

Overview of the 2024 White Paper on Information and Communications

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This White Paper includes two special features. The first feature, “The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake”, summarizes the damage to telecommunications and broadcasting infrastructure in the 2024 Noto Peninsula Earthquake, recovery efforts, the role played by information communication technology (ICT), and the issues that emerged and future efforts. The second feature, “Living in Harmony with Evolving Digital Technologies”, touches on the new possibilities and risks that AI and other technologies bring to society and the economy, and looks at the prospects for sound utilization of these technologies.

Special Feature 1 : The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake

Chapter1 The Status of Information and Communications related to the 2024 Noto Peninsula Earthquake

Section1 Summary of the 2024 Noto Peninsula Earthquake

The earthquake that occurred in the Noto region of Ishikawa Prefecture on January 1, 2024 had a significant impact on the information and communication infrastructure, causing disruptions in communication networks and power outages, affecting the use of smartphones and other communication devices, and leading to the suspension of television broadcasts in the Hokuriku region. Efforts were made by telecommunication companies, local governments, and government agencies to restore the information and communication infrastructure.

Section2 Status of communication, broadcasting and postal services etc.

1. Damages to communication infrastructure

Regarding fixed-line communications, services were unavailable mainly in Wajima City, Suzu City, and Shika Town in Ishikawa Prefecture. According to NTT West, this affected up to 7,860 fixed telephone lines and approximately 1,500 fixed internet lines.

A total of 839 mobile phone base stations (799 in Ishikawa Prefecture) was reported outage.

2. Damages to broadcasting network

Regarding the terrestrial television broadcasting, there were service disruptions for NHK, Japan’s public broadcaster, and four

private broadcasters in some areas of Wajima City in Ishikawa Prefecture, impacting approximately 2,130 households.

As for cable broadcasting, Wajima City, Nanao City and Noto Town which are directly managed by local governments, Suzu City, and Anamizu Town which falls within the service area of Nouetsu Cablenet, and as well Shika Town which falls within the service area of Kanazawa Cable, there were instances of transmission disruption due to power outages, depletion of backup power, and the collapse of utility poles due to landslides.

3. Damages to postal offices etc.

Due to the effects of the earthquake, including the collapse of postal facilities, water supply disruptions, and equipment failures, up to 117 post offices (including temporary post offices) in Ishikawa and Niigata prefectures suspended counter services. Additionally, delays and suspensions in postal and logistics operations occurred in these regions.

4. Initiatives to ensure communication tools

(1) Operation of mobile and portable base stations, mobile power supply vehicles, and generators

To address disruptions caused by landslides and prolonged power outages immediately after the disaster, each mobile phone service provider operated maximum approximately 100 mobile and portable base stations and utilized a total of maximum approximately 200 mobile power supply vehicles and generators in collaboration with the government and private sector.

(2) Utilization of mobile base stations

NTT DOCOMO and KDDI jointly operated a shipbased mobile base station to provide coverage to coastal areas in part of Wajima City, where restoration via land routes was challenging.

Additionally, SoftBank deployed a drone-based wireless base station capable of long-duration flights by providing wired power from ground-based power supply equipment.

(3) Utilization of satellite communication services

Related to the Noto Peninsula Earthquake, many areas experienced a loss of communication services due to transmission line disruptions and power outages at mobile phone base stations. To address this issue and facilitate emergency restoration, SpaceX’s low Earth orbit satellite communication service, Starlink, was widely utilized. KDDI, in particular, used Starlink antennas to connect to mobile phone base stations as a substitute for fiber optic and other communication cables that were severed by landslides. In addition to KDDI, NTT DOCOMO and SoftBank also provided Starlink equipments to evacuation centers and Disaster Medical Assistance Teams (DMAT), enabling internet communication via Wi-Fi.

Chapter2 The Roles which the Information and Communications Took and Challenges

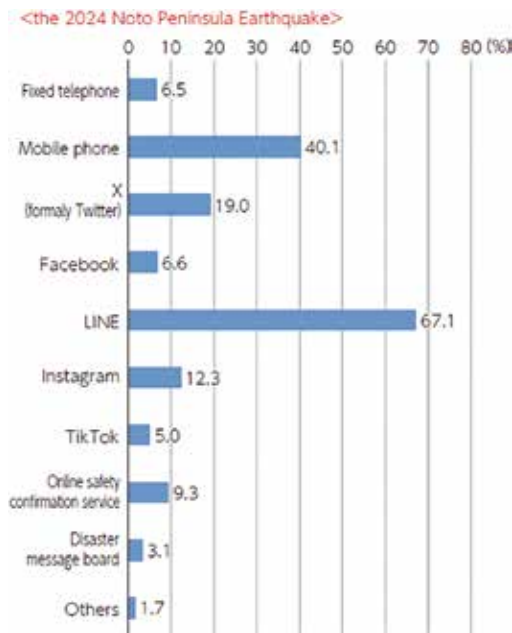
Section1 Information gathering and dissemination related to the disaster

1. How the citizens gathered the information related to the disaster

To investigate how people utilized information and communication tools to obtain earthquake-related information, a nationwide survey was conducted targeting the citizens.

Firstly, when asked how they confirmed the safety of family, friends, and acquaintances at the time when the Noto Peninsula Earthquake occurred, the most common response was LINE (67.1%), followed by mobile phones(40.1%).

■ Figure 1: How to confirm the safety of family, friends and acquaintances etc.



※ Among all respondents, the methods used by those who answered "conducted safety confirmation" (n=604) were aggregated.

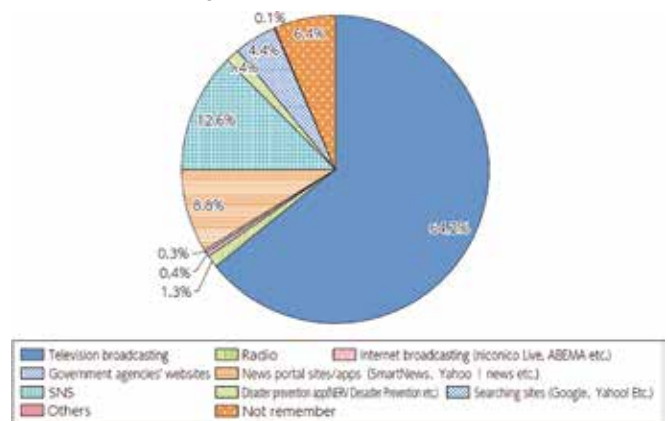
(Source) The Ministry of Internal Affairs and Communications (MIC) (2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Secondly, when asked which media they first accessed after noticing the earthquake, 64.2% of respondents mentioned television broadcasts (NHK and private broadcasters combined), which was higher than other options.

Looking at the data by age group, television broadcasts were the most accessed across all age groups, with the percentage increasing with age. Among those in their 20s, a high percentage also mentioned social media (30.5%).

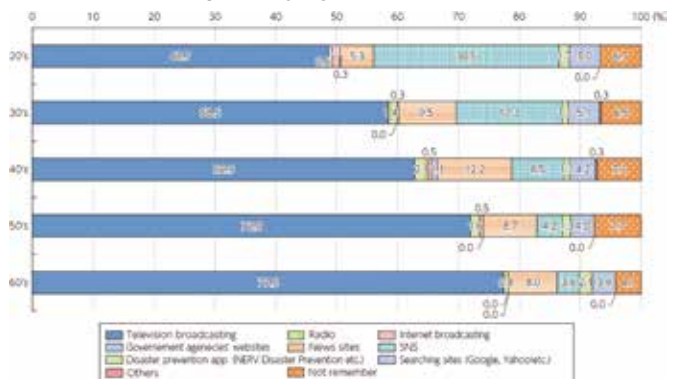
Among those who encountered such information, 25.5% admitted to sharing it with acquaintances or disseminating it to a broader audience. The reasons given for this included "believing the information would be useful to others," "finding the information interesting," and "wanting to alert others to the possibility that the information might be incorrect."

■ Figure 2: Media firstly accessed after noticing the earthquake



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

■ Figure 3: Media firstly accessed after noticing the earthquake by age



(Source) MIC(2024) "Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally"

Section2 Highlighted issues and responses in the future

1. Communication

(1) Strengthening mobile base stations and optical fiber

In the Noto Peninsula Earthquake, power outages and transmission line disruptions caused mobile base stations to be non-functional for extended periods. To fortify mobile base stations against future disasters, it is necessary to consider measures such as extending the lifespan of the batteries installed in these stations, installing solar panels, and utilizing satellite connections.

Additionally, the disruption of transmission lines also rendered fixed internet services unusable. To prevent future disruptions caused by the collapse of utility poles and the severing of optical fibers, it is essential to promote the underground installation of these fibers.

(2) Achieving intercarrier roaming in emergencies

"Intercarrier Roaming," which allows mobile phone users to temporarily use another mobile carrier's network, is one strategy to ensure continuous communication services related to natural

disasters or communication failures.

The Ministry of Internal Affairs and Communications (MIC), Japan has been holding the “Study Group on Intercarrier Roaming in Emergency Situations”. The study group is also conducting technical examinations and verifications.

2. Broadcasting

In response to the recent Noto Peninsula Earthquake, broadcasters played a crucial role in delivering accurate information to the affected individuals. However, challenges such as power outages and transmission line disruptions leading to service interruptions also became apparent. In preparation for future disasters, it is necessary to strengthen broadcast networks by implementing measures such as power outage countermeasures for center facilities, enhancing monitoring capabilities for transmission lines, and promoting the shared use and common facilities of relay stations. Additionally, measures such as optical and multiple-wire conversion of cable networks should be implemented to enhance the resilience of broadcast networks.

3. Postal services

Efforts are being considered to utilize data held by the post office, such as by installing drive recorders on delivery vehicles to selectively collect and analyze information on the road conditions in the Okunoto region.

4. Response to dis-/mis-information

In the Noto Peninsula Earthquake, the circulation and spread of dis-/mis-information on the Internet became a significant issue, exacerbated by the increased use of social media by the public. The MIC issued a warning about dis-/mis-information on the Internet through social media on January 2, the day after the disaster. Additionally, the MIC requested major social media platform operators to take appropriate actions based on their terms of use.

Special Feature 2 : Living in Harmony with Evolving Digital Technologies

Chapter3 History of Digital Technologies
Section1 History of development of AI and impacts of generative AI

1. History of development of AI

The history of AI began in the 1950s and has experienced several cycles of booms and winters. The first AI boom, which started with exploration and reasoning, led to the incorporation of technologies such as speech recognition in the second AI boom. The third AI boom introduced innovative technologies such as deep learning, paving the way for practical AI applications to permeate society. The rapid proliferation of generative AI around 2022 marked the onset of what is now referred to as the fourth AI boom.

2. Impacts of generative AI

(1) Rapid progress and dissemination of generative AI

The advent of deep learning as a foundational technology has led to a significant improvement in AI performance, giving rise to AI that can autonomously generate various types of content. “Generative AI” is a collective term for AI technologies that can

autonomously generate text, images, sound, and more. This field gained particular attention following the announcement of the conversational AI “ChatGPT” by OpenAI in 2022.

Section2 Evolving technologies along with the progress of AI

The evolution of AI, as reviewed in the previous section, is also influencing other technologies. Particularly, the development of deep learning during the third AI boom has contributed to the development of virtual space services using extended reality (XR), service robots, autonomous driving, and more. The advent of generative AI further supports the advancement of these technologies.

Figure 4: Changes in evolving technologies along with the progress of AI



Chapter4 Issues and Current Responses to Digital Technologies

Section1 Issues and current initiatives along with the advancement of AI

Although the development of AI has brought convenience to our lives, it also comes with risks and challenges that need to be considered. In the past, using inappropriate or biased data for training AI models has led to increased bias and errors, resulting in decreased reliability of predictions. Many traditional machine learning models have also been criticized for being black boxes (lack of transparency), making it difficult to understand their internal workings and potentially causing issues in critical decision-making scenarios. Additionally, as generative AI rapidly develops and becomes more widespread, specific challenges and risks have become apparent.

1. Issues of generative AI

The “AI Business Guidelines (Version 1.0)” formulated by the MIC and the Ministry of Economy, Trade and Industry (METI) in April 2024 provide examples of risks that have become apparent due to the use of generative AI, in addition to the risks associated with conventional AI. Additionally, there is a risk of perpetuating biases and amplifying prejudices present in existing information if AI-generated responses based on such information are uncritically accepted.

The development of Large Language Models (LLMs), which form the foundation of generative AI, is being led by major tech companies such as Microsoft and Google in the U.S.. However, simply utilizing LLMs developed through closed research and development by non-Japanese entities other than Japan may lead to the black-boxing of the LLMs construction process, raising concerns about rights infringement and information leakage when

utilizing LLMs. To ensure the effective utilization of LLMs with a strong focus on the Japanese language, it is essential to have domestically developed LLMs with high transparency, where the construction process and the data used are clearly visible, providing a sense of security. Some Japanese companies are already independently working on LLMs development.

2. Issues caused by generative AI

(1) Challenges and countermeasures for the circulation and spread of dis-/mis-information

In recent years, the use of deepfakes for information manipulation and criminal activities has been increasing worldwide, and efforts to address this issue are being made from various quarters.

In Japan, the MIC has been holding discussions since 2023 on ensuring the healthiness of information circulation in the digital space in the “Study Group on Ensuring the Healthiness of Information Circulation in the Digital Space”.

Technological measures include the development of the Originator Profile (OP) technology, which links information content such as news articles and advertisements to the originator’s information.

Section2 Responses to AI by country

In the midst of the rapid proliferation of AI, including generative AI, addressing the ethical and societal issues that have arisen requires collaborative efforts not only domestically but also internationally.

1. Trends in international discussion

Our country has been at the forefront of discussions in G7/G20 and the Organization for Economic Co-operation and Development (OECD), playing a significant role in formulating AI principles. G7 Hiroshima Summit held in 2023, and the leaders’ communiqué at the summit instructed the establishment of the Hiroshima AI Process for discussions on generative AI. In December of the same year, a Comprehensive Policy Framework for the Hiroshima AI Process, including Project-Based Cooperation on AI,” etc., were announced.

2. Trends in creation of legal rules and guidelines by country

Discussions on legal frameworks and international standards related to AI are actively taking place in various countries around the world. The year 2023 has become a significant milestone for AI policy, marked by the adoption of the EU AI Act by the European Parliament, the issuance of an executive order on AI safety in the U.S., and the publication of draft guidelines for AI-related businesses in Japan. In the establishment of regulations for rapidly evolving technologies, it is essential for governments to take the lead while also requiring voluntary efforts from AI businesses. This dual approach of public and private sector collaboration is currently being advanced.

In Japan, in May 2023, the government established the “AI Strategic Council” to discuss various themes such as addressing AI risks, optimal AI utilization, and measures to strengthen AI development capabilities and began work on integrating guidelines from various ministries. The “AI Guidelines for Business Ver 1.0”

were published on April, 2024.

Additionally, Japanese Prime Minister Kishida announced the establishment of the “AI Safety Institute” (AISI) in Japan, similar to institutions in the U.S. and the UK, in response to the growing international concern over AI safety. On February, 2024, the AISI was established under the Information-technology Promotion Agency (IPA). The AISI will collaborate with similar institutions in the UK, the U.S., and other countries to develop standards and guidance to improve the safety of AI development, provision, and utilization, conduct research on AI safety evaluation methods, and investigate technologies and case studies related to AI safety.

Chapter5 Penetration of Digital Technologies

Section1 Status of use by the citizens and corporations

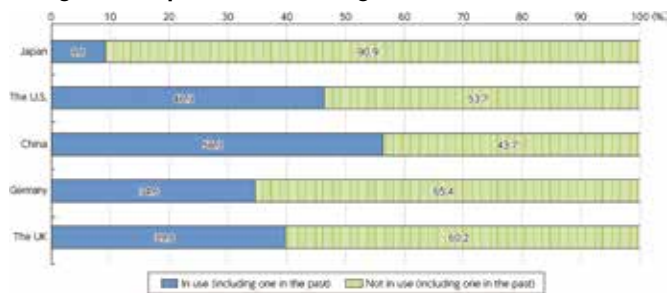
1. Generative AI

(1) Questionnaire to the general public

The MIC conducted a survey on the usage of “Digital Technology,” including generative AI, among citizens of Japan, the U.S., China, Germany, and the UK. According to the survey, the percentage of respondents in Japan who reported “Using” generative AI (including those who have used it in the past) was 91.1%, which was lower compared to other countries.

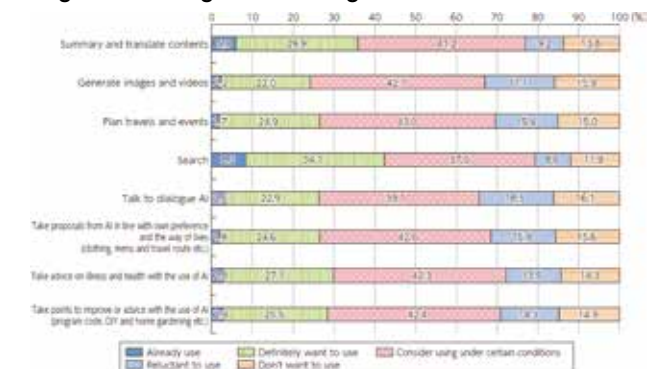
On the other hand, when asked about their willingness to utilize generative AI in their future lives and leisure activities, the percentage of respondents in Japan who indicated “already

Figure 5: Experiences to use generative AI



(Source) MIC(2024) “Research and study on the advancement of digital technologies and their utilization”

Figure 6: Willingness to use generative AI



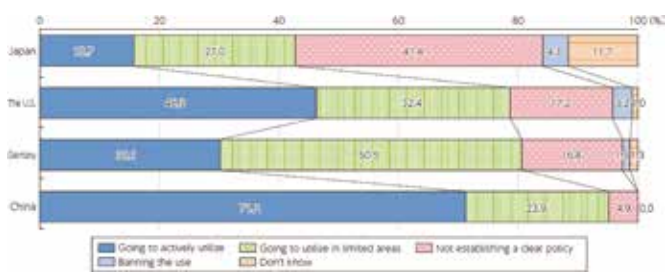
(Source) MIC(2024) “Research and study on the advancement of digital technologies and their utilization”

using it” was low. However, around 60-70% expressed an interest in using generative AI in the future, with some stating that they would “definitely like to use it” or “consider using it depending on the conditions,” indicating potential demand for such services.

(2) Questionnaire to corporates

This survey was also conducted targeting businesses in each country to inquire about the utilization of generative AI in their operations. When asked whether they had established a policy for utilizing generative AI, 42.7% of Japanese companies responded that they had “established a policy for utilizing it” (combining those who actively utilize it and those who use it in limited areas).

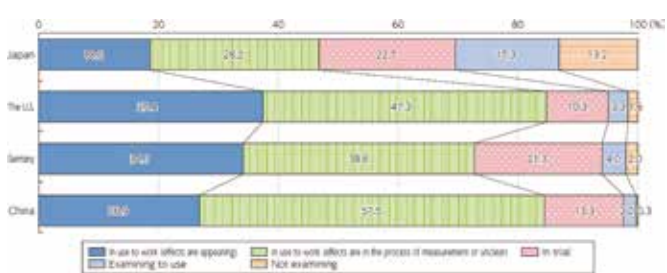
Figure 7: Status to establish a policy for utilizing generative AI



(Source) MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

When asked about the utilization of generative AI in specific business operations, such as “assistance in email, meeting minutes, and document creation,” 46.8% of Japanese companies reported using generative AI in their operations. Indicating that overseas, active utilization has begun in various areas, including customer support, while Japanese companies are proceeding with cautious adoption, particularly for internal operations.

Figure 8: Status to utilize generative AI in business operations (support for creation of mail, minutes and material)



(Source) MIC (2024) “Research and study on the latest trends in information and communication technology research and development, as well as digital utilization, both domestically and internationally”

1. Promotion of use of digital technologies to strengthen industrial competitiveness and solve social issues

Digital technology is an indispensable element for strengthening industrial competitiveness and solving social issues. (i) To promote its use in different fields, the MIC will enhance AI computing resources, expand and improve high-quality data, and advance research and development of foundational models (to strengthen AI development capabilities). (ii) The use of digital technologies for addressing societal challenges on a case-by-case basis will be promoted. (iii) Enhancing transparency and improving fairness in the market environment and user protection will be promoted, etc.

2. Ensuring the healthiness of information circulation in digital space, improving the literacy and developing human resource

In the increasingly complex digital space due to generative AI, ensuring the healthiness of information flow is crucial, as is improving skills to effectively use technologies. (i) The MIC will consider responses to the distribution and spread of dis-/mis-information, involving a wide range of stakeholders, including platform operators. (ii) Measures to improve literacy so that citizens can appropriately send and receive information will be promoted. (iii) The development and skill enhancement of human resources who can appropriately and proactively use digital technologies will be promoted, etc.

3. Realization of communication network which is a foundation of digital technologies

In response to the structural changes in networks driven by AI and the proliferation of new services such as the metaverse, the need for a stable communication network is increased. (i) The MIC will promote initiatives towards Beyond 5G, which enables ultra-high-speed, ultra-large-capacity, ultra-low-latency data transmission, and low power consumption. (ii) Building communication networks for the realization of autonomous driving will be promoted, etc.

4. Creation and application of rules and international cooperation to ensure safe, secure and reliable use

It is important to collaborate with the international community to promote and establish standards and rules in the borderless digital space. (i) Raising awareness of the AI Guidelines for Business and considering the institutional framework as the whole of the government will be promoted. (ii) The lead in initiatives related to AI governance will be taken, collaborating with other countries while promoting the dissemination and expansion of the achievement of the Hiroshima AI Process.

Chapter 6 Toward Living Further in Harmony with Digital Technologies

Various digital services utilizing AI are increasingly permeating our lives, and technologies such as the metaverse, robotics, and automated driving are expected to contribute to solving various social and economic issues faced by our country, such as regional revitalization and disaster prevention.