Section 3 Trends in discussion on other digital technologies

1. Trends in discussion on the metaverse, robotics and automated driving

(1) Metaverse

In the report compiled in July 2023 by the MIC's Study Group on the Utilization of Metaverse toward the Web3 Era, issues related to the metaverse are broadly categorized into "issues within the metaverse space" and "issues related to the outside of the metaverse space."

For issues within the metaverse space, the report identifies (1) challenges related to avatars, (2) interoperability between platforms, (3) issues during the construction and utilization of the metaverse, and (4) issues related to data acquisition and use. For issues related to the outside of the metaverse space, the report identifies (5) challenges related to user interfaces (UI) and user experiences (UX), and (6) the trends and social impacts of the metaverse. The study group has examined these issues related to from (1) to (4) and outlined directions for addressing them, including forming an international consensus on the principles of the metaverse, efforts to ensure interoperability (such as standardization), and the development of guidelines (provisional) for metaverse-related service providers. For issues related to (5) and (6), the group has outlined directions for continuous follow-up on market, technology, and user trends, and research on the relationship between the metaverse and UI/UX[1]. From October 2023, the MIC has been holding a "Study Group on Realizing the Safe and Secure Metaverse" to examine issues identified in the previous re-

port that require continuous follow-up. The group aims to realize safer and more secure metaverse for users, based on the democratic values confirmed at the G7 Digital and Technology Ministers' Meeting in Gunma-Takasaki in April 2023 and the G7 Hiroshima Summit in May 2023. The group is considering the "Principles of the Metaverse (First Draft)" , which consists of (1) principles for voluntary and autonomous development of the metaverse (openness and innovation, diversity and inclusiveness, literacy, community) and (2) principles for improving the trustworthiness of the metaverse (transparency and explanation, accountability, privacy, security)[2], with plans to compile a report by the summer of this year.

International organizations are also examining immersive technologies such as the metaverse. For example, the OECD announced the establishment of the Global Forum on Technology (GFTech)[3] in December 2022 and has set up focus groups to discuss immersive technologies. Discussions in the focus group on immersive technologies began in December 2023, with plans to compile a report by the fall of 2024. The MIC is also contributing to international discussions, such as co-hosting a session with the OECD on "Pursuing a metaverse based on democratic values" at the Internet Governance Forum Kyoto, organized by the United Nation in October 2023.

(2) Robotics

Robotics has traditionally been a strong technology for our country, and particularly in the case of industrial robots, it holds a 46% share of the global market. In a country where the labor force continues to decline, there are high expectations for the use of robotics to improve productivity, address the shortage of labor, and create new industries. In 2015, our country formulated the "New Robot Strategy" and has since implemented over 30 technology development projects through public-private partnerships. While the robots themselves and the individual technologies supporting them have evolved, there is a reality that social implementation has not progressed due to the gap between the needs of robot introduction sites. In response to this situation, the New Energy and Industrial Technology Development Organization (NEDO) published the "Comprehensive Action Plan for Research and Development and Social Implementation in the Field of Robotics" in April 2023, which outlines the direction for promoting the use of robots that contribute

to solving social issues and the early start of projects to develop robot technology strategies[4]. The action plan addresses eight fields where the use of robots is expected (manufacturing, food production, facility management, retail/food service, logistics warehouses, agriculture, infrastructure maintenance management, and construction) and compiles short-term measures for accelerating social implementation by around 2030 as the "Action Plan for Accelerating Social Implementation" and medium- to long-term measures for creating impact toward the next-generation technology infrastructure by around 2035 as the "Action Plan for Building Next-Generation Technology Infrastructure."

In the future, based on the actions extracted from the robot action plan for technology development and environmental improvement, efforts will be made to advance discussions on future national projects and social implementation.

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[1] MIC, "Study Group Report on Utilization of Metaverse toward the Web3 Era", <https://www.soumu.go.jp/main_content/000892205.pdf>
[2] MIC, "Study Group on Realizing a Safe and Secure Metaverse," <https://www.soumu.go.jp/main_sosiki/kenkyu/metaverse2/index.html>
[3] OECD, Global Forum on Technology, <https://www.oecd.org/digital/global-forum-on-technology/>
[4] NEDO releases "Overall action plan for research and development and social implementation in the field of robots" –Promoting the resolution of social issues through both social implementation and next-generation technology development–" <https://www.nedo.go.jp/news/press/AA5_101639.html>

(3) Autonomous driving technology

The utilization of autonomous driving technology is expected to contribute to the maintenance of public transportation and logistics in regions facing population decline and aging. Efforts to expand its societal use are being sought. In the "Comprehensive Strategy for the Vision for a Digital Garden City Nation (Revised in 2023)," the government has set a goal to promote regional transportation through autonomous driving. Various relevant government ministries and agencies are collaborating to achieve the target of implementing unmanned autonomous transportation services in approximately 50 locations by FY2025, and in over 100 locations by FY2027. Additionally, in the "National Comprehensive Development Plan for Digital Lifelines" (METI), the establishment of autonomous driving service support roads is listed as one of the Early Harvest Projects. It aims to set up priority lanes for autonomous driving vehicles of over 100 km on certain sections of the Shin-Tomei Expressway by FY2024, with the goal of realizing the operation of autonomous driving trucks. Furthermore, it aims to enable the provision of autonomous driving vehicle-based mobility services in 50 locations nationwide by FY2025, and in 100 locations nationwide by FY2027. To achieve this plan, collaborative efforts are being undertaken by the National Police Agency, the MIC, the Ministry of Land, Infrastructure, Transport and Tourism, and other relevant ministries and agencies.

2. Trends in discussion to ensure cybersecurity

To ensure that each citizen can utilize digital technology with peace of mind, it is important to ensure cybersecurity. In recent years, due to the increasing complexity of international situations, cyberattacks targeting government agencies and others have been occurring frequently in various countries, including our own. Additionally, with the emergence of technologies such as generative AI, while convenience has increased, there are also concerns about the expansion of risks through their misuse.

Traditionally, cybersecurity has mainly focused on ensuring the availability and confidentiality of systems, in other words, ensuring that systems do not stop and preventing the theft or leakage of data, in order to maintain business continuity and convenience. Alongside this, in recent years, various risks related to the integrity and reliability of information have become apparent, such as the spread of disinformation, deepfakes, and the tampering or leakage of information. The spread of disinformation and deepfakes and the tampering or leakage of information not only undermines societal trust and stability, and national security, but also has the potential to seriously impact political processes and decision-making, posing a significant threat to the health of democracy.

As highlighted in the National Security Strategy (December 2022), "cyberattacks across national borders on private critical infrastructure and the spread of disinformation are occurring constantly, blurring the line between peacetime and wartime." The threats surrounding cyberspace are becoming increasingly serious, and it could be said that the situation has become one of "Constant Crisis."

In light of this situation, efforts are being made to further ensure the safety and reliability of information and communication networks, enhance autonomous capabilities to address cyberattacks, respond to disinformation, promote international cooperation, and raise awareness and promote dissemination[5].

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5 National Security Strategy (December 2022), <https://www.cas.go.jp/jp/siryou/221216anzenhoshou/nss-j.pdf>