

Global Partnership on AI
Future of Work Survey Report 2021 in Japan

A Report and Recommendations from the Japan Survey

March 2022



This report was written by the Japan team of the Global Partnership on AI's Future of Work. The recommendations in this report are made by the Japan team and do not represent the views of the GPAI, the OECD, Japan's Ministry of Internal Affairs and Communications (MIC) or Ministry of Economy, Trade and Industry (METI), and related organizations such as companies or local governments that were the subjects of interviews.

Table of Contents

Summary	04
Introduction	05
About GPAI	
About the GPAI working group	
Activities of the "Future of Work" working group	
Purpose of this report	
The future of work	08
What tasks should be assigned to AI?	
Using AI to solve labor shortages in Japan's industrial structure	
Using AI to improve productivity, diversity, and service quality	
Challenges and impact on work styles by AI use	
IT workforce and data management issues	
Method of investigation	12
GPAI Japan team survey structure	
How to proceed with the survey	
Questionnaire	
Information management	
The subject of an investigation	
Results	17
Purpose of AI utilization	
Efforts to utilize AI	
Challenges in AI application	
Comparison of first and second generation (Japan) surveys	
Column: GPAI "The Future of Work" event report	
Feedback from students	
Column: Comments from a faculty supervisor	
Recommendations	25
Special thanks	27
GPAI "Future of Work" Japan team member list	28
Appendix: Questionnaire	29



Summary

In a society where artificial intelligence (AI) is growing ever more pervasive, what will it take to build a better future for workers? How is AI affecting their work and what is happening in the field? This document reports an experiment and survey conducted on these issues by members of the Global Partnership on AI (GPAI).

The GPAI is an international framework that aims to realize the development and use of "responsible AI" based on a human-centered approach and principles such as transparency and respect for human rights. Of the several subcommittees, the Japanese team of the "Future of Work" subcommittee authored this report.

Interview surveys were previously conducted in other countries as a precursor to this survey. In both the preceding survey and this survey, GPAI adopted a methodology in which students took the initiative to interview the personnel at work sites about the purpose and issues of AI utilization. The survey was conducted based on the belief that students, who are sensitive to technological changes and its applications, will be able to select survey targets and questions that can provide rich insights into the "future" of work in the midst of remarkable changes in the industrial world, including the introduction of AI.

To properly utilize AI at work, it is necessary to understand the industrial structure and social issues in the country and region under study. In Japan, labor shortages in an aging society with a declining birthrate are one of the motivations for the introduction of AI, as are improvements in productivity, diversity, and service quality. While the use of AI in the workplace is advancing, there are also concerns in Japan about the shortage of IT personnel, data management issues, and the impact of AI on fairness and accountability in the working environment.

This survey was conducted on a trial basis over a short period of time, as it was necessary to construct a survey structure and survey items tailored to the Japanese context. As a result, 11 interviews (3 finance, 2 public administration, 2 infrastructure & construction, 1 translation, 1 telecommunications & broadcasting, and 2 nursing care companies and organizations) were conducted with the persons in charge of the companies and public administration.

The survey results indicate that the objectives of AI utilization can be categorized into: addressing human resource shortages, improving service quality, and adapting to changes in the environment and industry. In addition to technological development, each industrial sector is implementing various initiatives, including analysis of business issues, establishment of governance systems, information disclosure, and human resource development. Nonetheless, the challenges of AI utilization include not only the technical issues of AI technology itself such as transparency and fairness, but also those concerning the building of trust between AI and humans, such as redefining the division of roles between AI and humans as well as the dangers of excessive dependence on AI. Finally, there are also challenges related to the social environment, including legal systems, business practices, and culture.

Based on the findings of this study, we conclude with the following two recommendations to GPAI member countries and GPAI committee members.

1. There is a need for country and regional reports on the "Future of Work" survey
2. Student-centered research methodologies is effective and should be promoted

The GPAI is supported by voluntary members. This report will be useful for Japanese companies, organizations, and students who have been and will be cooperating with GPAI activities to promote their understanding of GPAI activities. It will also be useful to GPAI expert committee members who will conduct case studies overseas to study the background of AI and work styles in Japan, as well as the methods and results of the surveys. We hope that this will serve as a reference for their survey.





Introduction

About GPAI

Global Partnership on AI (GPAI)¹ is an international framework that aims to achieve the development and use of "responsible AI" based on a human-centered approach and principles such as transparency and respect for human rights. Based on discussions at the 2018 G7 Innovation Ministers Meeting (Canada), the concept was proposed at the 2019 G7 Biarritz Summit (France), leading to a G7 agreement supporting the launch of the network at the May 2020 Science and Technology Ministers' Meeting (held online, USA). THE GPAI was then officially established in June of the same year.

GPAI is an international organization composed of multi-stakeholder groups including governments, international organizations, industry leaders, and experts. Their main goal is to encourage compliance with the OECD AI Principles² and bridge the gap between theory and practice regarding AI.

The founding members are Austria, Canada, France, Germany, India, Italy, Japan, Mexico, New Zealand, South Korea, Singapore, Slovenia, the United Kingdom, the United States, and the European Union. Brazil, the Netherlands, Poland, and Spain joined in 2020, and in 2021, Sweden, Denmark, Belgium, Czech Republic, Israel, and Ireland became members.

From Japan, the Ministry of Economy, Trade and Industry (METI) and the Ministry of Internal Affairs and Communications (MIC) are participating in this organization.³

About the GPAI working group

The GPAI has a top-level decision-making body at the ministerial level (the GPAI Council) and a Steering Committee consisting of representatives from five countries (Japan, the United States, Canada, France, and Brazil) and six multi-stakeholder representatives, who review operations and working group activity policies.

There are four working groups and one subgroup to facilitate substantive activities:

- Responsible AI: Consider the means to promote and ensure the responsible development, use, and adoption of human-centered AI, with particular emphasis on building public awareness and trust
 - AI and Pandemic Responses (sub-group of "Responsible AI"): Examining the use of AI in the fight against the COVID-19 pandemic.
- Data Governance: Consider the technical approaches to data access and sharing, intellectual property, and data ownership. The emphasis is on the protection of users' rights and to ensure that the principles of fairness, transparency, and privacy protection are upheld. Furthermore, it is of paramount importance that the environment is conducive to trustworthy AI innovation
- Future of Work: Conduct technical analyses to help understand how AI can be used in the workplace to empower workers and increase productivity. Examine how workers and employers can prepare for the future of work and how they can maintain job quality, inclusiveness, and health and safety
- Innovation and Commercialization: Promote international cooperation on R&D and innovation in AI. Conduct research and analysis of practical tools that can be used to commercialize research results, with an emphasis on supporting small and medium-sized enterprises as well as real-world applications in the fields of automation and medical care. In addition, the group will also examine the time needed to commercialize and bring to market the results of innovations as well as the challenges involved.

1 GPAI website, <https://gpai.ai/>

2 OECD AI Principles overview website, <https://oecd.ai/en/ai-principles>

3 METI, Global Partnership on AI established, <https://www.meti.go.jp/press/2020/06/20200616004/20200616004.html> (in Japanese)



In terms of support structure, the OECD headquarters in Paris will serve as the secretariat for the GPAI Council and the Steering Committee, while two expertise centers in Montreal (Canada) and Paris (France) will support the Working Groups.⁴ The Multistakeholder Experts Group Plenary will serve as the collective body of experts for the Working Group.

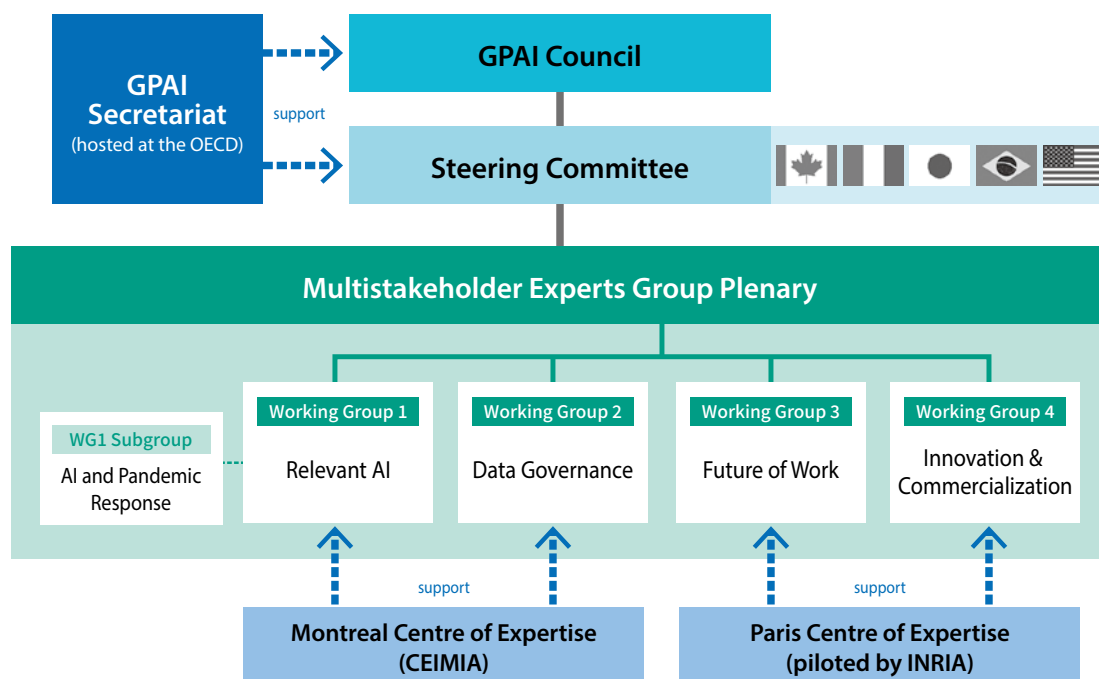


Figure 1 GPAI's organizational structure⁵

Activities of the "Future of Work" working group

As of March 2022, the "Future of Work" working group is developing activities around the following six themes.

1. Use cases in the workplace: Collect and analyze examples of AI working in different countries and regions. Consider the social impact of AI use and cultural specificities in implementation
2. Training: Promote evaluation and development of AI-based training tools
3. Human-Machine collaboration: Identify changes and risks concerning the physical and mental health of workers occurring in the workplace that result from human-machine interactions
4. Bias management: Examine the biases and inequalities that arise from the use of AI as well as the ethical and technical implications of correcting them
5. Work conditions: Analyze improvements in working conditions due to AI and establish a forum for discussion of best practices among companies, workers, and government
6. Living laboratory: Share knowledge of AI applications in the workplace and establish a web-based platform for interdisciplinary research

Of the six themes, the working group has positioned the research and analysis on "1. Use cases in the workplace" and "4. Bias

⁴ The Paris Center will be in charge of the "Future of Work" and "Innovation and Commercialization Working Groups," while the Montreal Center will be in charge of the "Responsible AI (including the AI and pandemic responses)" and "Data Governance" working groups.

⁵ GPAI website, <https://gpai.ai/>



management" in particular as the representative projects of the working group in 2021. In 2022, "6. Living laboratory" will be added to the list, given that three such projects⁶ are currently being carried out. These projects are being promoted in parallel, with an emphasis on synergies among projects and with other themes in project management.

These six themes were gathered in a bottom-up manner from the exchange of opinions among the members of this working group. Since the GPAI organization emphasizes issue setting and agile decision-making by its members, there is still potential for the themes and structure to evolve organically in the future.

Purpose of this report

The GPAI "Future of Work" working group is committed to collecting reliable use cases in an objective manner and conducts ongoing research in diverse sectors and regions. The report of the 2021 international case collection was released at the GPAI Summit in November 2021.⁷

This report is part of the "1. Use cases in the workplace" project, which examined case studies of Japanese companies and local governments. As can be seen from the GPAI's management structure, the development of the structure and implementation of the survey in Japan also took place concurrently.

GPAI's activities only started in 2020, and so there is still little specific information about its activities that is available in Japanese. Therefore, this report was prepared to help promote a better understanding of GPAI activities among Japanese companies, organizations, and students who have been and will be involved in GPAI activities in the future. The GPAI is supported by the activities of its voluntary committee members and collaborators. Therefore, we hope that more people will become interested in GPAI activities after reading this report and join our group of volunteers.

In addition, the GPAI's "1. Use cases in the Workplace" project is expected to be studied in many countries in the future. Different countries and regions have different purposes of introducing AI and a different existing industrial structure. Therefore, this report is intended to provide an overview of AI and work in Japan. After outlining the background of the survey based on several sources, we also documented the structure and methods of the survey conducted in Japan. By doing so, the report is intended to serve as a reference for GPAI expert committee members overseas when they conduct future surveys, as well as to make recommendations on how future survey reports should be written.⁸

6 Yann Ferguson of the Toulouse Institute of Technology for "1. Use Cases in the workplace," Mark Graham of the Oxford Internet Institute for "4. Bias Management," and Uday B. Desai of the Indian Institute of Technology Hyderabad for "6. Living laboratory" will be the representative.

7 Future of Work, AI observatory at the workplace, GPAI, <https://gpai.ai/projects/future-of-work/ai-at-work-observation-platform/ai-observatory-at-the-workplace.pdf>

8 This report will also be translated into English and made publicly available.



The future of work

There is a wide range of discourse surrounding AI, work styles, and employment, which ranges from "AI will take our jobs" to "we can be more productive by taking advantage of AI." In recent years, AI with machine learning and deep learning functions has been able to replace with a certain degree of accuracy human recognition, inference, and judgment. They have been used in a variety of settings, including medicine, finance, agriculture, transportation, and entertainment.⁹

This chapter summarizes the issues surrounding AI and work in Japan while providing the context for the study.

What tasks should be assigned to AI?

In recent years in Japan, information technology commonly referred to as Digital Transformation (DX) has not introduced state-of-the-art technology into workplaces, but rather the old-fashioned Information and Communication Technology (ICT) and standardization. This may result in the elimination of some professions.

However, when AI and ICT replace certain types of work, be it management or something else, AI engineers and frontline workers will be able to communicate with each other about what tasks should be delegated to machines. This will lead to the creation of a better working environment.¹⁰

In other words, the decision on which tasks can be entrusted to AI and ICT must be based on an understanding of the workplace; AI engineers travel to workplaces and make adjustments on site, but their imagination may not extend to the social circumstances of the employees of that workplace. Therefore, "AI and the Future of Work" is one of the areas where integration of knowledge by engineers, workers in the field, and social research is most needed. The understanding of society and workplaces is required not only for companies, but also governments and municipalities when they formulate AI policies.

This did not begin with AI technology. The occupational structure is constantly changing, with new occupations being created or eliminated in response to the demands of society.¹¹

Using AI to solve labor shortages in Japan's industrial structure

Since 2008, Japan has slowly transformed into a society with a declining population¹² and is now facing a serious labor shortage. As of 2021, Japan's labor force¹³ stood at 68.6 million, down 80,000 from the previous year.¹⁴ This labor shortage is the reason why Japan's unemployment rate was among the lowest in the developed world (2.7%) and the job openings ratio was an astonishing 1.16 times¹⁵ during the COVID-19 pandemic. The Bank of Japan's short-term economic survey of February 2021 of enterprises in Japan showed that while labor surplus was a serious problem during the 2008 financial crisis, the COVID-19 pandemic indicates that there is not enough surplus to fill a labor force that is originally in short supply.¹⁶

9 National Diet Library, Perspectives on Artificial Intelligence, Robots, and Labor and Employment (FY 2009 Research Project on Science and Technology), <https://www.ndl.go.jp/jp/diet/publication/document/2018/index.html> (in Japanese), English available from AIR website, <http://sig-air.org/publications/perspectives-on-ai>

10 Arisa Ema, "AI and Society through Pictures and Diagrams," Gijutsu Hyoronsha, 2021 (in Japanese).

11 For this reason, the Japan Standard Industrial Classification and Japan Standard Classification of Occupations are updated at regular intervals.

12 Statistics Bureau, Ministry of Internal Affairs and Communications, "When is the First Year of Population Decline?" , <https://www.stat.go.jp/info/today/009.html> (in Japanese)

13 The labor force refers to the population aged 15 and over, including both the employed and the totally unemployed.

14 Labor Force Survey (Basic Tabulation), 2021 Average Results, <https://www.stat.go.jp/data/roudou/sokuhou/nen/ft/pdf/index.pdf> (in Japanese)

15 National Institute for Labour Policy and Training, Impact of the New Corona on Employment, Employment and Unemployment (February 1, 2022 edition), <https://www.jil.go.jp/kokunai/statistics/covid-19/c07.html#c07-1> (in Japanese)



The effects of a declining and aging labor force have pushed previously labor-starved industries into even direr straits. Figure 2 shows the employment demographics by industry. The number of agricultural workers in Japan, where the self-sufficiency rate is very low, is declining even further today even though it was never substantial to begin with. The number of workers in the construction industry, which is responsible for civil engineering work of new projects, is also declining. Although the number of medical and welfare-related workers is on the rise, it is still difficult to retain workers in labor-intensive workplaces, which results in a constant labor shortage.

There are very high expectations for technology to solve this problem in workplaces where manpower is in short supply. Systems are being developed that use AI and other technologies to replace tasks in fields that are generally labor-intensive and in which workers are overworked. Although AI is still in the demonstration stage and may not be fully implemented, there is no doubt that AI is an important technology for Japan's super-aging society (29% of the population is aged).¹⁷

For example, even though many agricultural businesses are closing due to their aging workers, ICT, AI, robotics, and drone technologies are gradually being used to automate work as well manage and utilize crop growth data.¹⁸ The livestock industry has also suffered from the labor crunch, but ICT and AI are being used to build systems to condition animals and lighten the general workload to optimize the rearing environment.¹⁹ The same goes for the construction industry, which also suffers from a constant labor shortage due to the dangerous nature of the job. Here too, ICT, robot technology, and AI are being combined to improve the efficiency of infrastructure inspection work through automation, while the acquisition and use of data is being promoted by the government and companies for verification and study.²⁰ In the healthcare industry, AI is being used to support diagnosis and treatment, while AI and robots are being used in nursing and dementia care to reduce the burden on specialists. Discussions and studies are underway to collect and utilize data in a privacy-conscious manner.²¹

Despite these high expectations for AI utilization in various industrial sectors, the rate of increase in the number of workers in the information and telecommunications industry is lower than the rate of decrease in those in industries with labor shortages (Figure 2), suggesting that human resource development has not kept pace with the increase in the number of workers in these industries.

16 Nikkei Shimbun, February 1, 2021 morning edition, Bank of Japan, "National Short-term Economic Survey of Enterprises (Tankan)," Masayo Fujimoto, 2021, "What was happening to business organizations under the emergency declaration of the first wave of the 2020 Corona disaster," *Doshisha Journal of Sociology*, 25:53-80, https://doshisha.repo.nii.ac.jp/?action=pages_view_main&active_action=repository_view__main_item_detail&item_id=28270&item_no=1&page_id=13&block_id=100 (in Japanese)

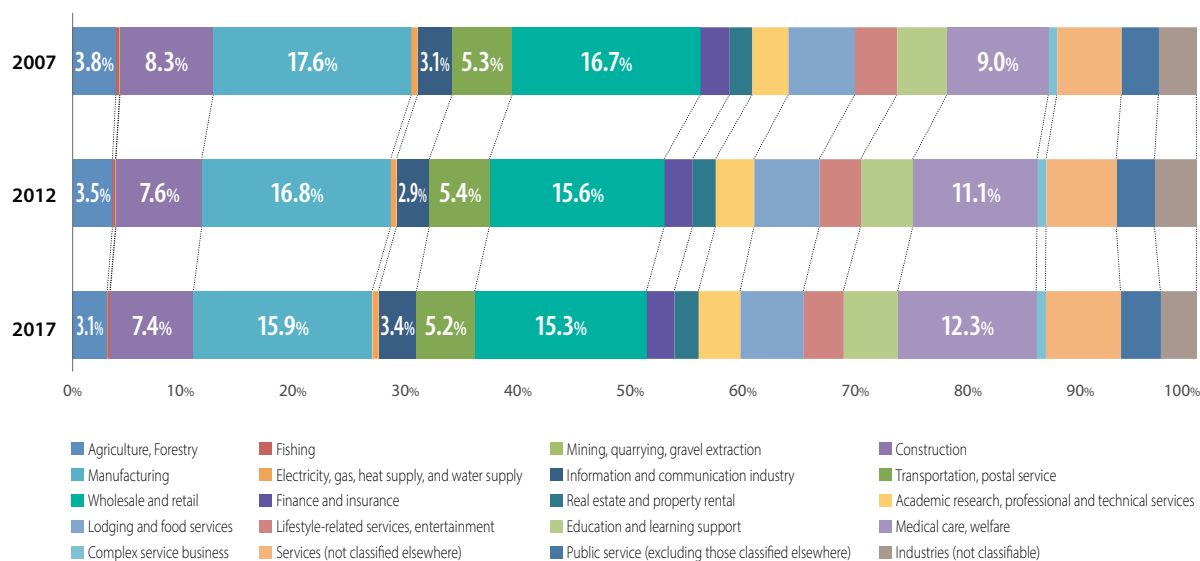
17 Cabinet Office, 2021 White Paper on Aging Society, https://www8.cao.go.jp/kourei/whitepaper/w-2021/html/gaiyou/s1_1.html (in Japanese)

18 Ministry of Agriculture, Forestry and Fisheries, Smart Agriculture, <https://www.maff.go.jp/j/kanbo/smart/> (in Japanese). There are also concrete examples, such as a system that uses ICT technology and AI to produce high-sugar tomatoes through irrigation control and enables farming with fewer people. Fujimoto, M., H. Higashi, R. Ikeda, and H. Nohara, 2022, Japan-France Comparative Study Series on Industry-Government-Academia Collaboration Clusters, Case Study J 1-2: Industry-Government-Academia Collaboration Cluster for Optics and Electronics Technology in Hamamatsu Area, Shizuoka, Japan 2019.

19 Ministry of Agriculture, Forestry and Fisheries, Catalogue of Smart Agriculture Technology (Livestock), published February, 2022 (updated February, 2022), https://www.maff.go.jp/j/kanbo/smart/smart_agri_technology/smartagri_catalog_chikusan.html (in Japanese)

20 Ministry of Land, Infrastructure, Transport and Tourism, Construction Oriented and Construction Machinery, https://www.mlit.go.jp/sogoseisaku/constplan/sosei_constplan_tk_000028.html (in Japanese)

21 Ministry of Health, Labour and Welfare, Consortium for Accelerating AI Development in the Health Care Sector, https://www.mhlw.go.jp/stf/shingi/other-kousei_408914_00001.html (in Japanese)



Source: Compiled by Masayo Fujimoto from the Basic Survey on Employment Structure 2007, 2012, and 2017 data (Statistics Bureau, Ministry of Internal Affairs and Communications)

Figure 2 Employment demographics by industry

Using AI to improve productivity, diversity, and service quality

AI is being introduced not only to address labor shortages, but also to improve productivity and the quality of services provided. For example, the financial industry and local governments have been recommended the use of AI-based recognition technology, natural language processing technology, and robot-assisted work automation (RPA) to streamline complicated administrative tasks as part of the efforts to reform work styles.²² In particular, local governments are promoting the use of AI to improve services for residents by developing various application reception support systems, as well as solve local issues such as support for responding child abuse and care prevention; guidebooks for AI utilization and introduction have been prepared.²³ In addition, as the accuracy of machine translation has improved remarkably, there is a need for the advancement and development of AI translation systems to improve diversity in society and the workplace, such as the acceptance and coexistence of foreign human resources.²⁴ Thus, AI is being utilized in fields where many professionals are engaged and where advanced skills are required. Furthermore, even those without specialized skills can improve productivity and add value to their work with the assistance of AI. For example, in the field of plant safety, it is expected that by utilizing AI's judgment in confirming abnormalities, the workload of workers will be reduced, and unskilled workers will be able to maintain a high level of safety.²⁵

Challenges and impact on work styles in AI use

While there are high expectations for AI use, various challenges have been identified. Various principles for AI utilization have been formulated for this purpose. For example, the Ministry of Internal Affairs and Communications (MIC) has released "AI Utilization Guidelines" with 10 principles including proper utilization, data quality, collaboration, safety, security, privacy, human

22 Ministry of Internal Affairs and Communications, RPA (Reform of Work Styles: Improving Productivity through Business Automation), https://www.soumu.go.jp/menu_news/s-news/02tsushin02_04000043.html (in Japanese); MIC, Recommendations for the Introduction of RPA in Local Governments, https://www.soumu.go.jp/main_content/000731626.pdf (in Japanese)

23 Ministry of Internal Affairs and Communications, Guidebook for the Use and Introduction of AI in Local Governments, https://www.soumu.go.jp/main_content/000757186.pdf (in Japanese)

24 Ministry of Internal Affairs and Communications, Further advancement of multilingual translation systems for the labor field, https://www.soumu.go.jp/menu_news/s-news/01tsushin03_02000324.html (in Japanese)



dignity and individual autonomy, fairness, transparency, and accountability.²⁶ The Ministry of Economy, Trade and Industry (METI) has also compiled guidelines and reports called "Contract Guidelines on Utilization of AI and Data" and "AI Governance in Japan," which address physical concerns such as safety risks posed by AI and social risks such as the promotion of discrimination and invasion of privacy.²⁷

In addition to these issues related to the use of AI in general, several issues focused on work and AI in particular have been identified both domestically and internationally. For example, if existing social and organizational structures are male- or white-dominated, hiring AI built on existing data may evaluate women and non-whites unfavorably, which has led to strong calls for mechanisms and regulations to mitigate bias regarding AI utilization.²⁸ The proposal for AI regulations released by the European Union in April 2021 also positions AI technologies in the field of employment and worker management as a high risk endeavor and that they should meet strict obligations before being brought to market as a service.²⁹

The GPAI "Future of Work" working group is also currently discussing the theme of "AI for Fair Work". Besides general issues of AI ethics, they are also discussing how the use of AI can change the quality of work, people's well-being, and working conditions.³⁰ Specifically, the project will attempt to identify issues from the perspective of employees before discussing them in a multi-stakeholder framework and linking them to proposals on the implementation of AI, AI Ethical Principles, and other practices. Candidate issues include the importance of listening to employees' voices, protection of their employment, the right to explain and negotiate the implementation of AI, and AI as an employee monitoring tool.

IT workforce and data management issues

In Japan, multiple companies are often responsible for the provision of AI systems and services introduced in the workplace. A comparison of the percentage of personnel involved in information processing and communications who belong to IT companies and other companies in Japan and other countries shows that in the United States, 65% of IT personnel belong to non-IT companies, while a strikingly high 72% of Japan's IT professionals belong to IT companies.³¹

In Japan, management consultants and others have persuaded companies of how inefficient the "do-it-yourself" approach is, which is why both the government and society have encouraged greater efficiency through outsourcing and splitting up operations. Since the burst of the bubble economy, companies have become cautious about hiring full-time employees due to employment regulations such as the 4 requirements for liquidation³² and have used outside personnel who can be easily hired and replaced at any time when it is necessary to introduce IT technology into the workplace. As a result of increased efficiency, organizations have fewer IT personnel, which often results in the data needed to train AI being stored in multiple organizations. These have resulted in a lack of standardization of data specifications and a lack of data integration mechanisms. Although Japanese government agencies are seeking to bring IT personnel in-house, companies that do not want to hire fixed IT-related maintenance personnel may demand that the government standardize the data as soon as possible.

25 Ministry of Economy, Trade and Industry, Three-Ministry Liaison Conference on Disaster Prevention in Petroleum Complexes and Other Petroleum Facilities, Advanced AI Case Studies in Plants - Practical Examples of AI Projects Realizing Results and Overcoming Challenges, <https://www.meti.go.jp/press/2020/11/20201117001/20201117001-4.pdf> (in Japanese)

26 Ministry of Internal Affairs and Communications, AI Utilization Guidelines, https://www.soumu.go.jp/main_content/000658284.pdf

27 Ministry of Economy, Trade and Industry, AI Governance, https://www.meti.go.jp/english/press/2019/1209_005.html and https://www.meti.go.jp/shingikai/mono_info_service/ai_shakai_jisso/pdf/20210709_8.pdf

28 Bogen, M. and Rieke, A. 2019. Help Wanted: An Examination of Hiring Algorithms, Equity, and Bias. Upturn.

29 European Commission, Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonized Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206>

30 GPAI, Fair work for AI, <https://gpai.ai/projects/future-of-work/fair-work-for-ai/>

31 Information-technology Promotion Agency, White Paper on IT Human Resources Development 2017, edited by IT Human Resources Development Division, <https://www.ipa.go.jp/files/000059086.pdf> (in Japanese)

32 Ministry of Health, Labor and Welfare, Rules on Termination of Labor Contracts, https://www.mhlw.go.jp/seisakunitsuite/bunya/koyou_roudou/roudosei-saku/chushoukigyou/keiyakushuryo_rule.html (in Japanese)



Method of investigation

As mentioned above, GPAI's "Future of Work" working group has been working on the "1. Use cases in the workplace" project since 2020. Interviews have already been completed with students in France, Italy, Canada, and other countries, and the report has been published. Surveys in other countries and regions are underway from 2021 using them as the first generation. Japan (this survey) is part of the second generation of the survey.³³

GPAI Japan team survey structure

The structure consisted of a management team and a research team, with each team communicating with the other to conduct the survey. The roles of each team are shown in Figure 3.

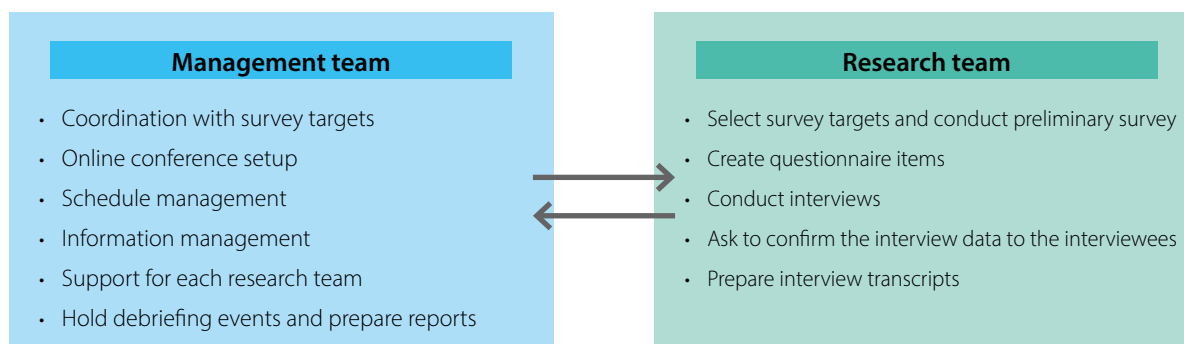


Figure 3 Roles of each team

In addition to the two GPAI "Future of Work" Japanese expert members, the management team included a university researcher and a student research assistant. Research team members were recruited from students majoring in sociology or information science, and a total of 9 students participated.³⁴

The activities of the Japanese team were supported organizationally by the Technology Governance Unit of the Institute for Future Initiatives at the University of Tokyo and the Work Environment & Science / Technology Research Center at Doshisha University.

How to proceed with the survey

This study was conducted according to the schedule shown in Table 1. During the planning phase, students were recruited and the "Future of Work" committee members explained to them the GPAI organization and purpose of this survey. Then, research teams were organized based on industry sector according to the interests of the students. Each of the six teams (finance / public administration / infrastructure & construction / translation / telecommunications & broadcasting / nursing care) consisting of 2-3 people was asked to review potential interviewees.³⁵

33 Since this year's survey was conducted concurrently with the establishment of the survey structure, the schedule, survey structure, and methods may be subject to change in the next fiscal year and beyond.

34 For a list of team members, see the Japan Team Member List in this report.

35 In the first-generation survey, students were interviewed alone; in Japan, however, interviews were conducted in teams. However, a team leader was assigned to each subject of the survey to conduct interviews, and the remaining members assisted the leader. Therefore, each student was responsible for one survey as a leader.



The survey phase began in October 2021. We approached 23 potential interview candidates, and ultimately received consent from 11 companies and municipalities due to time constraints. We held a preliminary online meeting with the interviewees, explaining the GPAI's organizational profile, purpose of the survey, and questions to be asked. At that time, the interviewees explained their AI strategies, the structure of their AI services, and background issues to help us formulate the questions to be asked.

All interviews were conducted over a period of approximately two months through December 2021. Interviews were conducted online, primarily by students on the research team. Each research team ask to confirm the interview data to the company and municipality in writing after the interviews and finalized the anonymized interview transcripts.

The interview transcripts were completed in February 2022, while the debrief and various reports were done over the course of March.

Table 1 Implementation Schedule

Planning phase	July-August 2021	<ul style="list-style-type: none"> Recruitment of students to participate in the research team
	September 2021	<ul style="list-style-type: none"> Kick-off meeting Research team Team formation, consideration of survey candidates Management team Preparation of Japanese translation of the questionnaire
Survey phase	October 2021	<ul style="list-style-type: none"> Research team Preparation of survey request form Management team Send survey request forms to candidates
	November-December 2021	<ul style="list-style-type: none"> Management team Schedule and set up online meetings Research team Preliminary survey, preparation of questionnaire Research team Preliminary meeting with survey targets Research team Conduct interviews
	January-February 2022	<ul style="list-style-type: none"> Research team Fact-finding and preparation of interview transcripts
Report	February-March 2022	<ul style="list-style-type: none"> Management team Conduct debriefs Management team Prepare various reports

Questionnaire

The Japanese questionnaire was developed based on the questionnaires developed by members of the previous (first-generation) surveys in Europe and the United States.³⁶ Each research team selected compatible questions and conducted interviews in light of the field and expertise of the survey targets. In addition, to extract and analyze the students' interests and the characteristics of Japan, each team arbitrarily added items such as questions pertaining to the understanding of industrial and social issues that form the background of AI utilization (Table 2).

³⁶ See the Appendix for the questionnaire prepared by the first generation.



Table 2 Questionnaire items

Questionnaire created by GPAI 1st generation	Sample questions added by the Japan survey team as appropriate
<ul style="list-style-type: none"> • AI System definition • Process of planning • Employees' personal data • Human-machine interaction • The ethical factors considered while designing the AI system • Impact assessment • Implementation • Reviews and adjustments 	<ul style="list-style-type: none"> • Challenges behind the utilization of AI • Future Vision of Business through AI utilization • Impact on people (employees, users, and other stakeholders) as a result of AI utilization

Information management

Communication with a number of companies and municipalities took place during this study. Given the possibility that non-public information and other information may be exchanged, the following rules were observed in the management of information.

- Questionnaires and other information will be managed in Microsoft Teams,³⁷ which only Japanese team members can access
- Recorded data will only be obtained with permission from the interviewees
- The management team will coordinate dates with survey targets to set up online meetings
- Fact-finding for the survey targets will be conducted by students from each research team, but will be divided among the team members so that no one member has numerous contacts
- In the preparation of the report, information that identifies the company or municipality is anonymized

The subject of an investigation

One of the goals of the GPAI first generation survey was to divide the survey target into four categories: managers, developers, users, and social partners.³⁸ This is because managers, employees, and users have different perceptions of AI (even for the same AI service) and it is important to collect examples from multiple perspectives.

However, because the pilot Japanese survey was limited in duration, interviews were conducted with a focus on matching students' interests with organizations that are part of companies and local governments that could respond, rather than covering all industrial fields. As a result, as shown in Figure 4, the survey was mainly concerned with "the organization's AI strategy" or "individual AI services" within the businesses, while interviews were conducted with management, digital strategy organizations, developers, and service providers. In some cases, especially in start-up companies, the managers were also the developers and service providers. Nonetheless, they cooperated fully in the extensive interviews. The survey only focused on businesses in each industry sector, as it was not possible to interview users and social partners this time.

37 Microsoft Teams, <https://www.microsoft.com/ja-jp/microsoft-teams/collaboration>

38 Social partners are defined here as a wide range of stakeholders, including employers, employees, labor unions, government and related agencies.

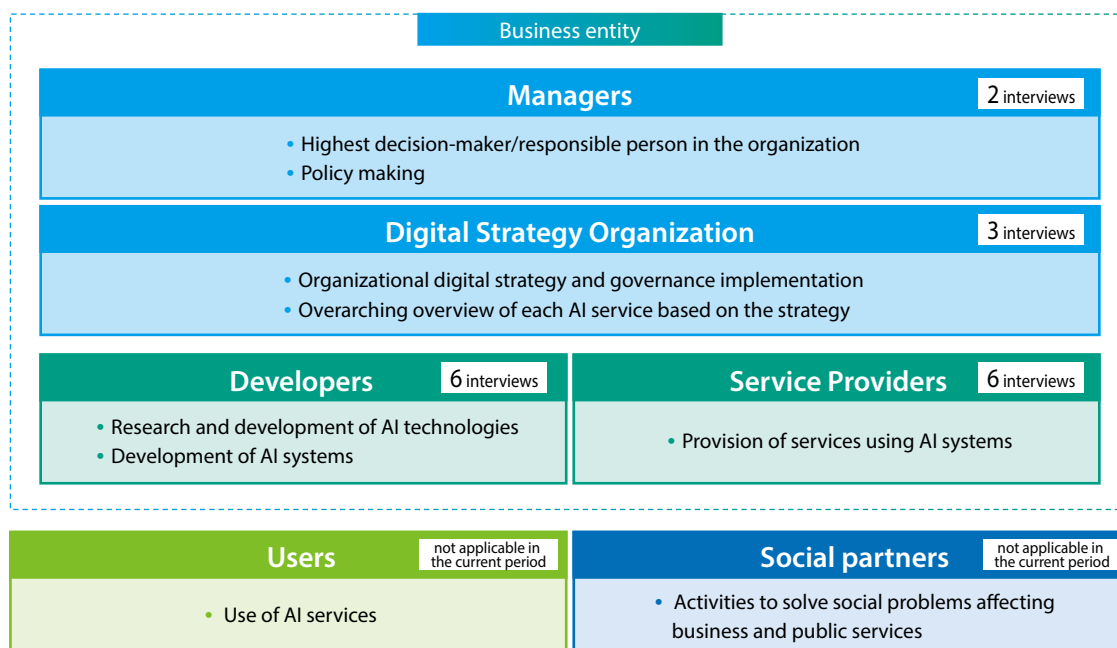


Figure 4 Breakdown of the subjects of this survey³⁹

The list of interviewees is shown in Table 3. The scope of the questions can be broadly categorized into "organizational AI strategy" or "individual AI services."

In the case of "Organizational AI Strategies," the survey covered multiple organizations within the businesses that are involved in AI services. Specifically, interviews were conducted with "digital strategy organizations" that oversee overall digital strategy and AI human resource development.

In the case of "individual AI services," use cases in the service provision stage (i.e., when the service is already in actual operation) were considered as priority research targets, and interviews were conducted with service providers who play a central role in the actual operation of AI services. In cases where the AI service was in the PoC⁴⁰ stage, use cases that had already been tested for actual operation were prioritized for investigation, and developers who played a central role in the PoC were approached for interviews.

39 Since the interview subjects included both managers and developers, there is some overlap in the number of subjects.

40 Abbreviation for Proof of Concept. It refers to the process of verifying the feasibility of an AI service.



Table 3 List of survey targets (information identifying businesses is omitted)

Industry	Organization	Interviewee	Scope of questions
Finance	Financial Institutions (DX promotion division)	Digital strategy organization	Organization's AI strategy
	Insurance company (DX promotion division)	Digital strategy organization	Organization's AI strategy
	Financial systems integrator (business unit)	Digital strategy organization (AI human resource development)	Organization's AI strategy
Public administration	Municipality (department in charge of public services)	Service provider	AI Services -Service delivery phase-
	Municipality (department in charge of public services)	Service provider	AI Services -Service delivery phase-
Infrastructure & construction	Construction company (research division)	Developer	AI Services -PoC phase-
	Construction company (research division)	Developer	AI Services -PoC phase-
Translation	Startup	Manager Developer Service provider	AI Services -Service delivery phase-
Telecommunications & broadcasting	Distribution Company (Business Unit)	Developer Service provider	AI Services -Service delivery phase-
Nursing care	Operating companies (business units)	Developer Service provider	AI Services -Service delivery phase-
	Startup	Manager Developer Service provider	AI Services -Service delivery phase-



Results

The results of the interviews with each company/organization were compiled by the student research team and summarized on an Excel sheet in a one-to-one correspondence with each item in Table 2. The content on the sheet was confirmed by the interviewees, translated into English, and sent to the group of GPAI Future of Work committee members compiling the "1. Use cases in the workplace"

This report presents an overview of the findings obtained by organizing the 11 sheets by industry rather than by subject.

Purpose of AI utilization

The results of the interviews were categorized by the purpose of AI utilization in each industrial field, while the main industrial and social issues behind the utilization of AI were categorized as "A. Addressing human resource shortages," "B. Improving service quality," and "C. Adapting to environmental changes" (Table 4).

The most common purpose of AI utilization was "A. Addressing human resource shortages." Of the 11 cases surveyed this time, 6 are in the service provision stage, and all are being considered for the purpose of reducing the workload faced by human resources. "B. Improving service quality" is also widely considered as an objective, even if the specific targets (competitiveness, operational quality, speed, safety, continuity, customer satisfaction, etc.) tend to differ by industry sector. In addition, depending on the industry sector, "C. Adapting to environmental changes" such as business portfolio/form of business/rapid change/human diversity were considered as important objectives.

Table 4 Objectives of AI utilization in various industrial fields

Industry	Question Subject	Purpose of AI utilization (A: Addressing human resource shortages, B: Improving service quality, C: Adapting to environmental changes)
Finance (3 interviews)	Organization's AI Strategy	<ul style="list-style-type: none"> • A major change in the business portfolio (C) is taking place. • Online conversion (C) is necessary due to the decrease in in-store customers. • The human resources are aging, and there are concerns about a shortage of human resources (A) and a decline in competitiveness (B) due to loss of experience in the future. • The rapid pace of technological innovation (C) requires that human resource development programs also be updated quickly and continuously (B).
Public administration (2 interviews)	AI services (consultation pertaining to citizens) - Service provision phase -	<ul style="list-style-type: none"> • The workload of staff continues to be high (A). • Nationwide, there is a high demand for problem solving, and improvements are needed in the quality of work and speed of citizen response (B).
Infrastructure & construction (2 interviews)	AI services (design automation, unmanned construction equipment) - PoC phase -	<ul style="list-style-type: none"> • There is concern about a serious shortage of human resources (A) in the future due to the aging human resources and the need to increase productivity. • To prevent construction site accidents and ensure safety (B) by reducing the workload of site workers.



<p>Translation (1 interview)</p>	<p>AI service (real-time interpretation) - Service provision phase -</p>	<ul style="list-style-type: none"> • Few Japanese are good at foreign languages (A), and their poor command of foreign languages is an obstacle to overseas expansion. • Online meetings with foreign countries are increasing (C), and there is a great need for real-time interpretation (B).
<p>Telecommunications & broadcasting (1 interview)</p>	<p>AI services (content distribution) - Service provision phase -</p>	<ul style="list-style-type: none"> • Store managers have a high workload (A) and need to be entrusted with space management. • A vast amount of content is released daily (C), and it is difficult to keep up with customer preferences and stop them from getting bored (B).
<p>Nursing care (2 interviews)</p>	<p>AI services (monitoring caregivers and proposing care plans) - Service provision phase -</p>	<ul style="list-style-type: none"> • The workload of caregivers remains high (A). • Many caregivers are stressed (B) by the camera watching over them. • There are few professional care managers (A), and so they feel anxious and lonely because they are expected to make decisions alone.

Efforts to utilize AI

Based on the interview results, Table 5 summarizes the efforts being made by each industry sector in AI utilization, including not only technology development, but also business problem analysis, governance structure development, information disclosure, human resource development, and AI ethics.

Table 5 Major Initiatives

Industry	Major Initiatives
<p>Finance</p>	<ul style="list-style-type: none"> • Trial a wide range of AI technologies that achieved higher results in some cases other than humans • Awareness of human biases contained in traditional business practices • Establishment of AI governance structure • Discuss the ideal development environment and system, and considered how human resources should be trained
<p>Public administration</p>	<ul style="list-style-type: none"> • Clarify AI's predictive purposes in various contexts (e.g., "child safety") • AI increases work speed and reduces staff workload • Accumulate new business know-how through continuous use of AI • Data used to make AI decisions are made available to the public
<p>Infrastructure & construction</p>	<ul style="list-style-type: none"> • Quantify the work of skilled workers to ensure training data for AI • Build work management methods at construction sites that includes AI-based automation • Effectiveness verification using simulators • Construct training data that can successfully highlight the features of the buildings designed by the company
<p>Translation</p>	<ul style="list-style-type: none"> • Ongoing advanced research by researchers • Realization of the necessary system computing power to support real-time AI services • Collaboration with experts in ethics and philosophy



<p>Telecommunications & broadcasting</p>	<ul style="list-style-type: none"> • Leverage traditional data analysis • Feedback by users • Compliance with the “Camera Image Utilization Guidebook”⁴¹
<p>Nursing care</p>	<ul style="list-style-type: none"> • Optimization of individual caregivers • Reduce workload for nursing home staff • Ensure that care manager makes final decision • Review biases in the study data • System reliability and information handling rules

Challenges in AI application

Regarding AI utilization, the survey identified not only technical issues of AI, but also issues related to the relationship of trust between AI and humans, issues with humans as users, and issues related to the social environment in general. Therefore, the main issues by industry sector were categorized as follows and are summarized in Table 6.

- AI: Technical issues related to technologies for AI services in general
- AI and humans: Issues related to building trust between AI and humans
- Humans: Issues related to humans using AI
- Society: Issues related to the social environment such as business practices, the legal system, and culture

Issues related to AI include not only those related to AI models, such as “maintenance of difficult logic” and “monitoring transparency and fairness,” but also those related to overall systems, such as “compatibility with conventional business systems” and “protection of personal information.”

Issues related to AI and humans include “redefining the division of roles” between AI and humans, “following up on users who are unfamiliar with the system,” as well as “considering the impact on the human subconscious.”

In terms of challenges for humans, “avoiding overdependence on AI” was mentioned more than once in the utilization of AI, while challenges related to the impact of AI utilization and communication (“coordination of AI proposals and customer requests,” “change in job satisfaction,” “project management skills,” “fulfilling communication with customers”) were also mentioned.

Issues related to the social environment include “collaboration with other stakeholders,” “linking capacity building to work motivation and career development,” and “how to consider appropriate budgets for developing and maintaining AI.”

41 IoT Promotion Consortium, Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry “Camera Image Utilization Guidebook” https://www.soumu.go.jp/main_content/000542668.pdf (in Japanese)



Table 6: Major challenges to achieving the objectives

Industry	Major Issues for the Future
Finance	<ul style="list-style-type: none"> • Redefining roles (AI and humans) • Maintenance of difficult logic (AI) • Transparency and fairness monitoring (AI) • Protection of personal information (AI) • Project management skills (human) • Ability development is linked to work motivation and career development (society)
Public administration	<ul style="list-style-type: none"> • Linkage with digitalization of municipalities (AI) • How to consider an appropriate budget for the development and maintenance of AI (Society) • Explanation regarding fairness toward citizens (AI and human) • Cooperation with other municipalities (society)
Infrastructure & construction	<ul style="list-style-type: none"> • Continued verification for practical application (AI) • Coordination of AI suggestions and customer requests (human) • Ensuring safety and improving productivity at construction sites (AI) • Overdependence on AI (human) • Compatibility with conventional business systems (AI)
Translation	<ul style="list-style-type: none"> • Developments in personal information protection technology in cloud environments (AI) • Proper understanding of personal information protection (human) • Examination of the roles of AI and humans (AI and humans)
Telecommunications & broadcasting	<ul style="list-style-type: none"> • Consideration of the impact on human subconscious (AI and humans) • Responding to differences in human habits (AI) • Change in job satisfaction (human)
Nursing care	<ul style="list-style-type: none"> • Follow-up with staff who are unfamiliar with the system (AI and human) • Overdependence on AI (human) • Maintaining full communication with caregivers while improving efficiency (human)

Comparison of the first and second generation (Japan) surveys

There are some differences between the survey conducted by the first generation of GPAI⁴² and this survey conducted by the second generation in Japan (Table 7).⁴³ First, the first-generation survey primarily covered AI services in the PoC phase, and interviews were conducted primarily with developers. In some cases, end-users were also interviewed. The survey raised issues such as the establishment of PoC methodologies that are not confined to AI systems, issues related to "fairness" in the development of AI models, issues related to the relationship with users such as "usability" and the degree of user involvement and "explainability," and the need for the development of AI training.

42 Future of Work, AI observatory at the workplace, GPAI, <https://gpai.ai/projects/future-of-work/ai-at-work-observation-platform/ai-observatory-at-the-workplace.pdf>

43 It should be noted that the first generation is not strictly a country-by-country comparison, as the interviews were conducted primarily with students from France, Italy, Canada, and other countries.



In the second-generation survey conducted in Japan, half of the AI services were in the service provision stage, and interviews were conducted mainly with service providers, who were similar to those of the first generation in that many of the technical issues of AI are still being considered in the PoC stage. Nevertheless, many of the issues raised by the human users of AI were related to changes in work, such as redefining the division of roles, avoiding excessive dependence on AI, and changes in job satisfaction.

Table 7 Comparison of First- and Second-Generation Surveys

	First generation (GPAI survey)	Second generation (Japan)
Subject of an investigation	Individual AI services (many in PoC phase)	AI strategy for the organization (3 interviews) Individual AI services (service provision phase: 6; PoC phase: 2)
Interviewee	Managers, developers, users	Managers, digital strategy organizations, developers, service providers
Major issues	<ul style="list-style-type: none"> • Successful use cases: establishment of PoC methodology not confined to AI systems (reorganization/socialization/practice), integration with academic research • Empowerment of workers: appropriate trade-offs between usability and degree of user involvement, accountability of AI systems, need for general AI training independent of specific applications • Fair AI: use case review with independent ethics committee, diversify design team to ensure appropriate data bias 	<ul style="list-style-type: none"> • AI technology: includes not only AI models (transparency, fairness, etc.) but also integration with conventional systems and data management • Trust between AI and humans: division of roles between AI and humans, support for users, influence on human subconscious • Humans: overreliance on AI, changes in job satisfaction, project management skills, communication skills • Social environment: collaboration with stakeholders, motivation and career development, budgetary approach



Column

GPAl "The Future of Work" event report

On February 16, 2022, we invited Yann Ferguson (Toulouse Institute of Technology, France), a leader in overseas research, to give a one-hour seminar.⁴⁴

At the event, Yuko Harayama, co-chair of the GPAl "Future of Work" 2020-2021, introduced the overall framework of the GPAl, followed by Ferguson's presentation on the design framework and results of the overseas survey. Finally, Arisa Ema, another member of the "Future of Work" committee, gave a brief introduction of the Japan survey.

Hideaki Shiroyama, Director of the Institute for Future Initiatives, joined the panel. The panel discussed the characteristics of GPAl as an organization consisting of diverse stakeholders, including the G7, OECD, and experts from various countries. They also discussed how the GPAl is positioning students as the next generation of experts and involving them in international cooperation projects.

On March 9, 2022, a two-hour webinar was held to introduce this report.⁴⁵ As of February 16, the overall framework and overview of the GPAl survey in Japan were introduced, followed by a panel discussion with Masayo Fujimoto and Takashi Matsumoto from the Japan team, and students Mizuki Inoue, Rieko Ikeda, and Ryu Kudo.

The students reported that their involvement in the GPAl survey had given them a new image of "AI introduced for diverse work styles and new value creation," rather than just "AI to cope with human resource shortages," which is the image generally prevalent in the public consciousness. In the overall panel discussion, participants discussed the importance of being aware of issues related not only to AI technology but also to its peripheral technologies, the state of organizations, and issues faced by the entire industrial sector when considering the "future of work."

In his closing remarks, Yoichi Iida of the Ministry of Internal Affairs and Communications (MIC) announced that Japan, as the next GPAl presidency, planned to hold a GPAl summit in Tokyo in November or December 2022.

The two events revealed a growing interest in the GPAl as a whole and in the "Future of Work" working group.



Photo from the February 16 event: Ema (top left), Shiroyama (top right), Harayama (bottom left), Ferguson (bottom right)



Photo from the March 9 event: Ema (upper left), Matsumoto (upper middle), Fujimoto (upper right), Kudo (middle left), Harayama (middle middle), Ikeda (middle right), Inoue (bottom left), Shiroyama (bottom middle), Iida (bottom right)

44 GPAl Future of Work: Insights from International Survey, organized by Institute for Future Initiatives, University of Tokyo, <https://ifi.u-tokyo.ac.jp/en/event/10074/>

45 GPAl Future of Work: Survey Report 2021 in Japan, organized by Institute for Future Initiatives, University of Tokyo; co-organized by Work Environment & Science / Technology Research Center, Doshisha University, RIKEN Future Strategy Office, Ministry of Economy, Trade and Industry, and Ministry of Internal Affairs and Communications, supported by Japan Deep Learning Association, <https://ifi.u-tokyo.ac.jp/en/event/10145/>



Feedback from students

A questionnaire was administered to the students who participated in this study after the reporting phase. The main feedback obtained from the students on the survey team is presented below.

Thoughts on this project/what students learned

- The interviews with the companies were all valuable experiences. In some of the interviews, I was able to experience actual demonstrations and feel the greatness of AI technology.
- Perceptions of AI have changed. I now understand that AI is not something that takes away human jobs, but something that is indispensable for solving industrial and social problems that humans cannot solve on their own.
- Participating in this project was a good way for me to gain experience in setting up and running a research project.

Opinions/issues raised regarding the management team

- Since the initial contact with the companies was conducted by the management team, and not by the students, we felt comfortable in terms of information management.
- It was difficult to monitor the whole situation online.
- The burden was sometimes concentrated on certain students. This could have been improved if asynchronous communication had been more effective.
- Students with specialized education in social research led each team, which is why they were able to facilitate effective and efficient interviews.
- The group was composed of students majoring in social research/information science, but there were few opportunities for synergy between different majors due to uneven numbers.

Opinions/issues raised in preparation for the interview

- Regarding the questionnaire, I was not sure how the answers would lead to an analysis.
- It was difficult to catch up on knowledge related to business and AI technology only from public information. I could only obtain a correct understanding by learning from the participants at the preliminary meeting.
- I had a hard time catching up on basic knowledge pertaining to AI technology.

Opinions/issues raised in conducting interviews

- It was necessary to make the interviewees understand the organization of GPAI and the purpose of this survey. I feel that it is very important to understand not only AI technology but also the background industrial structure and social issues.
- By turning on the cameras on both sides, we were able to conduct the interviews with peace of mind. Although I initially had a scary impression of the company representative, he was actually very kind and helpful. Sometimes, one hour of interview time was not enough. There were cases where other stakeholders, such as users, also wanted to be interviewed.
- It was good to conduct the interviews in teams of several people in each industry sector and to share each team's interview content with the weekly management team in touch points. That way, each team could control the quality of the questions.
- It was good to have a team of two or three people conducting the interviews instead of one person per company, so that we could see how others were interviewing.
- Since the survey included content that could be used for my research themes at universities, I would like to collaborate with the GPAI project starting from the planning stage in the next year.



Column

Comments from a faculty supervisor

Students who participated in this survey were expected to gain the following benefits:

- (1) Students aiming to obtain a "social researcher qualification" were given a valuable opportunity to practice their skills.
- (2) Through the survey, students learned that AI and ICT are being introduced as a solution to problems faced by the labor market and to improve services. At the same time, they also learned about the ingenuity of AI use in the field, management issues, and areas that require ethical monitoring.
- (3) The students were able to be involved in a major project undertaken by the OECD, Japanese central government ministries, and managers of large companies, which made the "distant problems" in the media and their classroom seem very real to them.

This can have an educational effect on them in the form of "anticipatory socialization" before they start their own journey in society.

One issue is that in FY2021, the process from initiation to implementation was very short, and so it was limited to information gathering. In FY2022, we would like students to experience a hypothesis-testing academic survey based on preliminary learning by conducting a survey of labor sites and organizations that have introduced AI. If we can conduct a survey to capture social phenomena that occur in workplaces where AI is implemented, we will be able to show more interesting results in research exchanges with students conducting GPAI surveys overseas, which will greatly benefit the education of both parties.



Recommendations

This Japanese survey conducted in 2021 involved many experimental attempts, including the creation of a survey system and the development of questions. The number of cases surveyed was not large (11 interviews). However, some findings were obtained by conducting the survey mainly with students in cooperation with overseas team members. This report will provide recommendations to the GPAI member countries and GPAI expert committee members regarding the future of the survey and its methods, based on the experiences and findings from the Japan survey, to further collect GPAI "Future of Work" case studies.

1) There is a need for country and regional reports on the "Future of Work" survey

The survey conducted by the second generation in Japan in 2021 partially followed the first generation's survey conducted overseas in certain aspects, namely that the GPAI students took the lead in selecting survey targets and conducting interviews, and the same questionnaire used by the first generation was used, as described in Table 2 and the Appendix. This allows for certain international comparisons regarding AI and the future of work.

Nevertheless, the survey was not necessarily designed to be an exhaustive comparative study, as questions unique to Japan were added to the questionnaire and the survey targets themselves were selected based on the interests of Japanese students. Furthermore, as shown in Table 7, many of the first-generation survey targets were in the PoC phase, whereas many of the second-generation main survey targets conducted in Japan were in the service provision phase. As a result, the points of discussion and issues in the utilization of the system were quite different from those in the first-generation report.

As indicated at the beginning of the survey results, the 11 Japanese surveys conducted by the second generation will also be combined with the first generation, as well as with surveys currently being conducted in other countries and regions for an overall analysis. However, if we consider the fact that the development of technological advancements and industrial structure differ from country to country and region to region, we would like to recommend to GPAI members in each country and region prepare individual survey reports for each country and region, as was done in this survey.

2) Student-centered research methodologies effective and should be promoted

Most existing surveys on the "future of work" are conducted primarily by institutions and researchers who specialize in surveys. The GPAI survey is unique in that the primary investigators were students, even if they were supported by a management team. As indicated by the student feedback, although there were some issues in understanding the survey methods and techniques, there was a certain value in having students, who will be responsible for the future of society, conduct the surveys.

With the introduction of AI and other significant changes in the industrial world, people in their teens and twenties, also known as Generation Z,⁴⁶ are said to be sensitive to technological change and utilization. The selection of survey targets and the questions themselves, which are based on the values of young people, can be highly suggestive in considering the future of work. Since this was a pilot project, only 11 interviews were conducted. Yet, as more case studies are accumulated, it will be possible to analyze the types of industries and questions being asked.

It is important to note the educational benefits that the students enjoyed which were that they were involved in an international survey, were able to conduct the survey while receiving industry knowledge and information management support from the management team, and were able to not only closely observe how the research project was launched and managed but also work closely with the team.



Therefore, in conducting research on "the future," we should consider the methodology of appointing the next generation as the primary investigators as well as the management system and educational benefits that support the methodology followed in this survey.

⁴⁶ The term refers to a generational classification that began to be used in the United States. As of 2022, the term roughly refers to those under the age of 25 (i.e., those born between 1997-2012). They are characterized by their familiarity with information technology and communication tools such as social networking services since as far back as they can remember.



Special thanks

This report was made possible by the thought-provoking topics provided by the companies and municipalities that graciously agreed to be interviewed. Due to the nature of the GPAI survey, it is not possible to reveal the names of companies and organizations, but we would like to thank those who responded to the interviews.

Through participation in GPAI-related surveys and symposiums, we were also able to obtain advice from GPAI experts and other knowledgeable persons. We would like to take this opportunity to thank the Ministry of Internal Affairs and Communications and the Ministry of Economy, Trade and Industry for providing us with this opportunity. The Japan Deep Learning Association also cooperated with us in approaching companies and local governments for the survey.

In addition to the support of GPAI staff overseas, the survey was also supported by Yann Ferguson of the Toulouse Institute of Technology, France, who is leading the first generation of case studies internationally. We also received organizational support from the University of Tokyo's Institute for Future Initiatives and Doshisha University's Work Environment & Science/Technology Research Center. Finally, we also received support from the Toyota Foundation D18-ST-0008 "Building platform on ethics and governance of artificial intelligence" for conducting this study.

We hope that this report will serve as a starting point for discussions with companies and organizations that have been and will be involved in GPAI activities, as well as with the next generation of young people, including students.



GPAI "Future of Work" Japan team member list

Management team

- Yuko Harayama, GPAI Future of Work Committee 2020-2021 Co-Chair / RIKEN Director
- Arisa Ema, GPAI Future of Work Committee Member / Associate Professor, Institute for Future Initiatives, The University of Tokyo
- Masayo Fujimoto, Professor, Faculty of Sociology, Doshisha University; Director, Work Environment & Science / Technology Research Center
- Takashi Matsumoto, Visiting Researcher, Institute for Future Initiatives, The University of Tokyo
- Rieko Ikeda, Doctoral Student, Graduate School of Sociology, Doshisha University
- Mizuki Inoue, Undergraduate Student, Faculty of Sociology, Doshisha University

Student teams (in Japanese alphabetical order)

- Mizuki Inoue, Undergraduate Student, Department of Sociology, Doshisha University
- Ryu Kudo, Master of Interdisciplinary Information Studies, The University of Tokyo
- Yasuhiro Saito, Undergraduate Student, Department of Sociology, Doshisha University
- Riho Shimizu, Undergraduate Student, Department of Sociology, Doshisha University
- Haruka Takabayashi, Undergraduate Student, Department of Sociology, Doshisha University
- Ikuno Nagao, Undergraduate Student, Department of Sociology, Doshisha University
- Misuzu Horii, Undergraduate Student, Department of Sociology, Doshisha University
- Hina Mori, Undergraduate Student, Department of Sociology, Doshisha University
- Liu Yiwei, Research Student, Graduate School of Arts and Sciences, The University of Tokyo



Appendix: Questionnaire

This questionnaire, developed by GPAI first generation, is a list of questions to ask each of the surveyed managers, developers, users, and social partners.

AI system definition:

1. **(All)** What sort of AI system is used? (if you don't know, please write "Unknown")

Process of planning:

Process of planning existence (yes/no) ? If yes:

2. **(Management, Developer, User)** What are the purpose and goals of an AI application in the company? (Process or product optimization, new business model, automation, substitution of jobs?)

Potential follow-up questions:

a. **(Management)** If the answer includes anything related to training:

What is your approach on training related to the application of AI?

b. **(Management, Social Partner, User)** If the answer discusses automation:

What potential risks lie ahead? Which opportunities came from this use of AI?

c. **(Management, Social Partner, User)** If answer discusses substitution:

Are you sure that there was no bias, inequality, discrimination coming from this use of AI.

d. **(Management, Social Partner)** Are there general agreements on AI usage in the company (ethic boards, codes of conduct etc.)?

3. **(User, Social Partner)** Are workers/representative bodies involved in setting goals of the AI application?

Potential follow-up questions:

a. **(Management, Social Partner)** If the social partners are not included, why?

(Skip similar questions on Social Partners afterwards)

b. **(Management, Social Partner)** Are there Social Partners' guidance – on what level?

c. **(Management, Social Partner)** Are there approaches regarding collective agreements (Co-government) on goals and possibly conflicting objectives? What is the starting point of information and bargaining? Are there regulations on co-determination and if so, in what respect?

d. **(Management, Social Partner)** Are there general agreements on AI usage in the company (ethic boards, codes of conduct etc.)?



4. (Management, User, Developer) Is cooperation with researchers / developers and external experts given?

Potential follow-up questions:

- a. (Management, User, Developer) If not, why?
- b. (Management, User, Developer) What skills are involved?
- c. (Management, User, Developer) What part is delegated?
- d. (Management, User, Developer) What are the risks and opportunities encountered?

Employees' personal data:

5. (Management, Developer, User) Are employees' personal data required for operational use or affected by operational use? (if yes, what kind of data...)

Potential follow-up questions:

- a. (Management, Developer) If not, why?
- b. (User) Are you aware of the use of your personal data?
- c. (User) Have you experienced an event related to your personal data?
- d. (Management, Developer) What kind of data?
- e. (Management, Developer) How does the technology track the user?
- f. (Management, Developer) What are the purposes and uses of this data?
- g. (Management, Developer) When is traceability used to define a responsibility?

Human Machine Interaction:

6. (All) Is HMI currently involved in your work?

Potential follow-up questions:

- a. (Management) If the HMI technology is not yet implemented, is it intended to be applied in the company? In what respect: empowerment of employees, traceability, explainability, etc.
- b. (User, Social Partner) What kind of HMI technologies do you use?
(Bot, chatbot, social robot, cobot or other kind?)
(One to one or in group?)
- c. (User, Social Partner) What kind of interactions do you have with these technologies?
(In face-to-face, by phone, by internet?)
(Language interaction [spoken, written], physical interaction [facial, gestural, touch, multimodal] or both language and physical interaction?)
- d. (User, Social Partner) Are HMI technologies useful for your work? How much of your time is spent interacting?
(100% 75% 50% 25%)
- e. (Management, User, Developer, Social Partner) What is your assessment about the following issues of the work with human-like cobots and chatbots?
(Autonomy v. obedience, replacement v. augmentation, creativity v. dependency)
- f. (Management, User, Developer, Social Partner) If the HMI technologies do not fully meet the expected work or present some errors, do you have procedures for reporting the anomaly to management?
- g. (Management, User, Social Partner) Does the system help in making decisions? Which opportunities resulted from it? (Work done easier, quicker or better)
- h. (Management, User, Developer, Social Partner) Do you like to interact with HMI technologies?
- i. (Management, User, Developer, Social Partner) Which risks are you expecting from HMI technologies? (High, me



dium, low or no risk)

j. (User, Social Partner) What are the most important social values (positive and/or negative) of working with human-like cobots and chatbots?

(Trust, transparency, explainability, tolerance, fun, traceability, scalability, empowerment, integration, security, or others)

The ethical factors considered while designing the AI system:

7. (All) Is the **transparency of the AI system** for the company (and for the user in the company) required and given?

a. (All) At what stage of the design?

b. (All) Does the system communicate? Or is it a black box AI?

c. (All) How does the system communicate its motives and states?

d. (Management, Social Partner) Who in the company is involved in the interface design – workers and representatives?

e. (Management, Developer) Which information is logged?

f. (Management, Developer) Who has got access to that logged information?

8. (All) How is Data quality addressed?

a. (Management, Developer, User) Is the data adapted to your needs?

b. (Developer, User) Are there any ethical risks involved in processing the data?

c. (Developer, User) What are used technics and methods to reach this data quality?

d. (Developer, User) What potential functions and opportunities does this data quality allow you?

9. (Management, Social Partner) How is the issue of accountability addressed?

Potential follow-up questions:

a. (Management, Social Partner) How are responsibilities distributed in the company?

b. (Developer, User) For each stakeholder, what are their means of action on the data? What are its limits?

10. (Management, Developer) Is the system auditable?

Potential follow-up question:

a. (Management, Developer) Is there audit process in place?

Impact assessment: Ex Ante Analysis:

(Recall that these questions deal with the **front end** of the implementation)

11. (Management, Social Partner) What working areas / working groups were affected in respect of the number and quality of jobs (reorganizations etc.)?

12. (Management, User, Social Partner) Which impact (bias)?

13. (All) Were there Impacts on qualification demands and skill management?

14. (Management, Social Partner) Were there impacts on the workload, working conditions and health management?



15. (Management, Developer, Social Partner) Were there impacts regarding the use of personal data of workers (privacy, data protection and trade-offs; realize benefits to employees)?
(skip if already covered)

16. (Management, Developer, Social Partner) Were there regulations on using personal data and if so, in what regard?
(skip if already covered)

Implementation:

(Please prepare further questions for the interview with committee 2 if there are specific cases of training or learning at work)

17. (All) What are the required skills? What are the measures put in place for training?

Potential follow-up questions:

- a. (All) What are the measures put in place for safety?
- b. (All) What are the measures put in place for responsibilities in HMI?
- c. (All) What are all others measures put in place when implementing the AI application?
- d. (User, Developer) How is the assimilation of an AI skill different from another technology?
- e. (Management, User, Social Partner) Were employees involved in developing these measures?
- f. (User, Social Partner) Is the pedagogy limited to the use of the system or does it also lead to the understanding of the system?
- g. (Management, Social Partner) Are there Social Partners' guidance – on what level?

Reviews and adjustments (Ex Post Evaluation):

(Recall that these questions deal with the **aftermath** of the implementation)

18. (Management, User, Social Partner) Do you find that the system makes mistakes? (many, moderately, not at all)? Can it be trusted? (totally, moderately, not at all)?

19. (All) Are there experiences, reviews and adjustments (Ex Post Evaluation)?

20. (Management, Developer) How is success for this use case measured?

21. (Management, Developer) What worked less well in the use case?

22. (All) Effects on number of jobs, quality of jobs, job satisfaction, workload, skills?

23. (All) Are there unintended outcomes for workers situation and prospects?

24. (All) Are there opportunities and ways to redesign the AI system and work organization?

Potential follow-up questions:

- a. (All) Are there feedback and participation opportunities for the employees?
- b. (Management, Developer, Social Partner) Has the use of the solution raised new issues around the transparency of the system?
- c. (Management, Developer, Social Partner) Usage of employees' personal data (Surveillance)



d. (Management, Developer) Opportunity to do predictive analysis (Data) that was not initially thought of?

Other comments?

(Message to be sent to the GPAI, Question from the respondent)

