

## Section 2 Toward Realizing an Abundant Data Distribution Society

As communications infrastructures become more advanced and the use of smartphones more common, diverse digital services that make use of data are becoming crucial parts of our lives. New forms of data usage, such as the metaverse and digital twin technology, have also been the subject of much recent attention. It is hoped that these technologies will contribute toward solving the various social/economic issues facing Japan, such as regional revitalization, disaster prevention, and the realization of diverse working styles.

This section summarizes issues and efforts involved in realizing a society where the safe and appropriate distribution of data is promoted and where anyone and everyone can benefit from the use of data.

### 1. Safe and robust communications networks supporting data distribution

There have been several recent incidents in Japan and elsewhere where communications infrastructures have been disabled due to large-scale natural disasters, abnormal weather, or even human errors. With an increas-

ing amount of activity now conducted over the Internet, the impact of such incidents is much higher than it was in the past (Figure 3-2-1-1).

Figure 3-2-1-1 Examples of recent telecommunications services outages

Area	Date occurred	Details
Global	June 2022	Cloudflare: An outage occurred in 19 data centers throughout the world.
UK	July 2022	Google, Oracle: An outage occurred in cloud services due to a heatwave.
Japan	July 2022	KDDI: A communications outage occurred due to human error.
Japan	Aug. 2022	NTT West: A communications outage occurred in the FLET'S Hikari Internet service due to equipment failure.
Japan	Sept. 2022	Rakuten Mobile: A communications outage occurred due to an equipment error.
Japan	Sept. 2022	Softbank: A communications outage occurred due to human error.
South Korea	Oct. 2022	Naver, Kakao: A service outage occurred due to a fire at an SK C&C data center. Service was restored in South Korea on the day of the outage for Naver, and then five days later for Kakao.
Japan	Dec. 2022	NTT Docomo: A communications outage occurred due to an equipment error and human error.
U.S.	Feb. 2023	T-Mobile: A communications outage occurred.
Japan	April 2023	NTT East, NTT West: A communications outage occurred in services such as "HIKARI DENWA."

(Source) Created by MIC based on publicly available documents released by various companies

As the international situation becomes more complicated, ensuring the reliability and safety of communications infrastructures has become an extremely important issue from the perspective of guaranteeing economic security. Cyberattacks are growing more complex and sophisticated as digital technology advances, making security risks a widespread and critical issue. There have been many cases of cyberattacks targeting key infrastructures in countries all over the world, causing social turmoil. This is true even in Japan, where cyberattacks targeting private companies, including key infrastructure operators, have occurred. There have even been cases where investigations have determined that foreign governments were likely involved in these incidents.<sup>1</sup> Furthermore, as ICT devices continue to become more advanced and supply chains more complex and global, security risks in supply chains have also become apparent, as seen in the fact that unauthorized software installed in communications devices and systems used in information and communications infrastructures and unauthorized software, such as malware, being introduced through supply chains related to main-

tenance and operations.

There are also growing concerns about ensuring economic security and problems that could prevent devices and parts from being procured that are required for the provision of digital services. Factors such as antagonism between the U.S. and China have even changed the structure of global supply chains, and even in Japan, ensuring reliable access to ICT-related devices and parts is now directly related to ensuring economic security. The ratio of companies exporting ICT-related devices and parts to Japan in 2021 reveals the tendency of Japan to rely on certain countries, with China and Taiwan accounting for a large ratio of the semiconductors, mobile phones, portable automatic data processing machines, and parts, such as processors, that Japan imports.<sup>2</sup>

Amid concerns of natural disasters becoming more frequent and intense and the international situation becoming more complicated, it will be crucial to build more robust communications infrastructures (including arranging alternate means), decentralize data centers and submarine cables, enhance cybersecurity and supply chains, and implement other measures to ensure

<sup>1</sup> [https://www.cas.go.jp/jp/seisaku/keizai\\_anzen\\_hosyohousei/dai3/siryou4.pdf](https://www.cas.go.jp/jp/seisaku/keizai_anzen_hosyohousei/dai3/siryou4.pdf)

<sup>2</sup> MIC (2022), "Ensuring the Economic Security of the Digital Society"

that data can be distributed reliably and safely and that digital services remain available even during an emer-

### (1) Building resilient communications infrastructures

Robust communications infrastructures are crucial to maintain access to digital services even during a natural disaster or other emergency. There are currently a number of initiatives underway in Japan to create more robust communications networks, based on lessons learned during large-scale natural disasters, such as the Great East Japan Earthquake.

Telecom operators have implemented measures to prevent power outages and transmission line disconnections, based on experience during the Great East Japan Earthquake, where such failures occurred due to mobile phone base stations being switched off. Some measures being implemented to prevent power outages include deploying more vehicle-mounted power supplies

### (2) Ensuring diverse communications infrastructures and measures

Intercarrier roaming allows mobile phone users to temporarily access other carrier networks. This technology is one means of providing continuous access to digital services even during natural disasters, communications outages, or other emergencies. One example of the use of this can be seen in Ukraine, where telecom operators<sup>4</sup> allow users to roam between networks at no charge to ensure continuous communication while the country is under attack from Russia. In the U.S., the Federal Communications Commission (FCC) in July 2022 implemented the Mandatory Disaster Response Initiative (MDRI), which requires providers to allow roaming between mobile carriers during disasters, such as hurricanes, wildfires, and long-term power outages.<sup>5</sup>

In Japan, the Ministry of Internal Affairs and Communications has been holding meetings for the “Study Group on Intercarrier Roaming in Emergency Situations” since September 2022. It has investigated a wide range of measures, including intercarrier roaming for mobile phones, to ensure that communication is available during emergencies. In December of the same year, the organization released the “First Report on Intercarrier Roaming in Emergency in JAPAN,”<sup>6</sup> a basic policy on introducing intercarrier roaming as quickly as possible and in a manner that allows for full roaming for data communications in addition to general calls and call backs from emergency agencies. In response, telecom operators have begun investigating policies for using and operating technologies in order to implement intercarrier roaming.

However, because there is always the possibility of a communications outage preventing the use of intercarrier roaming, it will be important to continue to promote comprehensive solutions, including utilizing other means of communication. Since March 2023, mobile car-

gency.

and power generators and enhancing base station batteries. Meanwhile, measures being implemented to prevent transmission line disconnections include adding new transmission line routes and expanding emergency restoration measures that make use of satellite entrance lines and micro-entrance lines.

The National Institute of Information and Communications Technology (NICT) Resilient ICT Research Center is now working with Tohoku University and other industry, academia, and government organizations to research, develop, and verify resilient ICT infrastructures that can cope with environmental changes, such as large-scale disasters and communications outages.<sup>3</sup>

riers have begun providing auxiliary line services that allow users to switch to other carriers to maintain connectivity.<sup>7</sup> This provides a useful alternative for situations where users cannot access their carrier network due to a communications outage or disaster. In response to demands from mobile carriers belonging to the Telecommunications Carriers Association to continue to use the “00000JAPAN” SSID for disasters even if a communications outage occurs, the Wireless LAN Business Promotion Association (Wi-Biz) revised its “Guidelines on Providing Free Access to Public Wireless LAN during a Large-Scale Disaster” in May 2023 to allow access to “00000JAPAN” during a communications outage. Wi-Biz continues to investigate situations where alternate operations could be required during a natural disaster.

One other effective means of ensuring communication is to use non-terrestrial communications networks, such as satellites. The Starlink broadband internet service is being used to maintain communications in war-torn Ukraine. This service, provided by SpaceX (U.S.), utilizes a satellite constellation for communications. Even in Japan, telecom operators are engaged in efforts to utilize and introduce satellites, etc. for use during emergencies (**Figure 3-2-1-2**). Authorities in Tokyo are also investigating the use of satellite communications to maintain access to the Internet even if a communications outage or disaster occurs.<sup>8</sup>

<sup>3</sup> <https://www.nict.go.jp/resil/>

<sup>4</sup> The three largest telecom operators in Ukraine (Kyivstar, Lifecell, and Vodafone Ukraine)

<sup>5</sup> [https://www.soumu.go.jp/main\\_content/000838215.pdf](https://www.soumu.go.jp/main_content/000838215.pdf)

<sup>6</sup> [https://www.soumu.go.jp/main\\_content/000852036.pdf](https://www.soumu.go.jp/main_content/000852036.pdf)

<sup>7</sup> <https://news.kddi.com/kddi/corporate/newsrelease/2023/03/27/6618.html>

<sup>8</sup> [https://note.com/smart\\_tokyo/n/n51c567aefe31](https://note.com/smart_tokyo/n/n51c567aefe31)

**Figure 3-2-1-2 Efforts by Japanese telecom operators to utilize and introduce satellites, etc.**

	Overview
NTT	Established Space Compass, jointly funded by SKY Perfect JSAT. Aims to begin providing low-delay communications services within Japan using High Altitude Platform Station (HAPS) in fiscal 2025.
KDDI	Signed contract with SpaceX (U.S.) to use Starlink as the backhaul link to au base stations. Began operating in Hastushima (Atami, Shizuoka Prefecture) in December 2022, and plans to expand service to approximately 1,200 locations throughout Japan.
SoftBank	Currently developing an NTN solution to provide communications networks from outer space and the stratosphere, using three services: (1) satellite phone service provided by THURAYA, (2) LEO satellite communications service provided by OneWeb, and (3) HAPS provided by HAPSMobile (a subsidiary of SoftBank).
Rakuten Mobile	Working with AST SpaceMobile (U.S.) on the "SpaceMobile" project to build mobile broadband networks utilizing LEO satellites. Aims to allow smartphones to communicate directly with satellites.

(Source) Created by MIC based on publicly available documents released by various companies

### (3) Strengthening data centers, submarine cable functions, and safety measures

Data centers serve to store and process data and are the foundation for a variety of internet services, including data communications. Japan also relies on submarine cables for about 99% of its international communications, which are becoming even more important as the volume of cross-border data flows increases. In addition, as tensions between the United States and China continue to rise and the international situation, such as the invasion of Ukraine, becomes more complex, it is increasingly important to strengthen security measures for data centers and submarine cables from the viewpoint of economic security.

In Japan, currently about 60% of data centers are located in the Tokyo metropolitan area.<sup>9</sup> In addition, domestic submarine cables are mainly laid on the Pacific Ocean side, while the Sea of Japan side is undeveloped (this condition is called "missing link"), and the landing bases of submarine cables are concentrated in the Boso Peninsula and the Shima Peninsula. With data centers and submarine cable landing stations concentrated in specific areas, a large-scale disaster in the Tokyo metropolitan area could have a significant impact on the communications environment on a nationwide scale. In fact, the Great East Japan Earthquake caused damage to KDDI's submarine cables in ten locations off the coast of Ibaraki Prefecture and Choshi in Chiba Prefecture, both of which are located on the Pacific side, and connections to at least ten countries were affected.<sup>10</sup> In January 2022, an eruption of an underwater volcano off the coast of Tonga severed a submarine cable, and it took five weeks to restore communications.<sup>11</sup>

Given the importance of data centers and submarine cables, Japan is currently decentralizing their locations. As part of the Digital Garden City Nation Infrastructure Development Plan (Revised) announced in April 2023, the Ministry of Internal Affairs and Communications, in cooperation with the Ministry of Economy, Trade and

Industry, plans to develop over ten regional data centers in about five years. And in light of the fact that the Tokyo and Osaka areas are increasingly becoming data center hubs, it also plans to promote the development of third and fourth core data center hubs to complement and replace Tokyo and Osaka for the time being. In addition, while paying close attention to trends in infrastructure development that are in line with internet traffic conditions, initiatives toward greening, and collaborations using Multi-access Edge Computing (MEC) and AI, based on the discussions at the Expert Meeting on Digital Infrastructure Development (DCs, etc.) and in cooperation with the Ministry of Economy, Trade and Industry and other relevant ministries and agencies, the Ministry of Internal Affairs and Communications will proceed with considering how data centers and other infrastructure should be distributed and the necessary support for site development. With regard to submarine cables, the Ministry of Internal Affairs and Communications plans to start operation of submarine cables on the Sea of Japan side by the end of fiscal 2026 and to promote distribution of landing stations and efforts to strengthen Japan's functions as a hub for international data distribution, such as multi-routing of international submarine cables and the laying of branch lines for landing stations, in conjunction with efforts to develop data center sites and strengthen safety measures for international submarine cables and landing stations (**Figure 3-2-1-3**).

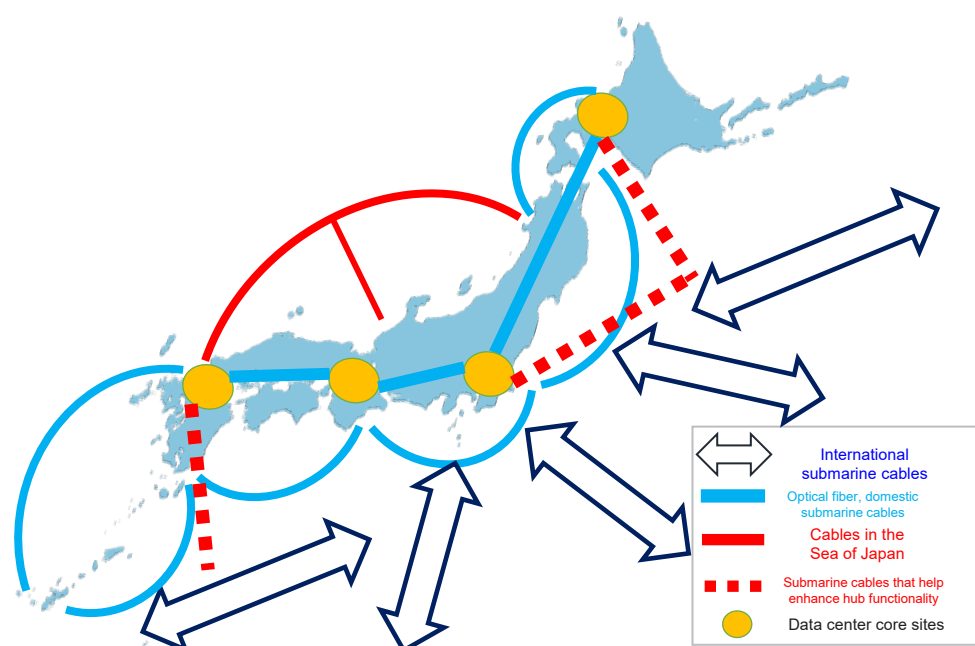
As a concrete measure, the Ministry of Internal Affairs and Communications has been providing subsidies to private businesses for digital infrastructure development using the Fiscal 2021 Supplementary Budget Digital Infrastructure Development Fund (Specified Telecommunications Facilities Development Promotion Fund) as a source of funding. As of June 2022, seven local data center projects have been adopted.

<sup>9</sup> The reason behind the concentration of data centers in the Tokyo metropolitan area is that constructing data centers close to Tokyo, which is where there is the largest demand for data, reduces the latency time of communications and improves the quality of services. In addition, from the viewpoint of operations and maintenance, it is desirable to locate data centers in the Tokyo metropolitan area for easy access by maintenance personnel. So locating data centers in Tokyo metropolitan area has been very advantageous for operators.

<sup>10</sup> The cable is believed to have been severed by the earthquake, which caused the ground beneath the sea to shift, placing excessive load on the cable.

<sup>11</sup> <https://www.technologyreview.jp/s/266975/tongas-volcano-blast-cut-it-off-from-the-world-heres-what-it-will-take-to-get-it-reconnected/>

Figure 3-2-1-3 Image of data center and submarine cables maintenance



#### (4) Responding to cybersecurity and supply chain risks

It is necessary not only to prepare for large-scale natural disasters but also to address cybersecurity risks (including those in the supply chain) and procurement risks.<sup>12</sup>

In light of the increasing importance of preventing acts that harm the security of the nation and its citizens from taking place in relation to economic activities in the face of the increasing complexity of the international situation and changes in the socioeconomic structure, the Act on the Promotion of Ensuring National Security through Integrated Implementation of Economic Measures (Act No. 43 of 2022) was enacted in May 2022.

In order to prevent important facilities that are part of Japan's core infrastructure from being used as a means for acts (including cyberattacks) that obstruct the stable provision of services performed outside Japan and to ensure the stable provision of core infrastructure services, this act stipulates a system for “ensuring the stable provision of specified social infrastructure services”

in which the government reviews plans in advance when core infrastructure operators introduce important equipment, etc. Telecommunications is stipulated as one of the industries that may be subject to the regulations.

In addition to working on the steady implementation of the system from the perspective of procurement risks, it is important to be able to secure telecommunications infrastructure autonomously without being overly dependent on specific countries. To this end, it is necessary to consider ways to procure reliable devices and parts, including promoting research and development in Japan and diversifying suppliers.

Furthermore, in light of the global importance placed on ensuring the safety and reliability of communications infrastructure, it is necessary for the public and private sectors to promote overseas expansion of 5G and submarine cables while strengthening cooperation with other countries as economic security measures, including measures with respect to supply chain risks.

## 2. Development of advanced ICT infrastructure that supports ultra-high-speed, high-capacity data distribution

As new technologies and services, such as block-chain-based NFTs, DAOs, metaverses, and digital twins, begin to be utilized, it will be necessary to transmit huge amounts of data at a very high speed and without delay in order for these technologies and services to penetrate society in the future.<sup>13</sup>

In addition, it is expected that in the 2030s, the integration of cyberspace and physical space (Cyber Physical Systems [CPS]) will advance, and physical communications in physical spaces will be reproduced in the form of digital data in cyberspace. By using AI, it is also expected that it will be possible to ascertain the status of

<sup>12</sup> For details on the MIC's cybersecurity policy, see Section 5, Cybersecurity policy trends in Chapter 5 of Part 2.

<sup>13</sup> According to Manabu Tsukada, Associate Professor at the Graduate School of Information Science and Technology at the University of Tokyo, delays, scale, and data transfer speeds are major points in the popularization of metaverses. For example, to achieve one of the goals for metaverses of unlimited numbers of users who can synchronize events and experience them satisfactorily, delays should be kept to within 150 milliseconds, and in more demanding environments, such as games, delays should be kept to within 20 milliseconds.

physical spaces at any time and make decisions on subsequent actions based on such information. Thus, it will be necessary to meet a wide variety of requirements, including performance beyond 5G.

Therefore, Beyond 5G (6G), which is a more advanced information and communications infrastructure than 5G, is essential for realizing the data-driven Society 5.0, which makes the most of CPS for socioeconomic activities (Figure 3-2-2-1).

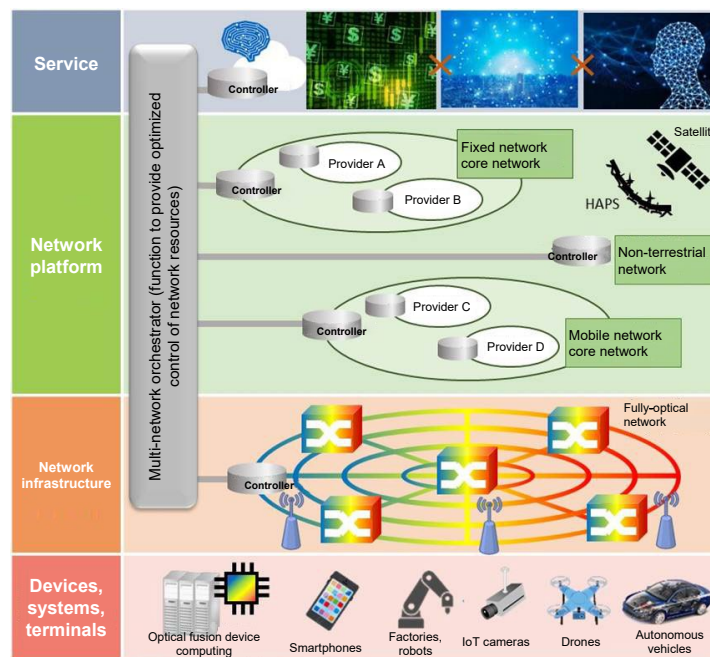
As well as further advancing the functions of 5G, which are high speed and high capacity, low latency, and multiple simultaneous connections, Beyond 5G (6G) is also expected to realize new functions, such as reduced power consumption due to recent advances in remote and online communication traffic in response to increases in network power consumption, scalability to expand communication coverage, and network safety, reliability, and autonomy.

In particular, as environmental problems, such as global warming, become more serious, reducing the power consumption of information and communications infrastructure has become an issue, and attention is being paid to fully optical network technology,<sup>14</sup> which utilizes photoelectric fusion technology to achieve higher network speeds and significantly lower power consumption by combining telecommunications and optical communications.

In the interim report of the Information and Communications Technology Strategy Beyond 5G- With the aim of building a robust and vibrant society in the 2030s- issued by the Information and Communications Council (June 30, 2022), the concept of capturing Beyond 5G (6G) as an entire network that includes wired, wireless, land, sea, air, space, etc. rather than as an extension of current wireless communications, the ideal network for Japan, the key technology areas that Japan should focus on, including all-optical network technology, non-terrestrial network (NTN) technology, and secure virtualization and integrated network technology, and the direction of strategically promoting research and development, social implementation, intellectual property and standardization, and overseas expansion. Based on this, the Ministry of Internal Affairs and Communications is devising new policies, including legal amendments and the creation of a permanent fund, that are based on budgetary measures.<sup>15</sup>

In addition, activities, such as the examination of use cases and technical challenges, international cooperation, and the promotion of intellectual property and standardization through industry-academia-government cooperation organizations (the Beyond 5G Promotion Consortium and Beyond 5G New Business Strategy Center), are also progressing in industry.

Figure 3-2-2-1 The ideal Beyond 5G network



(Source) Summary of the Information and Communications Council's interim report on the "Information and Communications Technology Strategy Beyond 5G"

<sup>14</sup> This is one of the major technology areas in NTT's IOWN Initiative.

<sup>15</sup> For details, see [Policy focus] Toward the realization of Beyond 5G (6G), and Section 7, ICT Technology Policy Trends in Chapter 5 of Part 2, etc.

### 3. Formation of international rules, including standardization

In order for new services and products to proliferate, it is important to disseminate rules for services and products.

Since digital spaces, such as metaverses, do not have the concept of borders and people from all over the world can participate and use them via the Internet, it is necessary to form and disseminate international rules, including standardization, in cooperation with the international community.

With regard to metaverses, there is already a growing movement toward the formation of international rules led by the private sector, with many companies and organizations participating in international forum organizations aimed at realizing interoperability. At its annual meeting in May 2022, the World Economic Forum announced the launch of the New Initiative to Build an Equitable, Interoperable and Safe Metaverse<sup>16</sup> as a public-private framework for international cooperation on metaverses. In June 2022, The Khronos Group Inc. in the U.S. led the establishment<sup>17</sup> of the Metaverse Standards Forum, an industry group that promotes the development of interoperability standards for metaverses, and it is working on developing open standards for metaverses, such as avatar identity management, privacy, and human interfaces, such as XR.

In addition, ITU-T Study Groups is examining security, wired content transmission, encoding, distribution of digital media, etc. in anticipation of ensuring the mutual compatibility of metaverses. Regarding standardization of transmission lines, it has also set delay tolerances, jitter as an indicator of dispersion, and packet loss requirements, etc. Furthermore, the metaverse focus group (FG-MV)<sup>18</sup> was established to collect information on the standardization of metaverses in a wide range of areas, and it is promoting examination of items that should be standardized in the future and how cooperation with other standardization organizations should be conducted.

### 4. Creation of abundant and sound information spaces

As described in Chapter 2, Section 3, the spread of social media has made it possible for all parties to disseminate information on the Internet and easily obtain various kinds of information. On the other hand, numerous problems have arisen regarding the distribution and utilization of data, such as the spread of illegal harmful information, disinformation and misinformation, and information bias. These issues are not confined to cyberspace or any particular age bracket but to society as a whole, including in the real world.

However, at present there is no magic solution for these problems, and no solution has been found for one

ed.

The VRM Consortium is taking the lead in developing the VRM format, a standard for 3D avatars developed in Japan. And relevant organizations in Japan, such as the VRM Consortium and private companies, are actively working on international standardization, including participating in the Metaverse Standards Forum.<sup>19</sup>

In this way, in addition to ensuring interoperability between multiple platforms, Japan is also moving toward standardization of advanced data compression technologies and standards for 3D avatars, so it is necessary for Japan to actively and proactively address and promote these initiatives in cooperation with the international community.

With regard to AI, which is becoming increasingly advanced and more widely adopted, it is important for each country to cooperate in examining which measures should be promoted and the form of regulations, etc.

The promotion of development, utilization and appropriate regulation of AI are all important. Based on these ideas, at the G7 Digital and Technology Ministers' Meeting held in April 2023, which Japan presided over, discussions were held on measures for realizing the common vision of each country to promote the adoption of "trustworthy AI." As a result, an action plan was agreed on to promote interoperability of AI governance, such as a basic framework for AI management and operation, which varies by country and region, and an agreement was also reached to quickly establish a forum for discussing generative AI, such as ChatGPT. In addition, at the G7 Hiroshima Summit in May of the same year, it was agreed to create the Hiroshima AI Process to discuss generative AI. Going forward, it is necessary to continue to promote development of the environment for utilizing AI in cooperation with other countries, based on action plans.

of the causes of these problems, the "attention economy" on the Internet. In addition, the spread of generative AI and deepfake technologies has made it possible for anyone to easily create fake text and images, and the Japanese public is increasingly exposed to information that the human eye has difficulty discerning whether it is real or not. The problem of disinformation and misinformation is expected to become more complicated in the future due to the misuse of these technologies.

In order to realize a sound information space where everyone can use digital services with peace of mind, further initiatives are required by a variety of stakehold-

<sup>16</sup> <https://initiatives.weforum.org/defining-and-building-the-metaverse/home>

<sup>17</sup> As of March 2023, more than 2,300 organizations are participating, including Meta, Microsoft, Alibaba, Deutsche Telekom, Sony Entertainment, and NTT QONOQ.

<sup>18</sup> Focus group: a fixed-term organization that is open to non-ITU members with the purpose of collecting a wide range of information for examining the development of recommendations

<sup>19</sup> Interim Report of the MIC Study Group on the Utilization of Metaverse Toward the Web3 Era [https://www.soumu.go.jp/main\\_content/000860618.pdf](https://www.soumu.go.jp/main_content/000860618.pdf)

ers, including operators of platforms that serve as a place for distributing, sharing, and utilizing data.

In the second report published by MIC's Study Group on Platform Services (chaired by Professor George Shishido of the Graduate School for Law and Politics, University of Tokyo) in August 2022, the direction of initiatives regarding disinformation and misinformation going forward is to comprehensively promote voluntary initiatives by a wide range of stakeholders, including platform operators, by, for example, promoting fact-checking initiatives in cooperation with platform operators, fact-checkers, fact-checking promotion organizations, and existing media, etc. and ascertaining the status of initiatives for improving ICT literacy and the problem of disinformation in Japan from the perspective of ensuring freedom of expression, based on voluntary initiatives by the private sector.

In this context, platform operators are required to appropriately set and operate disinformation policies that are based on risk analysis and assessment and promote transparency and accountability in these initiatives. Therefore, it is necessary for the government to continuously conduct monitoring and verification of these initiatives.

It is also necessary to improve the literacy of users of digital services.

In Japan up to now, measures for improving ICT literacy have mainly targeted young people, with the main aim of encouraging them to avoid risks associated with ICT use, such as how to avoid internet-related problems. With the use of ICT and digital services becoming com-

monplace, it is becoming increasingly important for all generations to learn the characteristics of digital services, the responsibilities associated with their behavior when using those services, and how to accept, utilize, and disseminate information in an independent and interactive manner while using ICT, etc.

The Ministry of Internal Affairs and Communications held the Working Group on Improving Literacy for ICT Use (chaired by Professor Tatsuhiko Yamamoto of the Graduate School of Law, Keio University) to discuss and examine measures to promote improving the literacy required for the digital society in the future while taking into account the concept of "digital citizenship" in which people voluntarily engage with the digital society. Based on the discussions of this committee, etc., the MIC plans to prepare and publish in the summer of 2023 a roadmap that summarizes future issues to be addressed. Going forward, it is necessary to proceed with examining the formulation of indicators for literary proficiency and the development of content for improving literacy, based on this roadmap.

New digital technologies and services, such as generative AI and metaverses, which have evolved and spread rapidly in recent years, will make the lives of ordinary citizens more convenient and bring various benefits, but this depends on these technologies being used properly. Incorrect use of these technologies may create problems not only for the user but may also violate the interests and rights of others.

In order for everyone to enjoy the convenience of using AI, etc., it is necessary to acquire the skills and literacy needed to properly use it.