My Vision No.59
2022.4

The "New Reality" That the Metaverse Will Open Up to Us

The Internet 3D virtual space known as the "Metaverse" has become a focus of attention.
How will the Metaverse change our lives?

About This Issue

As the Metaverse Begins to Attract Attention, What Are Its Possibilities?
- How Will the Metaverse Transform Our Lives?

Masaki Taniguchi
President, NIRA / Professor, Graduate Schools for Law and Politics, The University of Tokyo

The internet 3D virtual space known as the "Metaverse" has become a focus of attention. The Metaverse is expected to find application in a variety of fields. Nevertheless, upon hearing this new term, many people are no doubt confused about just what the "Metaverse" is in the first place. How will the Metaverse transform our lives? What are the challenges facing its wider dissemination in future? In this issue of *My Vision*, we discuss these issues with Japanese experts at the forefront of this new technology.

Keywords…Virtual three-dimensional space, Second Life, Metaverse campus

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Keywords…An extension of reality, an "impossible experience," "fun" and "pleasure"

The Possibilities of the Metaverse and Future Rule-Making

Mika Takagi
Director, Media and Content Industry Division, Commerce and Information Policy Bureau, Ministry of Economy, Trade and Industry

Keywords…Exchange of value, architecture, social norms

Interview period : January – February, 2022
Interviewer : Shoko Omori (NIRA Research Coordinator & Research Fellow)

Editor: Reiko Kanda, Maiko Sakaki and Tatsuya Yamaji. This is a translation of a paper originally published in Japanese. NIRA bears full responsibility for the translation presented here. Translated by Michael Faul.

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"Metaverse," a coined word that combines "meta," meaning "beyond," and "universe," representing the world, is said to have made its first appearance in the 1992 science fiction novel *Snow Crash*. It is therefore not in itself a new term. However, when Facebook announced last fall that the Metaverse will be its core business in the future and the company name was changed to Meta (Meta Platforms), it suddenly became a buzzword in the wider world.

The definition of the Metaverse is multiplicitous, but for the moment, the image of its having further improved the versatility of a variety of technologies such as virtual reality (VR), augmented reality (AR), and the technology supporting the Second Life platform seems to be close to the mark. The Metaverse will make it possible to wear VR goggles and immerse oneself in a virtual 3D space to work, play, and communicate with people around the world in a way that is more "real" than when facing a 2D monitor.

What can one do in the Metaverse? And is the use of the Metaverse genuinely becoming popular; alternatively, what would be needed to make it more popular? In *My Vision* No. 59, we interviewed five experts at the forefront of the development and utilization of the Metaverse in Japan.

A Virtual Three-Dimensional Space: Application Has Already Begun in a Variety of Fields

According to Masahiro Ajisawa, Managing Director of Facebook for Japan (the Japanese corporation has not changed its corporate brand at the time of writing), the distinctive characteristic of the Metaverse is that it allows users to have a social experience in a virtual space, moving back and forth between platforms while utilizing their own avatar and digital assets. Switching to different platforms from the platform that reproduces their actual office in the Metaverse, users will be able to pursue more meaningful exchanges with like-minded people from all over the world who cannot actually meet in one place.

The potential of the Metaverse is not limited to work or socializing over hobbies.

Holoeyes, a medical device software maker led by Director and CTO Naoji Taniguchi, is attempting to apply the technology to medical treatment. In this scenario, VR of a patient's organs, blood vessels, tumors, etc. is created from clinical data, and surgical simulations and training are performed in a three-dimensional space. Not only can surgery be reproduced exactly, but it is also possible to expand the site on which the operation is being conducted, and even travel inside the body, as in the science fiction movie "Fantastic Voyage."

Professor Mitsuyuki Inaba of Ritsumeikan University is studying the use of the Metaverse in the field of education. In an experiment in which he had Japanese and overseas students collaborate in a virtual space, the Japanese students were initially confused and slow to

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participate, but were inspired by the overseas students and gradually began to display their spontaneity. In addition, the use of avatars, which represented the students' alter egos, had the effect of making it easier for them to immerse themselves in the context of the virtual space and to concentrate on the project.

The Key to More Widespread Use of the Metaverse

What will it take to spread VR, AR, and similar technologies, which have thus far received only limited use, to society more widely under the banner of the Metaverse? One key will be to improve hardware performance and boost Internet connectivity in order to make the virtual space more "real."

In addition, according to Naotaka Fujii, the Representative Director of Hacosco Inc., who created cardboard goggles that used smartphones to make it possible to easily have a VR experience, another key to the spread of the Metaverse will be whether or not we can realize a space in which users experience "fun" and "pleasure" via an extension of their bodies and their real lives. It would be fun to fly around the Tokyo Skytree (a 634-meter tower located in Tokyo) or dive to Australia's Great Barrier Reef simply by wearing VR goggles. On the other hand, if for example the world of a thousand years in the future, which is beyond the scope of our imaginations, were to be "reproduced," possibly as a novel, a movie, or a game, it is not certain that it would appeal broadly to people.

Another thing that Mr. Ajisawa emphasizes is an open competitive environment in which a variety of creators can use the technology fairly. He and Mr. Taniguchi also mention the need to create mechanisms to ensure the privacy of personal information and the safety of Metaverse users. With regard to this, Mika Takagi, Director of the Ministry of Economy, Trade and Industry's Media and Content Industry Division, hopes for the development of open services that transcend the boundaries between companies and similar entities; she indicates that at present the market and architecture (system) are in the process of formation, and that the mutual interaction between these and social norms will enable the spontaneous formation of rules. Ms. Takagi explains that the law does not act on its own when it comes to regulation, and that we should consider a balance between factors while watching over the abovementioned movements in the market and architecture.

An Opportunity for the Globalization of the University

Personally, I am interested in the conversion of universities to Metaverse campuses. At the "Meta AI (Inside the Lab)" event held in February, a plan to develop a multilingual simultaneous interpretation system using artificial intelligence was announced. This means that the language barrier that has plagued the Japanese will disappear sooner or later. The distance of perhaps 10,000 kilometers from Japan to the Western nations cannot be closed, but the Metaverse campus would be closer to the user than going to the school building on the other side of the road, and it would be possible to interact with students and researchers from all over the world. The example of Minerva University is well-known, and the online competition among universities is intensifying throughout the world. For Japanese universities, whose low reputation in internationality is regarded as an Achilles heel, the Metaverse seems to me to be the last chance for salvation.

Professor Taniguchi is the President of the Nippon Institute for Research Advancement (NIRA), and a Professor in the Graduate Schools for Law and Politics of The University of Tokyo. He holds a Doctorate in Law from The University of Tokyo. Professor Taniguchi specializes in the study of political science and contemporary Japanese politics.

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Expert Opinions

We Will Participate in Rule-Making Discussions Responsibly

Masahiro Ajisawa
Managing Director
(Japan), Facebook

Just as devices that connect to the Internet once moved from PCs to mobile devices, we now think of this as a transitional period from those mobile devices to the Metaverse. The US headquarters of Facebook has changed the corporate brand from "Facebook" to "Meta" in order to make this vision clear.

Put briefly, the distinctive characteristic of the Metaverse is the provision of a next-generation social experience that enables immersive interaction within a space. Users can share the same three-dimensional experience, even if they are physically far apart. On today's mobile devices, it is difficult to share the same space in this way within an app. In the Metaverse, one will be able to move back and forth between platforms while utilizing one's avatar and digital assets. The important factor for this ability will be "interoperability," but this cannot be achieved overnight; it will take five to ten years to realize. The Metaverse will continue to evolve seamlessly, advancing the integration of current 2D apps with technologies such as VR and AR. In the future, as the fusion of the real world and the Metaverse progresses, people with disabilities and the elderly will become able to move around freely within the Metaverse.

People's connections in the Metaverse are expected to accelerate in two directions. One will be to move real-world communities and relationships, for example teams in a company, to the Metaverse. The other will be to enhance connections in communities that are built based on common interests and preferences. Japan has a rich array of content such as anime, manga, and games, making the nation highly suited to business in the Metaverse, and this offers the potential to open up new markets.

The Metaverse is still in its infancy. With the entry of a variety of creators from this point on, the possibility of improving people's communication, working styles, and daily lives will expand dramatically. In order to encourage their entry, open competition in which technology can be used freely and fairly will be important, and it would not be desirable for any company to monopolize or oligopolize the Metaverse. At the same time, the industry must build mechanisms to ensure the privacy and safety for users. Furthermore, it is indispensable to ensure the inclusiveness for users, no matter what backgrounds or characteristics the users have. Based on the experiences we have gained and the reflections we have engaged in thus far, it will be important to first comprehensively discuss possible future challenges and how to address them with stakeholders in a variety of policy areas, and to fulfill the related responsibilities.

Mr. Ajisawa is the Managing Director of Facebook (now known as "Meta" elsewhere) for Japan. Facebook has made major changes since its inception, changing the corporate brand to Meta and focusing on building for the Metaverse. A veteran of Microsoft Japan, in 2012 Mr. Ajisawa became the Senior Director of Japan Client Solutions and East Asia Business Development for Twitter Japan. In 2016, he became a senior executive officer of the same company. He has been involved for many years with advertising businesses on online media. Mr. Ajisawa has sought to accelerate the potential for the evolution of Internet advertising, and became Managing Director (Japan), for Facebook in January 2020.

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Expert Opinions

We Can Eliminate Medical Disparities via a Metaverse With a Highly-Developed Power of Expression

Naoji Taniguchi
Director and CTO,
HoloEyes, Inc.

The Metaverse is rapidly beginning to be used in clinical medicine and medical education. A typical example of this application in the field of medicine is three-dimensional models for surgery. Surgery – cutting into a human body with a scalpel – cannot be allowed to go wrong. There is a growing movement for multiple doctors to jointly consider treatment methods and to conduct careful training by simulating surgery plans in VR space numerous times in advance.

Conferences that discuss treatment methods and the like in VR space have the advantage of not only enabling participants to talk without being tied to a specific place, but also of allowing specialists from around the world to share and discuss three-dimensional information that is close to reality. Because the human bodies dealt with in treatment and surgery vary greatly from person to person, and the shapes of bones and organs also differ from person to person, it is important to have three-dimensional information available in medical treatment. The shape of the blood vessels that surround a tumor also varies from case to case. Furthermore, even if one is present at a surgery in reality, the field of view is obstructed and the viewable range is limited. There are no such limitations in the VR space. This provides a significant advantage, in that the body can be seen from a free vantage point, allowing, for example, the enlargement of the relevant part or moving inside the body. The movements made by expert doctors during surgical procedures can also be reproduced and shared. Although these services have only just begun to be offered, the use of the Metaverse in medical care will inevitably become a significant trend.

However, there will be numerous challenges in advancing adaptation of this technology to the field of medicine. First, the areas of medicine that intervene directly in conditions that affect the human body are very conservative and tend to be cautious with respect to introducing new technologies. It will be difficult to introduce the latest technology at a similar speed to fields in which technological competition is progressing more rapidly, such as games and entertainment, but it will be desirable to incorporate the positive aspects of outcomes in those industries at the earliest possible stage.

Next will be efforts to ensure the security of personal information, such as information regarding people's bodies. It will be important for organizations to manage medical data responsibly, but in the future, we may also consider the use of blockchain technology to authenticate and record medical data to ensure that it will not be tampered with from the outside.

Additionally, current Metaverse-related technologies still display limitations in their power of expression. In the future, sensory technologies such as tactile-, temperature-, and acoustic-related technologies will be combined in complex manners. If Metaverse technology can provide sufficient power of expression, it will also be able to seek to close the medical disparity between rural areas and cities, and between developing nations and developed nations. The world of software is growing and expanding at an overwhelming speed through the sharing of outcomes, and I believe that the same thing will be possible in the field of medicine.

Following a period at Japan Research Institute, Limited, Mr. Taniguchi was involved in CG research and development at Nabla Co., Ltd., following which he became freelance. He is involved in the planning and development of smartphone applications, robot applications, and VR applications, with a focus on 3D programming. Mr. Taniguchi established HoloEyes Inc. in October 2016, becoming the CEO and CTO of the company. He develops and provides VR apps for clinical applications, training and education in medical fields. Mr. Taniguchi is a part-time lecturer at Joshibi University of Art and Design. He graduated in ocean engineering from Yokohama National University's College of Engineering Science.

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Expert Opinions

Social Design From the Perspective of Future Generations

Mitsuyuki Inaba

Professor, College of Policy Science, Ritsumeikan University

How should we position learning that makes full use of the Metaverse in the field of education? For 10 years I have been focusing on the Metaverse service called "Second Life," and recently I have been conducting research on learning in virtual space, using, for example, the Minecraft multiplayer environment. Based on a series of studies, it has become clear that the Metaverse space has the potential to have a positive effect on learning and education in the era of Society 5.0 through interaction-rich active learning that incorporates dialogue.

One of the events that made me aware of this possibility was an experiment in which Japanese and overseas university students gathered in a virtual space to participate in a learning activity. Participants were given the task of "creating" under the theme of "53 Stations of the Tokaido" by working together in a virtual space. At first, the Japanese students were confused because they did not understand what to do, but they were inspired by the overseas students who proactively made proposals; the process took effect as they gradually became aware of a "position" from which they could contribute voluntarily and actively. Exchange and learning transcending nationalities and the promotion of voluntary learning by participants are phenomena that can only be realized in the Metaverse space. In order to actually learn beyond the boundaries between countries and cultures, it is necessary to prepare physical venues and classrooms in which participants gather. This is not an easy thing to do, even if we were not in the midst of a pandemic. In addition, the use of a mechanism such as an avatar (the learner's virtual body) has the advantages of making it easier for the learners to immerse themselves in the context of the virtual space without being bound by the constraints of the real world, and to recognize the purpose of the project and their own role in it.

At the same time, there are also issues. If left unregulated, a virtual space can readily become a "lawless zone." A risk management system, for example consideration as to how to prevent intrusion from outside, is also necessary. In addition, in order to prevent selfish behavior of participants and to ensure the autonomous maintenance of order in the virtual space, it is important that what may be termed "socially useful goals" are shared among the participants. Our past studies have also shown that posts in Internet communities are less likely to become inflammatory if socially meaningful goals are shared. In the Metaverse also, the setting of a "sense of purpose" will be important in exerting a positive effect on learning. Setting clear socially useful goals, for example by considering how it will be possible to contribute to society and what precisely should be done in activities performed in the Metaverse space will facilitate effective collaborative learning. There is an urgent need to design learning environments, asking ourselves how learners are to use the new cultural tool represented by the Metaverse and what they should learn by doing so.

Professor Inaba specializes in learning science and cognitive science. He conducts research on "collaborative learning" using the Internet via an approach that fuses humanities and sciences. He completed coursework in the Graduate School of Information and Computer Sciences of the University of Hawaii. Following periods with Fujitsu Limited and in the University of Hawaii's Software Engineering Research Laboratory, in 1998 he became an associate professor in Ritsumeikan University's College of Policy Science. For a year from 2005, he worked at the University of California, San Diego's Laboratory of Comparative Human Cognition, researching learning support using computer games. In 2008, he served as a professor in Ritsumeikan University's College of Policy Science.

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Expert Opinions

We Will Be Able to Live the Realities That We *Want* to Live

Naotaka Fujii
Representative Director,
Hacosco, Inc.

The Metaverse, a new space that is entirely technology-based, will enable us to have experiences and engage in forms of communication in ways that we cannot in real-world spaces. The reality that we feel that we are living in now is created by the brain. The brain both consciously and unconsciously creates the concept of the "self," and we perceive the reality of this self through the body. Using technology, the Metaverse is attempting to expand the boundaries of what our brains perceive as reality. Whether or not the "reality" created by the Metaverse offers us new value will be determined by whether or not it creates an extension of reality, a space in which our brains experience "fun" and "pleasure." Personally, I believe that the new possibilities of the Metaverse will be realized in a space that is not separated from our bodies and our real lives.

At present, the Metaverse is what might be called technology for technology's sake. Engineers and companies are going in their own directions; it is not yet a consumer-oriented technology, The value design of the Metaverse, the design that makes the brain feel "fun" and "pleasure," is something that is yet to come. To date, it would appear that only the gaming space offers an advance taste of such an experience, but given the disconnect of the gaming space from reality, it would be difficult to say that it captures the essence of the Metaverse. The influence of the pandemic has normalized online communication between remote areas. While Metaverse technology should enable richer conversations and interactions, it has not yet developed any services that have a greater reach among users than Zoom.

At the same time, it will generally happen that when one meets a person that one has interacted with in the Metaverse space in the space of real life, that person will be far from having the appearance and being the person that was envisaged. There are people who wish to change their character online and behave with the freedom that this grants them, but when doing business, we want our interlocutor to be the person that they actually are. Our value judgements, the way that we judge "good" and "bad," will not change significantly from the definitions that society has agreed on up to the present. The Metaverse will only be able to create value in a space that connects with the world in which we actually live.

In the future, we will create a society based on the premise that what the brain thinks of as reality depends on the person. Correspondingly, everyone will be able to live the reality that they want to live. What we have to do now is to redefine what "reality" actually is.

Professor Fujii conducts research focusing on the "science of reality." He obtained an MD degree and a Ph.D. degree from the Tohoku University School of Medicine. Following a period as a researcher at the Massachusetts Institute of Technology, in 2004 he became the Deputy Team Leader of RIKEN's Laboratory for Symbolic Cognitive Development Research; in 2008, he became the Team Leader of RIKEN's Laboratory for Adaptive Intelligence. In 2014 he launched Hacosco Inc., a company that develops and provides VR services. Professor Fujii serves as the CEO of the company. He has been a full-time professor in the Graduate School of the Digital Hollywood University since 2018.

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The Possibilities of the Metaverse and Future Rule-Making

Mika Takagi

Director, Media and Content Industry Division, Commerce and Information Policy Bureau, Ministry of Economy, Trade and Industry

The space of the Metaverse, in which avatars move about and interact, will expand in a variety of directions. At this stage, we can organize this into three fields. The first of these is as a substitute for actual space in reality. This is the area in which we can talk about "virtual offices" and "digital twins." The second is as a space that adds to this substitute functions unique to digital space. To take an example from the live entertainment industry, this means spaces in which performers interact directly with their audience through their avatars. The third is the Metaverse that creates a "new reality" that cannot be physically realized in reality. For example, one could experience things that go beyond the restrictions of the body, such as flying through the sky, something which is not possible with one's actual body.

From the perspective of the further development of the content industry, the Metaverse as it currently is remains a "closed" form that is provided separately for different companies and services, but in the future, we can expect interoperability beyond the boundaries of companies and similar entities, in other words, the development of "open" services. Up to the present, the exchange of "information" has been the main focus, but in the future, it will be possible to exchange "value" through the Metaverse and non-fungible tokens (NFT), and this may be the dawn of the next level of the Internet.

It can be expected that a variety of problems will occur in this process, but for the time being, new markets and architectures (systems) will be formed, and rules will be formed by the interaction between these markets and architectures and social norms. This is exactly what American legal scholar Lawrence Lessig pointed out some 20 years ago. Lessig argued that people's behavioral constraints are the result of an interplay between the elements of laws, social norms, markets, and architectures. The Metaverse space is new and may require legislation with regard to how to approach intangible ownership, but in terms of regulation, the law does not act alone, and it will be necessary to consider a balance with other factors. I think that we should review the best direction for rules and regulations while watching these movements in fast-changing markets and architectures.

As support measures, in order to support the sound development of the market and the transmission of this technology to overseas destinations, it will be important to establish mechanisms to ensure technological standardization and compatibility, and to promote digital transformation (DX) in industry. Because this is a fast-moving field, we should maintain a close view of trends and respond flexibly.

A graduate of The University of Tokyo's Faculty of Economics and the holder of an MBA and an MA in Education from Stanford University, Ms. Takagi joined the Ministry of Economy, Trade and Industry in 2002. She was initially involved in disseminating the "Cool Japan" concept overseas and promoting measures to foster creative industries. Following this, she was responsible for international rule formation measures in areas such as trade policy for emerging nations and international standardization policy. She has held her current position since 2018. Ms. Takagi is currently involved in the promotion of the content industry. Given the expansion of the use of virtual spaces in the content industry, for example in gaming, she was responsible for and conducted the "Project for Research and Analyses Concerning Future Potential for Virtual Spaces and Challenges therein" between 2020 and 2021.

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