Overview of the 2023 White Paper on Information and Communications

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The focus of this White Paper on Information and Communications is "Toward Realizing the Resilient and Sound Data Flow Society for the New Era." It gives an overview of the progress of data flow, which accompanied the advancement of telecommunications infrastructure in Japan, and analyzes the current situation, challenges, and new trends in data flow and use. It also surveys initiatives toward a data flow society where everyone can enjoy the benefits of diverse services using data.

Part 1. The Current status and Issues of Data Distribution and Utilization

Chapter 1. The Continuing Acceleration of Data Distribution and Data Utilization

1. The explosive increase in data distribution

With the advancement of telecommunications infrastructure and the spread and diversification of digital services, the volume of data distribution on networks in Japan has increased exponentially. Since the COVID-19 pandemic, digitalization has progressed, which has enabled us to live without physical contact and work without face-to-face interaction. As of November 2022, the total download traffic of fixed-line broadband service subscribers increased by 23.7% year on year, and that of mobile communications subscribers as of September 2022 increased by 23.4% year on year. Globally, the volumes of data traffic and data distributed especially through mobile terminals have increased significantly and are expected in increase further.

2. The awareness of companies regarding the provision and utilization of data

While Japanese companies' utilization of data is processing, the rate of their utilization is low compared to other countries. The result of a survey of companies showed that 52.8% of Japanese companies have been "using" personal data, against 81.9% of U.S. companies.

Many Japanese companies cited "lack of methods for utilizing data" and "unclear cost-effectiveness and lack of human resources for handling data (processing and analysis, etc.)" as challenges and impediments to date usage.

Chapter 2. Concentration of Data among Platform Providers

1. Data Acquisition and Storage by Platform Providers

As information and communication technology advanced, and massive amounts of data are being generated and distributed, platform providers have grown rapidly as innovators that continue to generate innovative businesses and markets. Currently, various services provided by platform providers have penetrated deeply into our lives, making everyday life significantly more convenient.

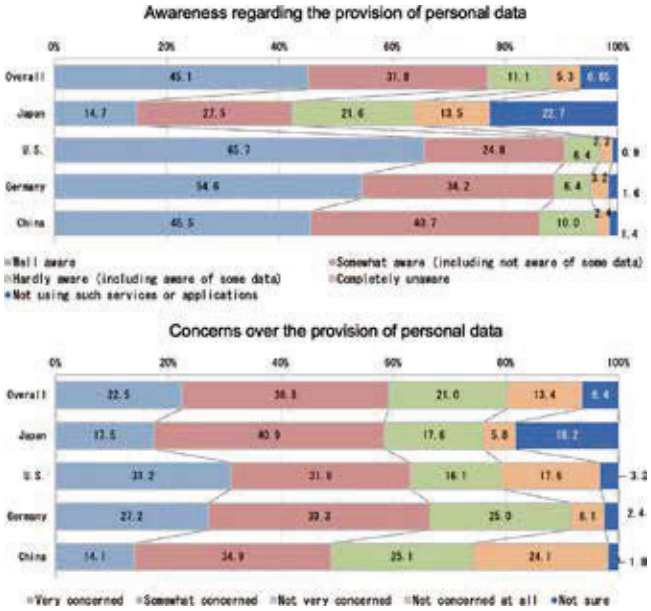
At the same time, through the provision of a variety of services, platform providers have been acquiring and accumulating a huge amount of data, including attribute data, such as names, usernames, IP addresses, and data on purchasing and communication behaviors and various other activities.

2. Concerns about transparency and appropriateness of data acquisition and utilization by Platform Providers

According to the results of the survey, the percentage of respondents who were "aware" (the sum of "well aware" and "somewhat aware") of providing personal data when using services and applications was the highest in the United States (90.5%), against about 40% (42.2%) in Japan. Regarding whether or not they felt anxious about providing personal data, the highest percentage of respondents who answered they were "concerned" (the sum of "very concerned" and "somewhat concerned") was 66.5% in Germany, with 58.4% in Japan.

Figure 1: Awareness and concerns about providing personal data

(Source) Ministry of Internal Affairs and Communications (MIC, 2023), "Survey Research on Advancement of ICT Infrastructure and Flow of Digital Data and Information"



Also, for all the four countries surveyed (Japan, U.S., Germany, and China), "provider's assurance of sufficient security" was the most important consideration for users in providing personal data to platform providers.

Chapter 3. Spread of Disinformation and Misinformation on the Internet

1. The current status

(1) The spread of the attention economy

Amid the vast amount of information circulating on the Internet, to attract more attention and clicks from users, some platforms generate articles with sensational and provocative titles and content that are not based on facts but solely on speculation. This so-called "attention economy" is structured in a way that promotes the spread of disinformation and misinformation and the fueling of controversy on the Internet.

(2) Filter bubbles and echo chambers

By continuing to receive information distributed by algorithms, users tend to only gain information of their own interest. This is called a "filter bubble" that surrounds users with a film of information. Many thoughts and opinions similar to their own are concentrated inside this bubble, and opposing thoughts and opinions are eliminated (filtered out), making it difficult to notice the latter's existence. Also, as a result of communication with users of similar interests, such as in social media, users receive only opinions similar to their own. This leads to the so-called "echo chamber," where only specific opinions and ideas are amplified. By repeatedly hearing similar opinions, they tend to believe that they are correct and cannot be mistaken.

(3) The distribution of illegal and harmful information

The number of consultations received at the Illegal and Harmful Information Consultation Center, which is operated through MIC consignment, continues to remain high, with 5,745 received in FY2022.

Also, according to a questionnaire survey*1 conducted on social media users, about half (50.9%) of respondents said they had seen defamatory posts on the Internet (slander).

(4) The spread of disinformation and misinformation

A characteristic of social media platform services is that any user can easily transmit (post) information, and that disinformation and misleading information is easily disseminated. This is considered to be one of the reasons why people frequently come into contact with disinformation on social media. Also, with the spread of the attention economy, much disinformation and misinformation created for the purpose of earning advertising revenue is circulating and being spread and amplified by bots.

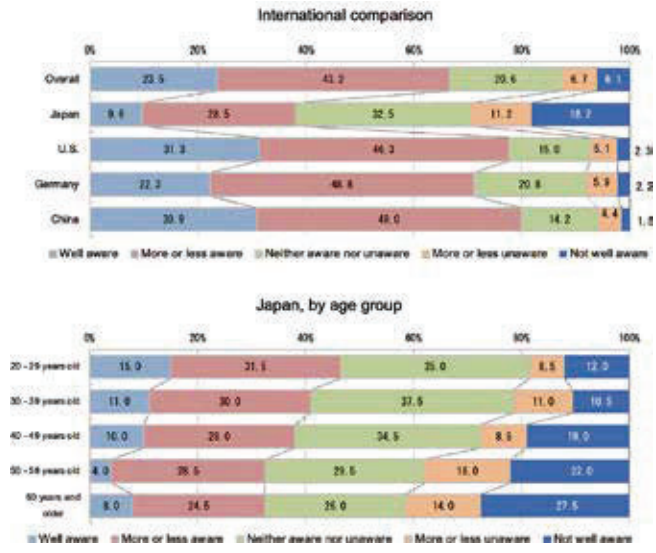
Recently, there have been cases where fake images and videos created using deepfake technology have spread either unintentionally or intentionally. Already, anyone can easily make fake images simply by typing in a few words using AI, raising concerns about the democratization of deepfake technology.

2. Consumer awareness of the characteristics of social media and other platform services

The percentage of respondents who replied that they were "aware" (the sum of "well aware" and "more or less aware") of social media's tendency to expose users disproportionately to opinions and thoughts similar to their own was less than 40% (38.1%) in Japan, while 70% to 80% in the three countries other than Japan. Looking at Japan by age group, the proportion of respondents in their 50s and in their 60s and above who replied that they were "aware" was lower than that of other age groups.

Figure 2: Awareness of social media's tendency to expose users disproportionately to opinions and thoughts similar to their own

(Source) MIC (2023), "Survey Research on Advancement of ICT Infrastructure and Flow of Digital Data and Information"



3. Digital literacy

Improving digital literacy is very important in order to prevent users from being misled by illegal and harmful information, disinformation and misinformation. A survey on the actual situation of disinformation and misinformation in Japan*2 showed that the higher their media literacy, the more likely users are to

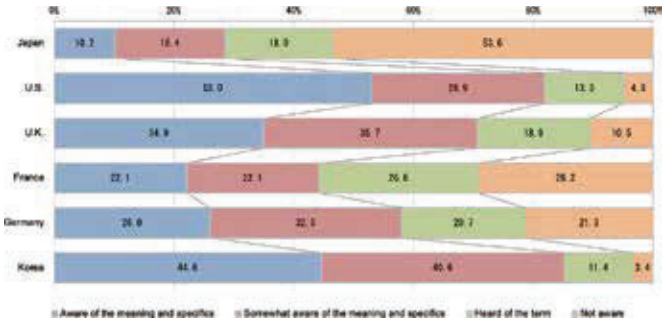
*1 Document 2 from the 40th session of the MIC Platform Service Study Group, "Questionnaire survey on the distribution of illegal and harmful information on the Internet" by Mitsubishi Research Institute (MRI).
*2 International University of Japan GLOCOM, "Innovation Nippon: Understanding the Actual Situation of disinformation and Misinformation in Japan and Examining Social Responses"

recognize disinformation or misinformation, and the less likely they are to spread such information.

4. The promotion of fact-checking

In regard to fact-checking, an activity aimed at verifying the authenticity of information, the percentage of respondents in Japan who answered they were "aware" (total of "aware of the meaning and specifics," "somewhat aware of the meaning and specifics," and "heard of the term") was the lowest (46.5%) among the surveyed countries. Although the awareness of fact-checking in Japan is increasing, it is still low compared to other countries.

Figure 3: Level of awareness of fact-checking
(Source) MIC, "2021 Survey on Awareness about False Information in Japan and Abroad"



Part 2: Toward realizing a resilient and sound data flow society for the new era

Chapter 1: New trends in data flow and use

The implementation of 5G networks that enable ultra-high-speed, ultra-high-capacity data flow and the further advancement of cross-reality (XR) technology and AI are creating new trends in the approaches to data distribution and management and in the services that utilize data.

1. Web3

While issues associated with excessive concentration of data among platform providers have become apparent, Web3 is gaining attention as a new approach to data management and distribution. Web3 is considered "decentralized" because it builds a new digital economic ecosystem where independent users directly interconnect on a decentralized network based on blockchain technology, without relying on a specific platform.

This kind of Web3 environment reduces transaction costs and enables co-creating, storing, and exchanging all kinds of value across borders and platforms. It therefore has the potential to create a significant social impact, such as through the construction of new business models in the cultural and economic domains, investment and economic revitalization, and the promotion of the resolution of social issues.

2. Metaverse and digital twins

(1) Metaverse

With the advancement of communication networks and XR technologies, attention has focused on the "metaverse," which enables the transmission, experience, and sharing of new values linked to the real world and virtual space.

Metaverse is gaining recognition in Japan. Various services are being provided in the entertainment field such as music events and shopping on the metaverse. In addition, attempts have been made to utilize metaverse spaces for providing learning and employment opportunities, as well as for community building in which real cities and virtual spaces are linked.

For example, the University of Tokyo launched the Metaverse School of Engineering in October 2022 to "offer an education in the field of engineering utilizing digital technology with a focus on realizing a society where the latest information and practical engineering skills to fulfill personal goals become available to all."

(2) Digital Twins

A digital twin is a technology that builds a digital representation of a physical entity in a virtual space based on data gathered from the real world. It is expected to provide benefits such as optimized production, improved operational efficiency, reduced time and costs, and the ability to perform simulations not possible in the real world.

Digital twins began to be used mainly by users in the manufacturing industry, such as in the aviation industry and manufacturing lines, and are now being used in a wide range of fields, including national land planning, urban planning, and disaster prevention.

In the field of disaster prevention, since 2019, Shizuoka Prefecture has been promoting the Virtual Shizuoka initiative, which acquires three-dimensional information, such as on topography and buildings throughout the prefecture, as point cloud data and releases it as open data. The prefectural government compares and analyzes information from Virtual Shizuoka and aerial photographs taken in the past with 3D data measured by drones at points where landslides occurred during disasters. In the landslide disaster in Atami City that occurred in July 2021, data were used for early assessment of damage and prevention of secondary disasters.

3. Generative AI

(1) Trends in generative AI

Generative AI technology, which is used for the purpose of generating and creating information, an area traditionally dominated by humans, has been rapidly developing.

OpenAI announced GPT-3, a large-scale language model with 175 billion parameters, in May 2020, ChatGPT chatbot based on GPT 3.5 in November 2022, and GPT-4 in March

2023. In 2022, prompt-based image generation AI (also called text-to-image AI), which generates images with text entered by users, was launched, enabling the use of AI to draw images for humans. Other generative AI for a variety of other purposes have been released, including AI that creates program source code and AI that composes music from text, under human instructions.

(2) Discussions on generative AI

The negative aspects of generative AI, however, are becoming apparent, such as the unintentional or intentional spread of fake images and videos created using it, causing violation of the interests and rights of others and social disruption. With image generation AI readily available, anyone can easily create and spread high-quality fake images. Also, it has been pointed out that it may be causing infringement of intellectual property rights and an economic impact on artists, illustrators, and other content creators.

In addition to stipulating the terms and conditions for use by the companies that provide AI services, it is necessary to ensure that these terms and conditions are properly conveyed to users and to encourage the ethical use of services based on those stipulations.

Also, in regard to multilateral cooperation on the handling of generative AI, discussions were held at the G7 Digital and Technology Ministers' Meeting held in Takasaki City, Gunma Prefecture, in April 2023 on the "Promotion of responsible AI and AI governance." Through the G7 Digital and Technology Ministerial Declaration adopted at the meeting, an agreement was reached on an action plan to promote global interoperability of AI governance and to hold a forum for discussion of generative AI as soon as possible.

Furthermore, at the G7 Summit held in Hiroshima City in May of the same year, Heads of States shared a recognition of the importance of international discussions on AI governance and of the interoperability of AI governance. A summit level agreement was reached to establish the Hiroshima AI Process by the end of the year to discuss generative AI.

Chapter 2: Toward realizing a diverse data flow society

As we have seen, with the advancement of communication infrastructures and the spread of smartphones, various digital services utilizing data have become indispensable to our lives. New forms of data utilization, such as the metaverse and digital twins, are attracting attention and are expected to contribute to resolving various social and economic issues in Japan, including regional revitalization, disaster prevention, and the realization of diverse work styles.

In order to promote the safe and appropriate distribution of data and realize a society in which everyone can enjoy the benefits of data utilization, it is important to promote initiatives centered on the following four axes: (1) resilient telecommunications networks supporting data distribution; (2) early realization of Beyond 5G supporting ultra-high-speed, ultra-large-capacity data distribution; (3) contributions to standardization and development of international rules, and (4) realization of a diverse and sound information space.

Figure 4: Crucial initiatives toward realizing a society where everyone can enjoy the benefits of data utilization