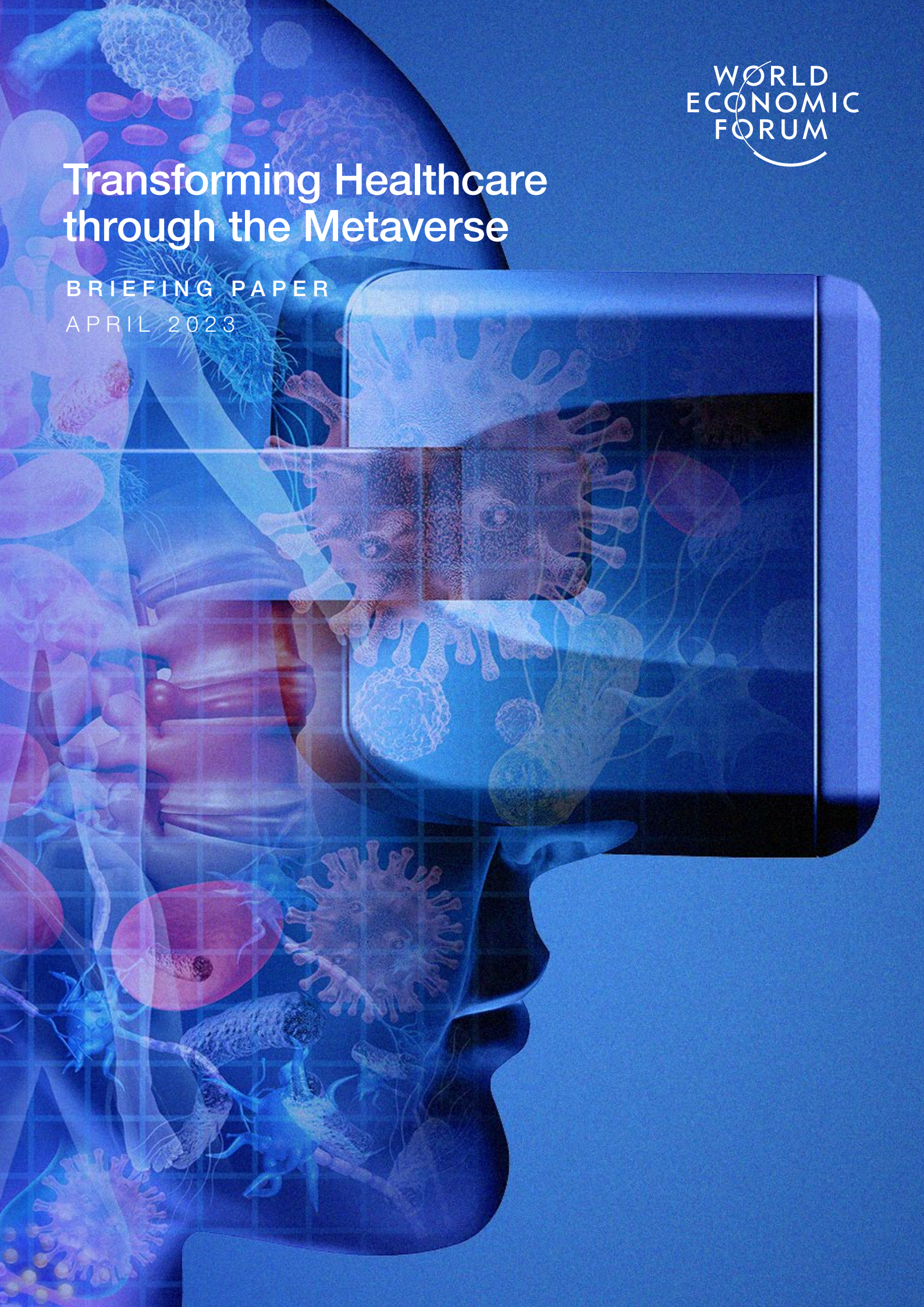


Transforming Healthcare through the Metaverse

BRIEFING PAPER

APRIL 2023



Contents

1 Introduction: Why healthcare through the metaverse?	3
2 How healthcare through the metaverse will change our lives	4
3 What are the challenges?	5
4 Conclusion: What is required in the metaverse for healthcare well-being	6
Acknowledgements	7
Endnotes	8

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Introduction: Why healthcare through the metaverse?

In recent years, with advances in technology and devices, terms such as Web3 and the metaverse have attracted much attention. Although definitions are not always clear, it is believed that the Fourth Industrial Revolution will lead to the fusion of the real and virtual worlds. In Japan, such a future has been described as Society 5.0¹, and it is expected to bring about a range of benefits, primarily through big data analysis by artificial intelligence. The benefits have been described as lifestyle support, health promotion, optimal treatment, and burden reduction.”

The metaverse has been attracting a great deal of attention around the world, as symbolized by Facebook’s name change to Meta. The World Economic Forum launched the Defining and Building the Metaverse Initiative² at its Annual Meeting 2022 in Davos and various initiatives are also under way³.

While there are various definitions of the metaverse, we believe that as an evolutionary system of the internet, the metaverse is not simply limited to virtual space but constitutes an emerging world that is in continuity with the real world. Accenture defines virtual space using 3D and VR as a metaverse in the narrow sense of the term

(metaverse as an expanding continuum), which will bring about changes in business and society. That is, various transformations are expected to occur through (1) the connection of technologies, (2) the connection of values (virtual and real), and (3) the connection of trust (between participating companies and customers, etc.).

However, there are several challenges in these changes that require rule-making. For example:

1. The connection of technologies: Build an open, interoperable and sustainable metaverse
2. The connection of values: Introduce NFT (Non-Fungible Token) as a means of creating, trading and monetizing virtual assets within metaverse
3. The connection of trust: Ensure virtual privacy, safety and cyber security

The impact of these major transformations also extends to healthcare. In particular, the creation of non-contact virtual places, known as the “internet of place”, has been attracting attention from the perspective of infectious disease control since the COVID-19 pandemic.

2

How healthcare through the metaverse will change our lives

Several proposals have been made regarding the use of the metaverse (or Web3 utilization) in healthcare. DeHealth, for example, has proposed a new healthcare data ecosystem⁴, and Juntendo University has started a joint research project with IBM to build medical services using the metaverse⁵.

While it is possible to organize examples of utilization in terms of what kind of technology to focus on (XR, virtual currency, digital twin, etc.), they can also be organized as follows, depending on their purpose:

Realization of value for the patient

It is possible to conduct telemedicine using VR and to provide a hybrid “phygital” place for therapeutic intervention as an alternative to a real hospital. In particular, such spaces are expected to be useful for dementia and mental healthcare. Moreover, as the accuracy of the “digital twin” improves, it can also be used for early detection and prevention. In addition to healthcare, it is also expected to be used to improve well-being. A person with a disability that is untreatable in the real world, for example, may be able to operate in the virtual world as if they did not have the disability.

Create a place for information provision

Virtual hospitals can be used to provide information before the patient visits a real hospital. Medical institutions and companies will be able to provide information efficiently on the use of medicines and other precautions in daily life. Instead of one-way provision of information, the metaverse will serve as a place for democratization of information, as expressed in the term “internet of ownership”, where virtual patient associations can be formed and information can be shared.

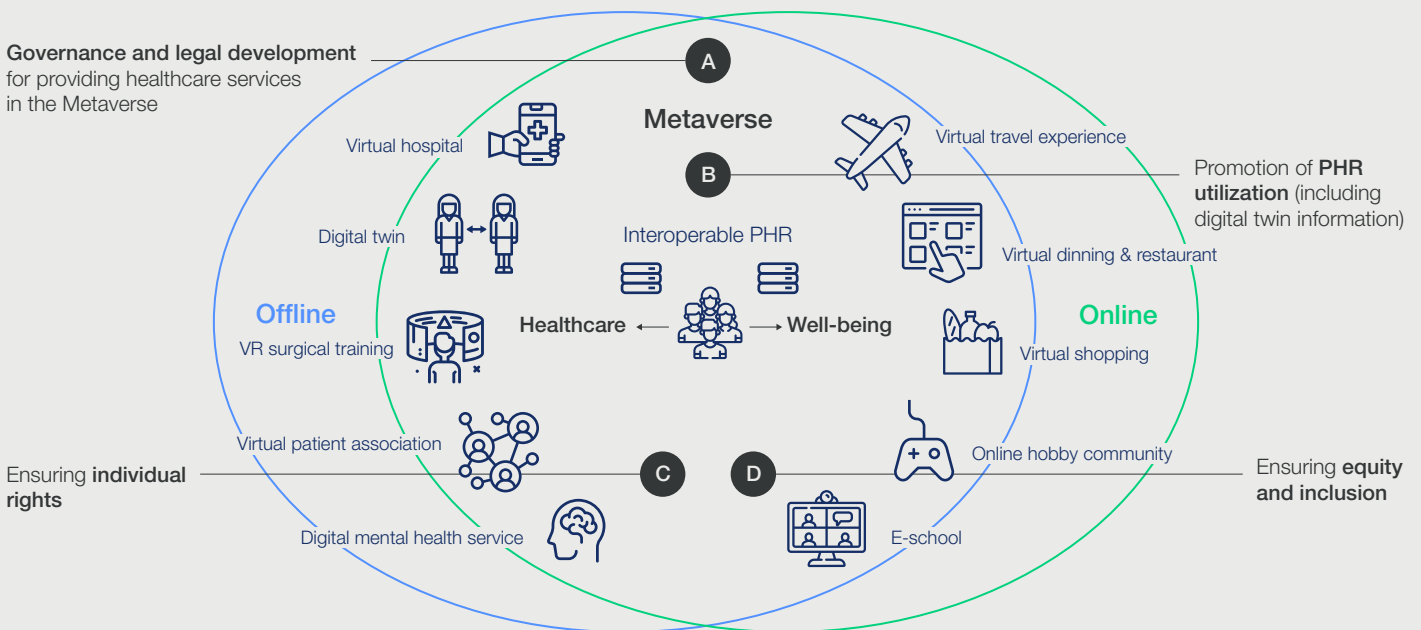
Utilization for innovation

The metaverse can also be used as a place for clinical research for the development of pharmaceuticals and medical devices. It will also be possible to conduct experiments on the metaverse, making it a living lab for the improvement of prototypes.

Education

There is great potential for use in education, such as training using XR for surgical and other procedures, and simulations of patient interviews.

Sustainable & seamless Metaverse



What are the challenges?

Issues related to the utilization of the metaverse in healthcare can be summarized in the following four categories.

- Governance and legal development for providing healthcare services in the metaverse
- Promotion of personal health records (PHR) utilization (including digital twin information)
- Ensuring individual rights
- Ensuring equity and inclusion

Although issues not limited to healthcare are also important as prerequisites for realizing the metaverse in general, the following is an introduction to issues from the perspective of healthcare:

Governance and legal development for providing healthcare services in the metaverse

In recent years, especially since the COVID-19 pandemic, the implementation of online medical services has expanded around the world. The governance and legal issues related to the realization of value for the individual, particularly with regard to the provision of services in the healthcare metaverse, are generally the same as those related to online medical care.

A particularly important legal issue is to sort out the relationship between extraterritoriality and the application of local laws in the provision of healthcare services across countries. In addition, as a prerequisite, it is necessary to determine whether the healthcare laws of each country (in Japan, the Medical Practitioners Act, Medical Service Act, Pharmaceutical Affairs Act, etc.) can be read as corresponding to the metaverse.

In the case of providing services related to medical consultation/recommendation and well-being, rather than medical practice, the rules related to such services (especially laws for quality control) are important. Also, competition laws (unfair competition prevention laws, anti-monopoly laws, etc.), intellectual property laws, laws on personal data and privacy, and civil laws on contracts, etc. are required.

Furthermore, while national constitutions and the Universal Declaration of Human Rights call for the provision of services for health and welfare, a certain level of consensus will also be required regarding the provision of services in the metaverse.

Promotion of personal health records (PHR) utilization (including digital twin information)

In addition to the issues in governance and legal development, which are in line with real medical

interventions, there are issues associated with sharing digital data. These issues are not unique to the metaverse but are almost identical to those related to the use of PHRs, which have been discussed in the past. In Japan, a public-private consortium has been established to promote the use of PHRs and guidelines have been prepared⁶, but the use of PHRs has not been sufficiently promoted. Therefore, the World Economic Forum Japan Centre for the Fourth Industrial Revolution, in collaboration with PHR-related organizations in Japan⁷, has developed a toolkit for PHR and data utilization in local government⁸.

As this is an area where there are still few successful examples internationally, we should be able to share good practices and promote the use of PHRs not only for healthcare in the narrow sense but also for improving well-being. To this end, interoperability among PHRs should be ensured together with interoperability assurance of the metaverse.

Ensuring individual rights

An important principle in bio/medical ethics is personal autonomy and no harm to the individual. The human rights of each individual must be ensured and “security of the person”⁹ in the metaverse must be provided. This requires the same traditional demands for privacy and security, ethical demands for artificial intelligence, etc. For example, discussions on data sovereignty and mechanisms to appropriately reflect the will of individuals (e.g., management of consent) must be incorporated, and issues specific to healthcare through the metaverse will require consideration of the nature of identity, including virtual identity, and the realization of a world view that removes disease-related stigma.

Ensuring equity and inclusion

Finally, it is important to ensure inclusion, equality and fairness so everyone can be users, including the reduction of the “digital divide”. Goal 3 of the UN Sustainable Development Goals calls for achieving universal health coverage, thus improving the health and well-being of everyone through the metaverse could be an important theme. It is not always possible, however, for all human beings such as the elderly and people with disabilities, to use the metaverse equally.

The lack of availability from an economic standpoint can also be problematic for healthcare services. It is desirable for the system to be accessible even to refugees and immigrants, without being unavailable in different countries. In such a case, it is necessary to carefully discuss who should be in charge of management (i.e., who will manage IDs and other information). This is an important issue not limited to healthcare and the metaverse.

4

Conclusion: What is required in the metaverse for healthcare well-being

In aiming for a sustainable and seamless metaverse economy, in addition to solving the above issues, it is also necessary to design reward incentives to engage patients and healthcare professionals, and to build an ecosystem where creators can share and monetize their own cyber and physical contents to support healthcare services in the metaverse.

We are promoting industry-government-academia multistakeholder pilot activities related to the above proposal and are also preparing a white paper that will further deepen this briefing paper. If you are interested and would like to know more, please contact us.

Acknowledgements

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Endnotes

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