Standardisation for MediVerse

In MediVerse, AI is used to analyze health data and provide smarter medical solutions. Implementing MediVerse using AI requires strict ethical and regulatory considerations to ensure that patients continue to receive quality medical services and optimal data security. Some of the applications of AI in MediVerse are Automated Diagnosis, Navigation Systems and Virtual Assistants, Virtual Therapy and Rehabillitation, Patient Monitoring and Prediction, Patient Education and Counseling, Medical Simulation and Training, Drug Research and Development, and Data Security and Privacy.

9. Cloud Computing

Medicine in the Metaverse refers to the application of Cloud Computing technology and the Metaverse concept in the context of health and medical services, namely providing remote health services via a virtual platform in the Metaverse, allowing doctors and patients to interact online. The use of cloud computing in MediVerse will

enable the rapid access and scalability required to support a variety of health applications in the virtual world, namely Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Uses Metaverse technology to provide medical simulation and training for healthcare professionals. Enables researchers and health professionals from around the world to collaborate in the Metaverse environment to develop medical research and new therapies, providing health information, education and support through virtual platforms in the Metaverse.

C. RESEARCH METHOD

The concept and method of this study is to design a health service system integrated into the health service center, which is the medical Metaverse or MediVerse for short. This research used 624 informants who were directly related to Covid-19, researchers conducted observations, interviews, and documentation to collect field data in the period July 2021 to January 2022, with research locations namely DKI Jakarta, West Java, Central Java, East Java and East Kalimantan.

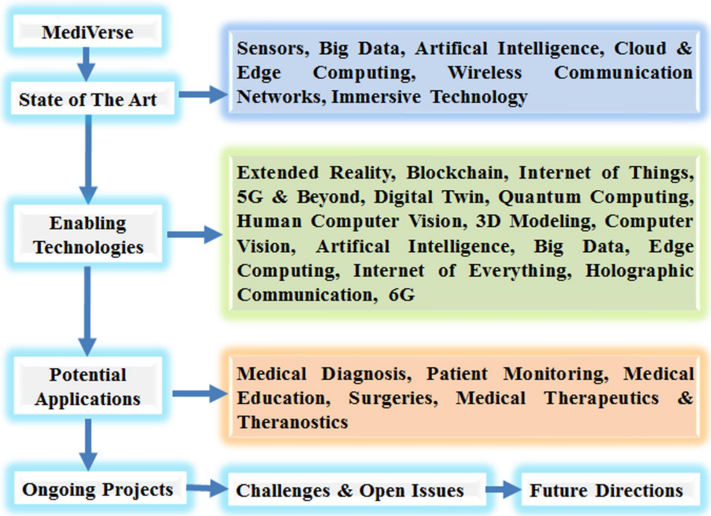

Figure 2. Outline of the work for MediVerse

The researchers searched for information about existing healthcare delivery systems and designed the MediVerse concept by integrating multiple digital healthcare applications, as shown in Figure 1.

D. RESULTS & DISCUSSION

1. Demographic Characteristics of The Study Population

From the results of the frequency analysis of the questionnaire, the researcher obtained the data processing results in the form of the percentage of responses of the 624 respondents regarding the demographic characteristics of the study population.

1. In terms of gender, 59.62% of the respondents were men and 40.38% were women.
2. Research locality, 22.76% of respondents live in DKI Jakarta, 20.03% of respondents live in West Java, 18.59% of respondents live in Central Java, 20.83% of respondents live in East Java, and 17.79% the respondent lives in East Kalimantan.
3. Respondents in group A were confirmed Covid-19 patients (if conditions are not possible, the patient can be helped by their family) amounting to 62.18%, Respondents in group B were medical officers, doctors and nurses amounting to 17.79%, Respondents in group C were pharmacists and laboratory workers at 10.58%, and respondents in group D were delivery courier services, GoRide and Grab Ride at 9.46%.

2. Perception of Access to Online Health Services

The perceptions of 624 respondents are the most important input information for the success of socializing the Online Health Service system, because they measure the level of satisfaction with the success of a system. Frequency analysis uses datum processing from the Likert scale results submitted by respondents.

1. Analysis of data from questionnaires given to respondents about the ease of online health services. Analysis of data obtained from the questionnaire showed that 96.79% of respondents were satisfied with the convenience of online health services, 1.76% were quite satisfied, and 7% were dissatisfied.
2. Analysis of data from questionnaires given to respondents involved with Digital Health. Analysis of data obtained from the questionnaire shows that 33.81% of respondents know the application and have used the Digital Health application, 57.53% of respondents know the application but have never used the Digital Health application, and 8.65% of respondents do not learn about digital health applications.
3. Data analysis from the questionnaire given to respondents includes the convenience of TeleHealth. Analysis of data obtained from the questionnaire showed that 81.89% of respondents were satisfied with the convenience of

TeleHealth services, 11.70% were quite satisfied, and 6.41% were dissatisfied.

4. Analysis of data from questionnaires given to respondents to the convenience of Telemedicine. Analysis of the questionnaire data showed that 87.18% of the respondents were satisfied with the convenience of telemedicine services, 7.85% were somewhat satisfied, and 4.97% were dissatisfied.
5. analysis of survey data from respondents involved in recommending telemedicine, telemedicine, and digital health. Analysis of questionnaire data shows that 81.89% of respondents would recommend to others, 8.49% would not recommend to others, and 9.62% would not recommend to others.

3. Metaverse in Medicine Analysis

Metaverse that supports 3D modeling in the Healthcare industry with interactive anatomical representation from high-quality imaging. Patients can view medical aid products in 3D before they purchase appropriate medical equipment. Metaverse's 3D modeling capabilities can help doctors obtain more complete information about a patient's disease. 3D modeling metaverse can help doctors provide better care to patients and carry out treatment more precisely. Metaverse's 3D modeling capabilities enable medical researchers to create artificial organs and evaluate their performance in a variety of simulated environments. The following is an analysis of data from the questionnaire given to respondents whether they know about Metaverse.

1. Analysis of the questionnaire data shows that 65.38% of the respondents understand Metaverse, and 34.62% of the respondents do not understand Metaverse.
2. Analysis of data from questionnaires given to respondents who know about Metaverse with professional work and educational backgrounds. Analysis of the questionnaire data shows that 27.21% of people work as doctors and nurses, and 16.18% work as pharmacists and laboratory workers. 35.05% of confirmed Covid-19 patients have undergraduate educational backgrounds, and 21.57% confirmed Covid-19 patients with a master's educational background.
3. Analyze whether the data provided to respondents in the questionnaire contributes to the development of the medical metaverse.

4. Approaches to Digital Health Transformation

Metaverse combines virtual reality into a digital domain and a specific, physical

reality created with many advanced features and supports. To access the metaverse, users must have an augmented reality/virtual reality (AR/VR) device, smart glasses, game console, haptic device, mobile device, computer, or laptop. An extended reality (XR) approach with a combination of AR and VR technology has better potential in improving user experience in the metaverse. Metaverse with edge computing capabilities can maximize transfer speeds while also storing limited amounts of data. In Metaverse, edge computing brings data processing, analytics, and storage closer to the source of data generation. This technique can help healthcare applications in the Metaverse to optimize data collection, storage, and analysis by leveraging edge computing capabilities. Metaverse technologies include artificial intelligence (AI), blockchain, computer vision, advanced networking technologies, user interactivity, XR, the internet of things (IoT), and robotics. The vendor or sole owner of metaverse access is considered a collaborative space between service providers and users. Wearable devices such as trackers and smartwatches will be able to efficiently transfer data and provide doctors with up-to-date status on important patient vital data such as heart rate and blood pressure, thereby alerting medical professionals to potential problems before they arise.

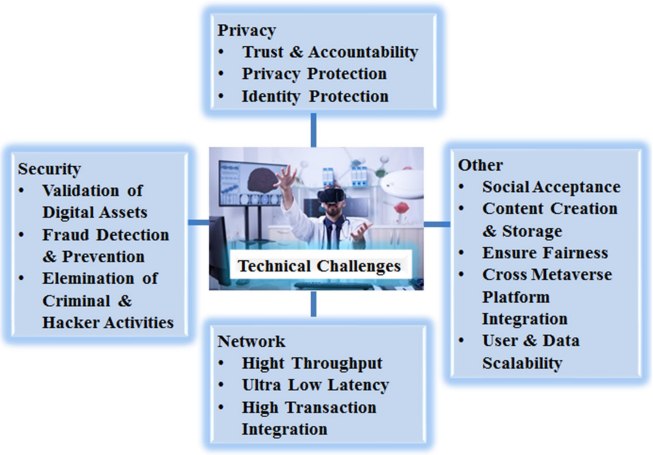

Figure 3. Technical Requirements For MediVerse Realization

A metaverse that supports quantum computing will make it possible to overcome major challenges related to security, large computing capacities and cyber attacks. In this case, doctors, epidemiologists, pharmacists, nurses, ministries, hospitals, device suppliers and all interested organizations reduce the spread of the pandemic by adopting digital technology. Through the development of quantum-based security applications, quantum

computing will provide the security the Metaverse needs. As the Metaverse evolves, all activities and transactions in the healthcare sector will require quantum-resistant security. The immense computing capabilities of the Metaverse supporting quantum computing will increase the efficiency of healthcare applications. Healthcare applications in the Metaverse make extensive use of computing and simulation.

5. Building a Virtual Reality Platform and Partnerships in The Metaverse in Medicine

The future of healthcare lies not in treatment, but disease prevention. The Metaverse has the potential for virtual analysis that is faster and more accurate than humans or any other technology. 5G technology and other technologies will bring the Metaverse closer to realizing its true potential. For multimedia content creation using immersive technologies such as AR, VR, and IoT, Metaverse requires the low latency and high bandwidth connectivity provided by 5G technology and beyond. Big data is a key technology in the Metaverse, which is developing rapidly and gaining rapid momentum with the intervention of the Metaverse itself. Driven by the rapid development of digital technology and the Covid-19 pandemic, new technologies are emerging and being initiated by many large technology companies. Based on the results of the analysis and previous research results, the development of this metaverse medical technology system platform is connected to several partnerships. Metaverse includes data in structured, semi-structured, and unstructured formats, which are difficult to handle using traditional data analysis tools. A digital twin is a digital representation of an object, process, or service that exists in the real world. A digital twin can be a digital copy of a physical object, such as a machine, medical equipment, or even a larger object, such as a skyscraper or even an entire city.

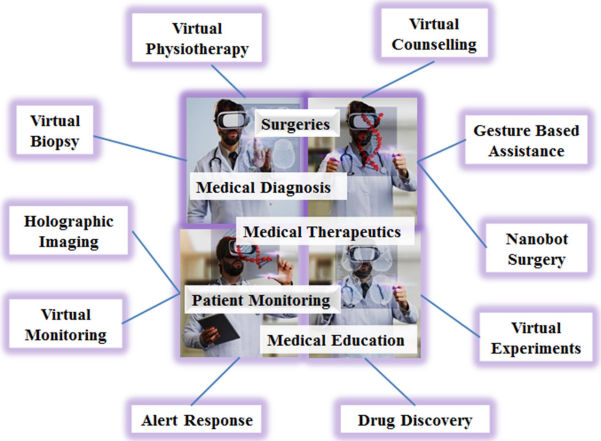

Figure 4. Potential Application of The Metaverse in Medicine

Metaverse-based medical applications can be provided more efficiently without having to locate patients in specific locations. This issue allows consultations without having to travel, and regular examinations can be carried out quickly, thereby eliminating geographical barriers. Visual interactions in the Metaverse will be carried out by HCI technology called wearable consumer head-mounted displays (HMDs). This HMD will play an important role in communication between users and the surrounding environment in the Metaverse. This HCI device will actuate the user's senses in the Metaverse. Another HCI technology called haptic wearable devices will provide users with touch, smell, and taste experiences in the Metaverse. Approaches such as holographic construction, holographic emulation, and virtual reality integration can be used in the metaverse for telemedicine purposes. These metaverse medical applications can also be extended to the level of remote surgery. This app is very important in pandemic situations like Covid-19, where remote isolation centers can be equipped with necessary remote and wearable measuring devices and patients can be consulted through the Metaverse app.

6. Virtual in the Future of Metaverse Medicine

Metaverse is an important milestone in the field of medical education. IoT, blockchain, AI, AR and VR are the pioneers of the Metaverse in the field of medical education. The contribution of AI, blockchain and Metaverse in medical healthcare is presented in, where unique identifying tags in blockchain help identify data in blockchain-based Metaverse. Metaverse uses AI and blockchain to create a digital virtual world that goes beyond the boundaries of the real world. Medical diagnosis is the process of determining a patient's medical condition based on their symptoms. The adoption of Metaverse in healthcare significantly helps in the efficient diagnosis of patients' medical conditions with the help of various advanced technologies such as AR, VR, extended digital twin, blockchain, 5G, and so on. This technology provides space for medical students even in their busy clinical environment to focus on sessions, participate in discussions, interact in detail, and engage with more fun.

Metaverse is becoming an important technology in the medical industry, especially in the field of surgery. Surgeons today use tools ranging from VR headsets to haptic gloves to mimic real surgical procedures to improve readiness and efficiency in the

Journal of Engineering, Electrical and Informatics
Vol.2, No.2 June 2022
e-ISSN: 2809 - 8706; p-ISSN: 2810-0557, Page 72-90

operating room. AR can help surgeons perform operations more conveniently by giving them hassle-free data access. AR can give surgeons quick, easy, and hands-free access to patient information by mapping a 3D virtual model onto the patient's body. Lecturers and professors can teach complex operations in three dimensions in the Metaverse. Even more than that, Metaverse can be used to provide counseling services to post-operative patients.

Metaverse is based on the use of technology that enables multisensory interactions between virtual, digital objects and humans. Metaverse is supported by the use of augmented reality (AR) and virtual reality (VR) technology. The use of virtual reality can be used for several activities such as seminars, expos, teaching and learning, and other activities by digitizing the use of the internet. Seminary and expo activities are very popular nowadays because with easy access, a lot of knowledge can be obtained by relying on existing smartphones and the internet. The development of the metaverse in the world of health is the use of telemedicine or long-distance medicine, which is now widely used by the public. Apart from being easy to access, telemedicine treatment is also very helpful in emergencies without having to come to a clinic or hospital.

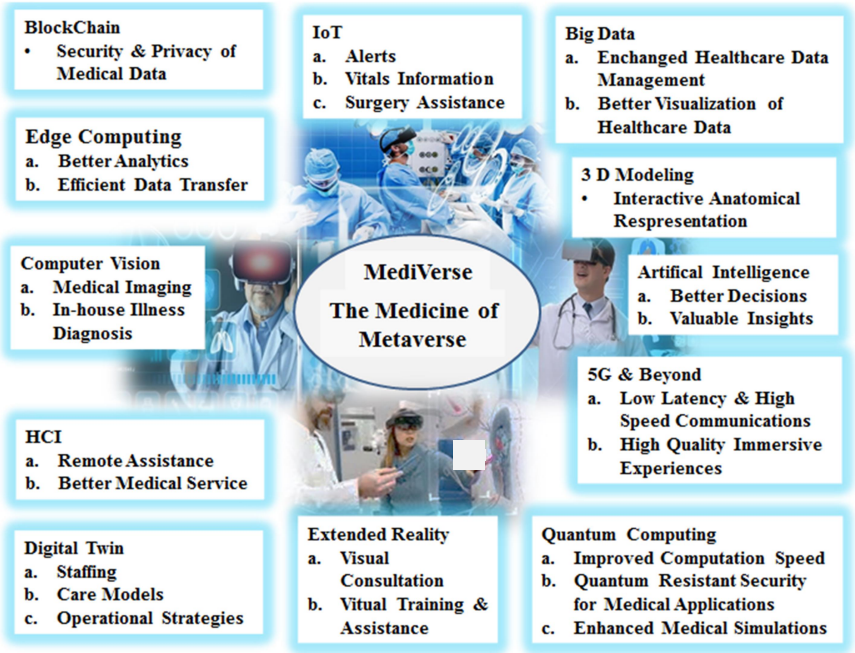

Figure 5. Enabling Technologies of the Medicine Metaverse

Interoperability is key to driving the creation of a well-established digital health

ecosystem. An interoperability mechanism is where a health system can connect (communicate) with other health systems so that the data owner (patient) can access and transfer data from one data controller (such as a hospital) to another. Metaverse's intervention in therapeutics and theranostics can bring important changes in the field of medicine with digital therapeutics to avoid the use of drugs in treating patients. Computer Vision is a technology that can process, analyze, visualize and interpret images and videos. Metaverse is the future of medicine that can take telemedicine to the next level by integrating technologies such as AR, VR, XR, blockchain, AI, and computer vision. A digital twin of a patient can be created using existing electronic health records (EHR), with the help of which 3D simulations can be obtained. The virtual system connects health data with hospitals, insurance, pharmacies, clinics, laboratories and health centers, so that health monitoring becomes easier. A patient can easily move his health records from one place to another. This can certainly increase the efficiency of health services.

The results of this research provide ideas and concepts for building an integrated system that combines several connected virtual ports. The convergence of telepresence, digital twinning, and blockchain provides benefits for patient monitoring from the Metaverse in healthcare. Telepresence in medicine provides telemedicine services. Patient dummies' tests can be used to determine the response before surgery or administering medication to the patient. Medical data is the most sensitive and important thing, the use of blockchain technology helps in storing and transferring it safely so that the data will not be damaged and does not pose a risk. Several virtual parts of the Future Metaverse Medicine concept in the world of health, namely remote medicine, medicine, nursing, pharmacy, laboratories and education, can be carried out by utilizing the sophistication of internet technology in its application.

E. CONCLUSIONS AND SUGGESTIONS

1. Conclusion

1. 624 respondents said they were very satisfied with the current digital healthcare scene and the need for implementing Metaverse for healthcare. Metaverse has potential applications in medical diagnostics, patient monitoring, medical training, surgery, pharmacotherapy, and theranostics. Indonesia's success in controlling the Covid-19 pandemic shows that challenges and problems are open in realizing the

full potential of the future metaverse, which enables the application of Metaverse in health services.

2. Government policies have a positive and significant impact on the development of digital health and reducing the number of daily COVID-19 cases. Development of health service technology, namely MediVerse, which utilizes virtual reality and augmented reality technology for more innovative and interactive health services. The advancement and development of virtual digital systems in MediVerse is supported by the readiness of Internet networks, health apps, smartphones, and communities to adapt to technological advances.

2. Suggestion

1. Health workers and health practitioners are expected to involve the community in an active role as digitalization subjects in the dimensions of capabilities and health promotion.
2. The government is expected to strengthen the monitoring and regulation system for digital health technology services, develop digital health literacy, and set up partnerships with related parties. This is necessary to face the challenges of the second phase of the Covid-19 epidemic, as the possibility of another outbreak of Covid-19 in the next 3-4 years cannot be ruled out.

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