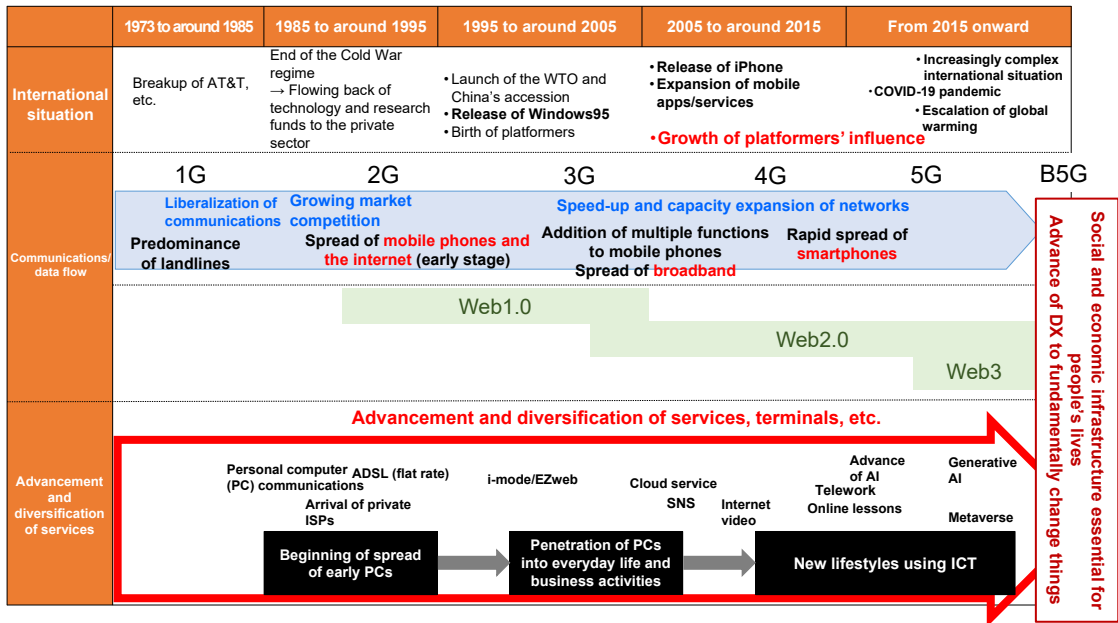


Key Points of the 2023 White Paper on Information and Communications in Japan

Chapter 1 Advancement of the telecommunications infrastructure and progress in data flows

- Data flows continue to grow due to the advancement of telecommunications infrastructure and the diversification of digital services, among other factors.
- At an early stage of the Internet, **one-way data flows**, such as the viewing of websites, was predominant (**Web 1.0**). Since the beginning of the 2000s, **two-way data flows between general users** have continued to grow due to the spread of social networking services (SNS) (**Web 2.0**).



(Source) MIC

(1) Advancement of communications infrastructure to support data distribution

- Regarding fixed communications networks, the **fiber to the home (FTTH)** service was launched in 2001, and during the latter half of the 2000s, the transition from conventional **ADSL** progressed. FTTH surpassed DSL in terms of total subscriptions in 2008, and FTTH services continue to be the mainstream service.
- The **first generation** of the mobile communications network service was launched in 1979, and the **fifth generation** was launched in 2020. The network has undergone a generation cycle of approximately 10 years, continuing its evolution in the direction of increasing speed and volume.

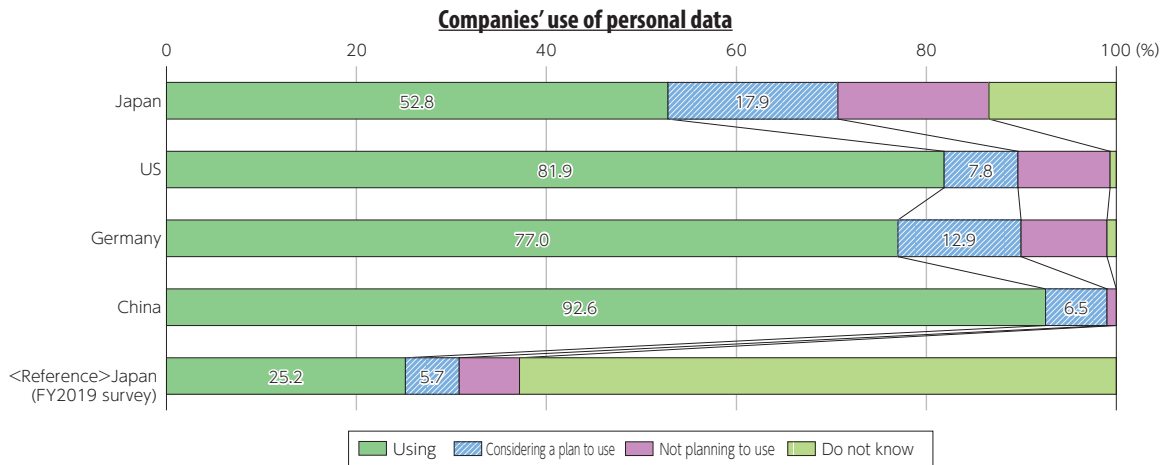
(2) Progress in data distribution and digital services

- Since the launch of Windows 95 in 1995, the Internet spread rapidly in Japan, and data distribution and utilization evolved through several stages
- In the early days of the spread of the Internet (from the mid-1990s to the mid-2000s), the Internet was called **Web 1.0**, and it mainly distributed information and data in one direction, such as through the browsing of websites and the sending of messages via e-mail.
- With the advent of **social media and video posting websites, etc.** around 2005 and the **rapid spread of smartphones**, users shifted to the role of disseminating information themselves. This period of two-way information flows between unspecified numbers of users is referred to as **Web 2.0**.

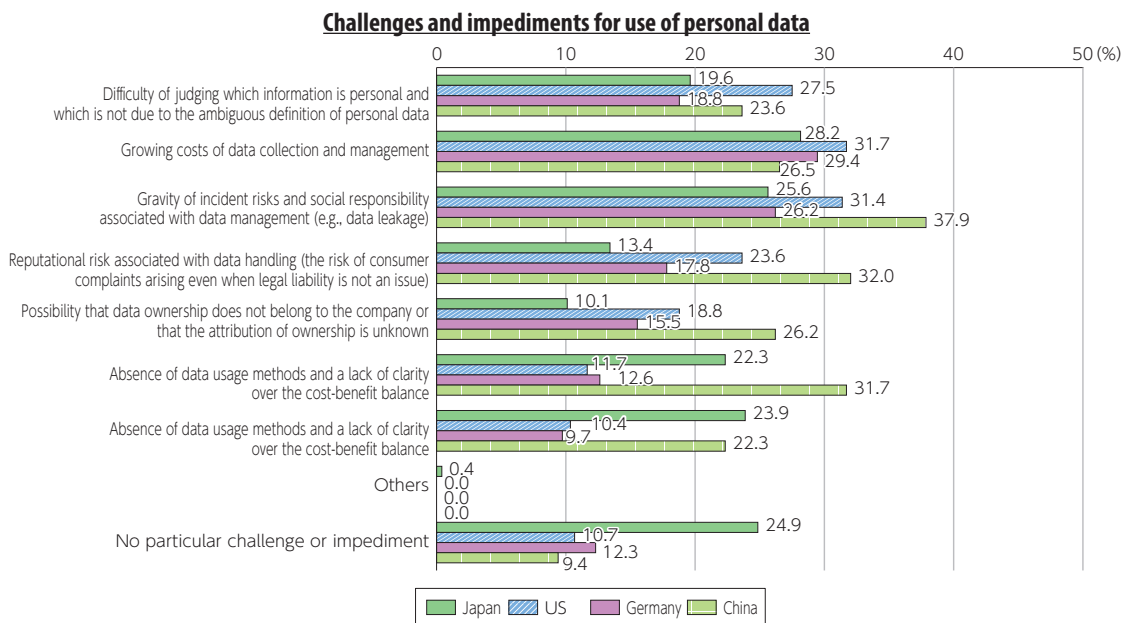
Chapter 2 Current situation and challenges of data flows and use

(1) Data distribution and data utilization continue to accelerate

- While Japanese companies' data utilization is progressing, the rate of its utilization is comparatively low compared with that in the U.S.
- Many Japanese companies cite “costs of data collection and management” and the “gravity of risks and social responsibility associated with data management” as challenges and impediments to data usage.



(Source) Prepared from MIC (2023) “Survey Research on R&D on the Latest Information and Communications Technologies and Trends of Use of Digital Technologies in Japan and Abroad” and MIC (2020) “Survey Research on Consumers' Awareness about Data Flow Environments, etc.”

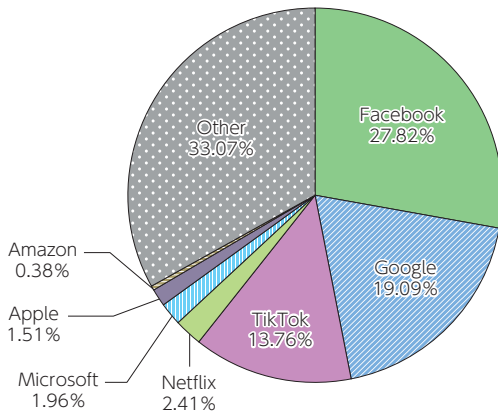


(Source) Prepared from MIC (2023) “Survey Research on R&D on the Latest Information and Communications Technologies and Trends of Use of Digital Technologies in Japan and Abroad”

(2) Concentrating data with platform providers

- Services provided by platform providers (**platformers**), such as social media, e-Commerce, and search functions, make **our lives more convenient**.
- However, through the provision of services, platformers **collect and store vast amounts of digital data**, and they have **established a strong economic position in the digital-related market** through advertising and other activities utilizing such data.

Percentage of mobile data traffic by application



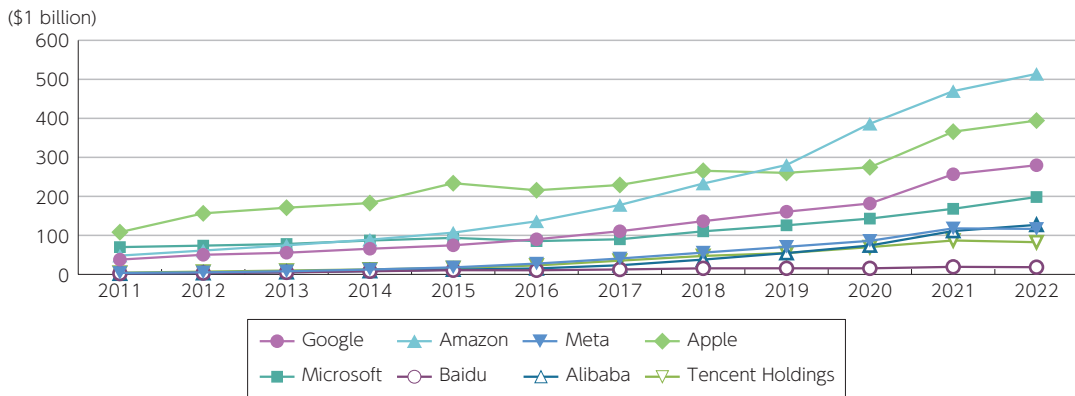
(Source) Based on SANDVNE "PHENOMENA (THE GLOBAL INTERNET PHENOMENA REPORT JANUARY 2023)"

Data items acquired by the platformers

Data item	Platform			
	Google	Facebook	Amazon	Apple
Name	○	○	○	○
User name	–	–	○	–
IP address	○	○	○	○
Search word	○	–	○	○
Details of content	–	○	–	–
Link between content and displayed ads	○	○	–	–
Time, frequency, and duration of activity	○	○	–	○
Buying activity	○	–	○	–
Persons with whom you communicated	○	○	–	–
Activity in third-party apps	○	–	–	–
Browsing history	○	–	○	–

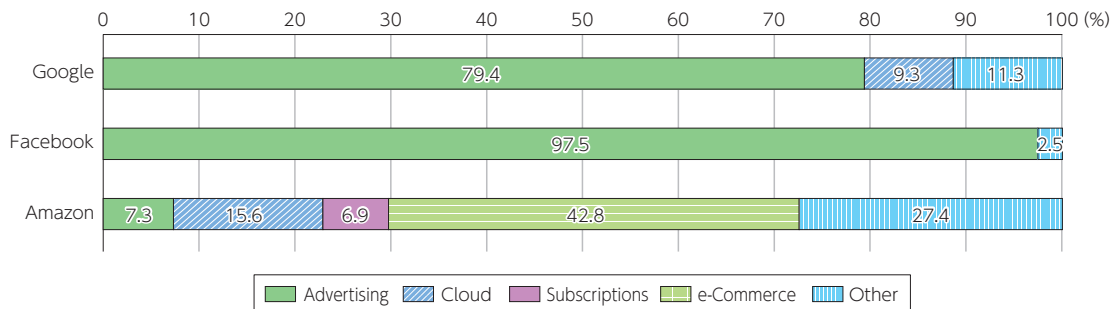
(Source) Extracted from Security.org "The Data Big Tech Companies Have On You"

Change in the sales of major platformers



(Source) Based on data from Statista

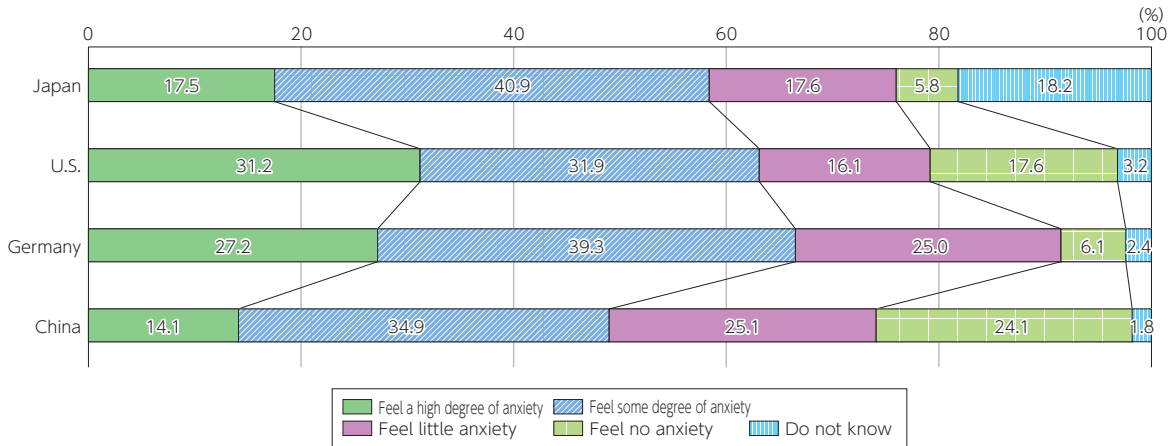
Details of sales (2022)



(Source) Based on the published data of each company

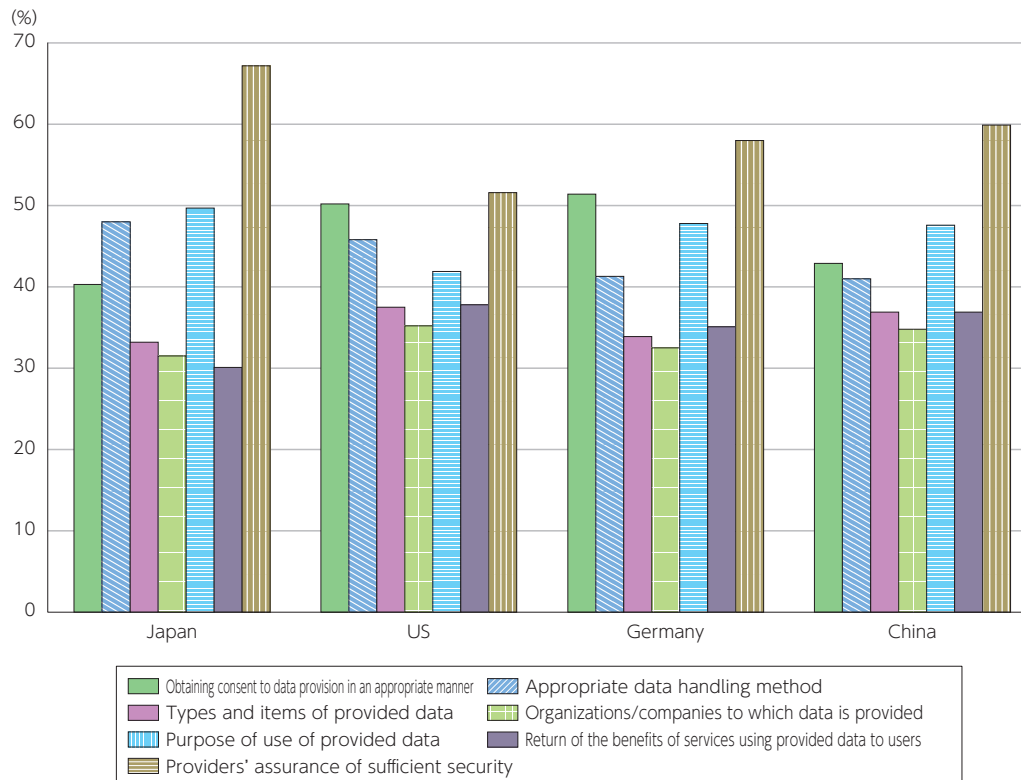
- While digital services provided by platformers, such as SNS and search engines, make our everyday lives more convenient, some users **feel anxiety about providing personal data to platformers** when using their services.
- In Japan, many users cite **“assurance of sufficient security,” “purpose of data usage,”** and **“appropriate data handling methods”** as important points of consideration when providing personal data to platformers.

The presence or absence of anxiety about providing personal data



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

Items and conditions that users consider important when providing personal data

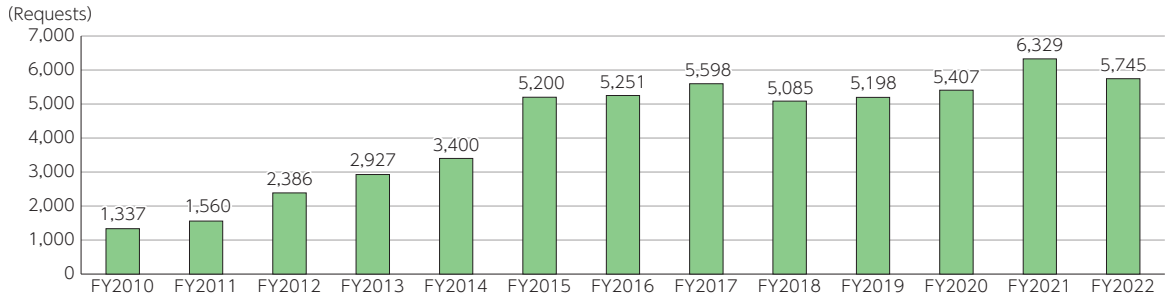


(Source) MIC (2023) “Survey Research on Advancement of ICT Infrastructure and Flow of Digital Data and Information”

(3) The spreading of false information and misinformation on the Internet, etc.

- On platform services including SNS, **information tends to become biased** (e.g., an **echo chamber** where users only see opinions similar to theirs and a **filter bubble** where information other than that favored by the user is automatically excluded) due to the characteristics of the services (e.g., **the attention economy and algorithms**).
- With the spread of SNS, etc., users can easily obtain and send various kinds of information, but the problem of **distribution and diffusion of slander, defamation, and disinformation** has come to the surface. The spread of **AI Deep Fakes** is likely to accelerate the diffusion of fake images and videos.

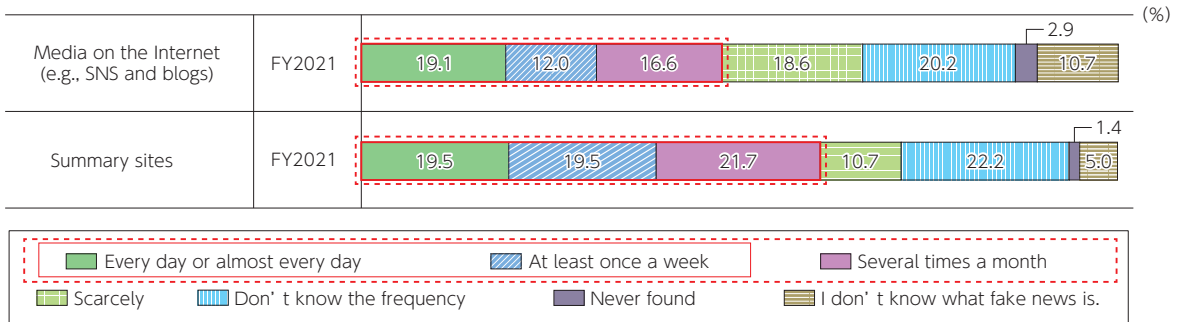
Changes in the number of requests for consultation submitted to the Illegal Harmful Hotline



(Source) MIC "FY2022 Report on contract works, including consultation services concerning illegal/harmful information on the Internet (summary)"

The frequency of contact with disinformation and misinformation on the Internet

How frequently have you found fake news* in the following media during the past month?
 *The term refers to false or misleading information/news

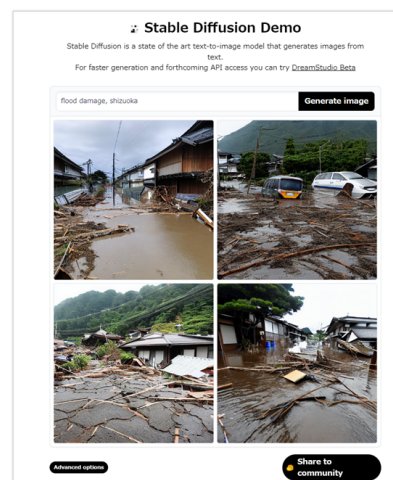


(Source) MIC (2023) "Survey Research on Advancement of ICT Infrastructure and Flow of Digital Data and Information"

Cases of disinformation / misinformation

Year	Area	Details
2021	Europe	European lawmakers conducted video conference calls unaware that the video of Russian lawmakers was a deepfake video.
2022	Japan	Stable Diffusion was used to create a hoax image of flooding from a typhoon in Shizuoka Prefecture, which was posted on Twitter.
2023	U.S.	A political activist created a video of President Biden announcing the start of World War III. The creator explained that it was created with AI, but many people shared the video without this explanation.
	U.S.	The founder of Bellingcat used Midjourney to create and publish a fake image of former President Trump being arrested that went viral on Twitter.

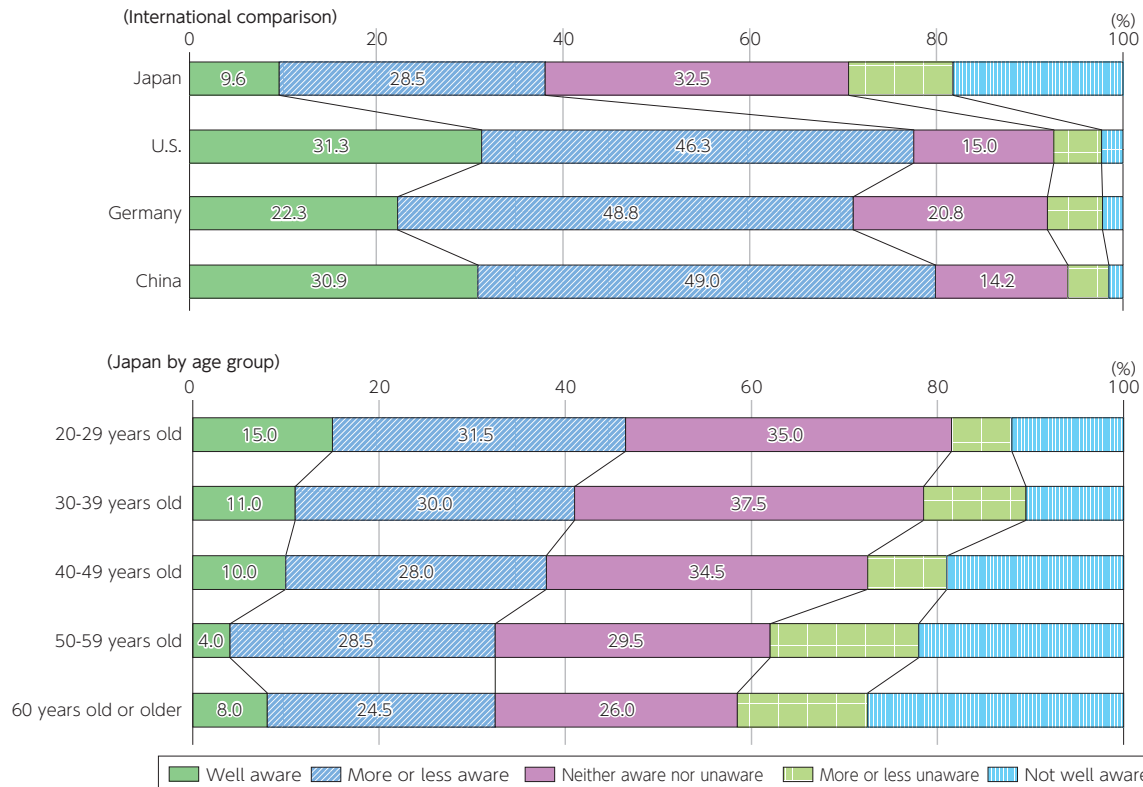
(Source) Based on various websites



(Source) Spectee, "Shizuoka disaster rumor — New age brought about a rapid evolution of image generation AI" (September 28, 2022)

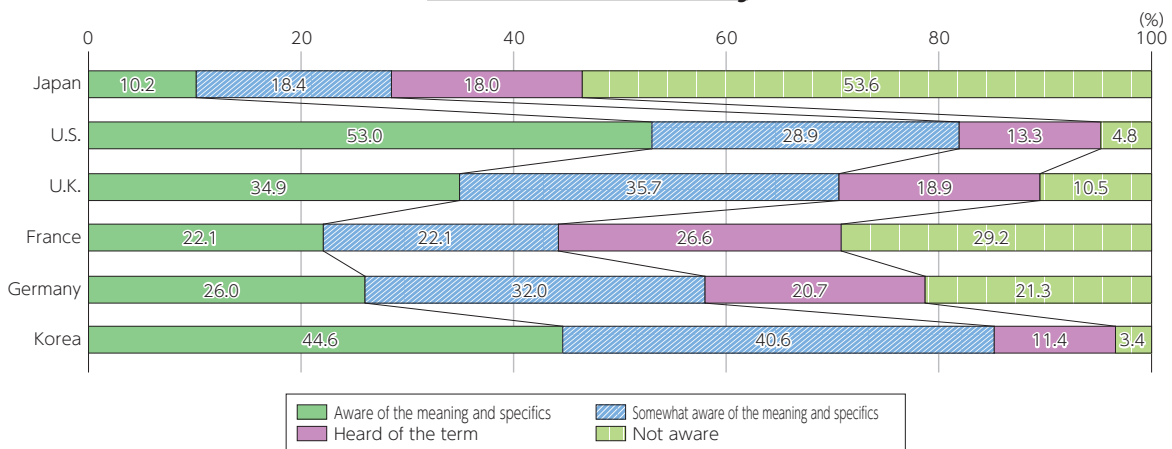
- The percentage of those who replied that they were **aware** (those who replied that they were “well aware” or “more or less aware”) of the tendency of SNS to **expose users disproportionately to opinions and thoughts similar to their own** (the echo chamber effect) was **low compared with the percentages in the United States and Europe**. In Japan, by age group, **the percentage of those who replied that they were aware of that tendency was low among respondents in their 50s and 60s compared with other age groups**.
- The level of awareness of activities to counter false information and misinformation, such as **fact-checking**, is also **low in Japan compared with other countries**.

Awareness of the echo chamber effect



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

Level of awareness of fact checking

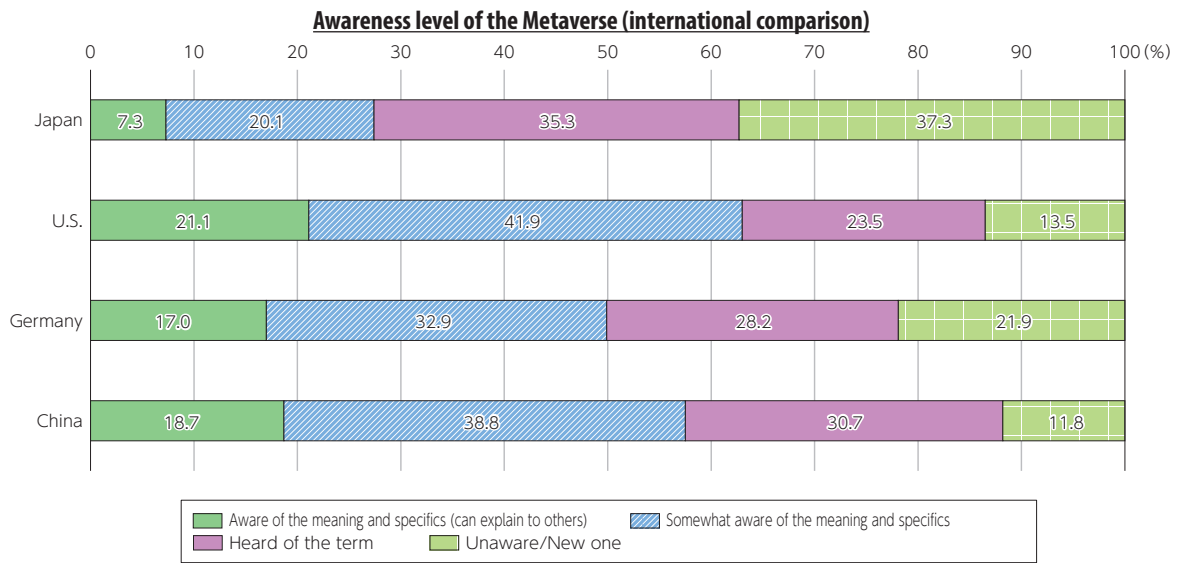


(Source) MIC "2021 Survey on Awareness about False Information in Japan and Abroad"

Chapter 3 Toward realizing a resilient and sound data flow society

(1) New trends in data distribution and utilization

- A new trend in data distribution is the emergence of **Web 3**, based on data distribution and distribution management using blockchain, and its applied technologies (e.g., distributed autonomous organizations).
- With the advancement of communications networks and XR technology, etc., new services that utilize **the Metaverse and digital twins** have emerged, and public awareness in Japan is improving. These services are **utilized** not only for entertainment but also for **education, regional revitalization, infrastructure management, disaster prevention, agriculture, etc.**
- Rapidly evolving **generative AI** includes Chat GPT, an interactive language model, and prompt-based image generation AI that generates images when you type text.



An example of a metaverse application

Metaverse School of Engineering,
the University of Tokyo



(Source) The University of Tokyo

Digital twin application example

Virtual Shizuoka



(Source) Shizuoka Prefecture

(2) Toward realizing a prosperous data distribution society

- **Diverse digital services using data** have penetrated deep into our lives. Application technologies related to Web 3 and **new services, such as the Metaverse**, are also attracting attention, and there are expectations that those services **will contribute to resolving various social and economic challenges** faced by Japan, including regional revitalization and disaster risk management.
- It is important to promote efforts to **realize a society in which everyone can enjoy the benefits of data usage by promoting safe and appropriate data flows**

Initiatives for data distribution and utilization

Resilient communications networks underpinning data flows

- **Develop communications networks resilient against disasters and secure alternative means of communication** (e.g., intercarrier roaming and the use of non-terrestrial networks) in order to realize an environment conducive to the continuous use of digital services in emergencies.
- Promote **geographical diversification of data centers and submarine cables** from the viewpoint of enhancing resilience against disasters.
- **Strengthen cybersecurity and the response to supply chain risks** from the viewpoint of economic security amid the increasingly complex international situation.

Early realization of Beyond 5G to underpin ultra-high-speed, ultra-high-capacity data flows

- Strengthen and accelerate efforts to develop **Beyond 5G (6G), which enables ultra-high-speed, ultra-high-capacity data flows with ultra-low delays** in order to spread new services, including the Metaverse, and realize the data-driven Society 5.0.
- Amid the deepening of environmental problems, including global warming, it is necessary to realize at an early time **Beyond 5G, which enables data flows with ultra-low electricity consumption**.

Contributions to standardization and the development of international rules

- In borderless digital spaces, it is important to **promote standardization and develop rules in cooperation with the international community**.
- Regarding **AI**, which is spreading and evolving at a remarkable pace, promote the **development of an AI usage environment** in cooperation with other countries based on the **Hiroshima AI Process**, which was launched at the **G7 Hiroshima Summit**, and the **action plan agreed on at the G7 Digital and Tech Ministers' Meeting**.
- Regarding the **Metaverse**, promote efforts to realize **interoperability** between different metaverse platforms, and **develop international standardization concerning relevant technologies**.

Realization of a diverse and sound information space

- **Improve literacy** so that **individuals can appropriately receive and disseminate information and make correct use of new tools and services**, including AI, in internet spaces where various sorts of data and information flow.
- Encourage a **broad range of stakeholders**, including platformers that provide information, to make voluntary efforts (e.g., fact-checking and research and development) on the condition that consideration be given to freedom of expression and that transparency is ensured.

Chapter 4 Trends in the ICT market

Item	Year	Total	YoY
ICT market size (expenditure)	2022	27.2 trillion yen	+ 5.2%
Domestic value of ICT industry (nominal)	2021	52.7 trillion yen	+ 0.8%
ICT investment	2021	15.5 trillion yen	▲ 0.4%
Import value of ICT goods and services (nominal)	2021	19.2 trillion yen	+ 14.6%
Export value of ICT goods and services (nominal)	2021	12 trillion yen	+ 13.3%
Research spending on ICT	2021	3.4 trillion yen	▲ 1.6%
Researchers in ICT industry	2021	157,000	▲ 6.0%
Population coverage rate of 5G	2021	93.2%	—
Internet traffic	2022	29.2 Tbps	+ 23.7%
Fixed-line broadband services subscriptions	2021	43.83 million	+ 2.7%
Sales of all broadcasters	2021	3.7 trillion yen	+ 4.6%
Subscribers to broadcasting services	2021	81.613 million	▲ 0.2%
Size of the digital advertising market	2022	3.1 trillion yen	+ 13.7%
Number of 5G-compatible smartphone shipments	2021	17.53 million units	+ 67.7%
Market size of 5G base stations (shipment value)	2022	303.5 billion yen	+ 6.2%
Size of video streaming market	2022	530.5 billion yen	+ 15.0%
Size of metaverse market (sales)	2022	182.5 billion yen	+ 145.3%
Size of data center service market	2022	2.0 trillion yen	+ 15.3%
Size of cloud service market (sales)	2022	2.2 trillion yen	+ 29.8%
Number of cyber-attack-related communications detected by NICTER	2022	About 526.6 billion	+ 0.9%
Internet usage rate (individuals)	2022	84.9%	82.9%*
Smartphones ownership rate (individuals)	2022	77.3%	74.3%*
Telework use situation	2022	51.7%	51.9%*
State of introduction of IoT/AI	2022	13.5%	14.9%*

*Indicates the percentage of the previous year, not the year-on-year change

Chapter 5 Status of the ICT policy at the MIC

Promotion of a comprehensive ICT policy

Promotion of the Vision for a Digital Carden City Nation

- Toward realization of the vision, the MIC is accelerating the “development of hard and soft digital infrastructure,” “development and securing of digital human resources,” “initiatives to prevent leaving anyone behind,” and other initiatives.
- **Vigorously promoting the development of digital infrastructure including optical fiber and 5G based on the Infrastructure Development Plan for a Digital Garden City Nation (revised version)**

A deliberation on the information and communications policies with a view to 2030

- The General Policy Committee, the Information and Communications Policy Section of the Information and Communication Council, **backcast** the international competitiveness of Japan’s information and communications industry and the safe and secure utilization environment **from the projected future situation in 2030**, and it discussed the ideal direction of the information and communication policies in 10 years. The committee compiled and published its **final report, “Information and communications policies with a view to 2030”** in June 2023.

Telecommunications business policy

Developing and maintaining digital infrastructure and securing its security and reliability

- Develop optical fiber toward achieving the goal (a household coverage rate for optical fiber of 99.9% at the end of fiscal 2027) of the **Infrastructure Development Plan for a Digital Garden City Nation**, and support the decentralization of datacenters and submarine cables by using the **Digital Infrastructure Development Fund**. Hold the **Study Group on Intercarrier Roaming in Emergency Situations** to discuss the mutual use of networks among carriers in emergencies.

Development of a safe and secure utilization environment

- Promote the development of consumer protection rules, and **respond to illegal/harmful information and dis/misinformation** on the Internet and other efforts.

Radio policy

Spread and dissemination of 5G

- Work toward achieving the goal (a population coverage rate for 5G of 97% nationwide at the end of fiscal 2025) of the **Infrastructure Development Plan for a Digital Garden City Nation**; promote the spread of 5G by providing subsidies and tax benefits; and implement initiatives to promote infrastructure sharing.

Broadcasting policy

Deliberation on the vision of future broadcasting and the ideal broadcasting system

- Based on the recommendations, etc. of the **Study Group on the Ideal Broadcasting System in the Digital Age**, the MIC is promoting the shared use of equipment, reviewing the principle of decentralization of media, and developing systems to enable identification of broadcasting programs in multiple regions

Improving the resilience of broadcast networks and enhancing disaster resistance

- Promote the development of an environment for the sure delivery of information in times of disaster by enhancing the disaster resilience of the broadcast network through the conversion of cable television to fiber optics

Cybersecurity policy

Securing the safety and reliability of information and communications networks

- In order to create an environment for citizens to use ICT with security, the MIC promotes activities to ensure the security of IoT devices and initiatives by telecommunications carriers to detect C&C servers and to address supply chain risks.

Developing cybersecurity human resources

- Promote the development of cybersecurity human resources through NICT National Cyber Training Center (e.g., CYDER).

Promotion of ICT

Promoting the use of ICT that contribute to solving social/economic issues

- Promote **Local 5G** and the spread of telework and ICT utilization in education, medical care, and other fields.

Creating an environment where everyone can enjoy the convenience of ICT

- Promote initiatives to bridge the digital divide toward digitalization that leave no one behind (e.g., support for the elderly to use digital technology and support for barrier-free information) and **consideration/efforts to improve ICT literacy**.

ICT technology policy

R&D implementation and international standardization toward Beyond 5G

- Toward the realization of Beyond 5G (6G), which is the next-generation information and communications infrastructure, the ministry **vigorously promotes R&D aimed at social implementation and overseas expansion with a focus on the technology fields where Japan has strengths** while promoting the **international standardization** of Beyond 5G through collaborations between industry, government, and academia.

Global strategy for ICT

Contribute to strengthening Japan's international competitiveness in the ICT sector and solving global social issues

- In order to contribute to strengthening Japan's international competitiveness in the ICT sector and solving global social issues, the MIC promotes the **overseas expansion of digital infrastructure, etc.** and **bilateral and multilateral collaborations in digitalization** (e.g., Japan-US, Japan-EU, QUAD, G7 and IGF)
- At the **G7 Digital and Tech Ministers' Meeting** in April 2023, participants discussed six themes, such as "Secure and resilient digital infrastructure," "Maintaining and promoting a free and open Internet," and "Promotion of Responsible AI and Global AI Governance." As a result of the meeting, the ministers **adopted the "G7 Digital and Tech Ministers' Declaration."**

Postal service administration

Reviewing regional contributions by post offices in a digital society

- Discuss measures for the spread and utilization of personal number cards in post offices; promote the utilization of post offices as a counter for administrative services; and implement demonstration projects for collaborations between post offices and public infrastructure in the region.