Online Panel Discussion: "Future Audit - The Future of Auditing AI-based Service" was held to discuss the future of auditing against AI.

The way we would audit artificial intelligence (AI) -based services has gained global interest in recent years. There are various challenging questions regarding artificial intelligence and auditing. For example, how, in what scope, and at what stage should audit be conducted on an ambiguous black box system commonly referred to as deep learning. Moreover, auditing an AI requires numerous modifications from conventional framework and practices of auditing such as the role of internal and external auditing, procedures to ensure audit quality, auditor's competence, and how to conduct audits under differently prioritized values specific to AI-based services: user safety, fairness, accountability, etc. On the other hand, there are also studies and experiments that aim to utilize AI models in the auditing process, hence the general discourse on auditing and AI has a wide range of issues.

The University of Tokyo Institute for Future Initiatives (IFI) has been making efforts to establish the platform for AI governance by discussing risk management methods and collaborating with domestic and international organizations. In this event, we have discussed how to audit AI services and AI systems by inviting experts who are leading the audit and security assurance of AI systems at major audit firms, experts in internal control on information systems, and relevant organizations. The main purpose of the event was to create an opportunity to have a dialogue on the future state auditing and the governance system of artificial intelligence.

■ Date: November 26, 2021 (Fri), 13:00-14:30
■ Format: Online Meeting
■ Keynote Speakers:
- Teruka Sumiya (Centre for the Fourth Industrial Revolution Japan, World Economic Forum)
- Takashi Matsumoto (Deloitte Touche Tohmatsu LLC / Institute for Future Initiatives, The University of Tokyo)

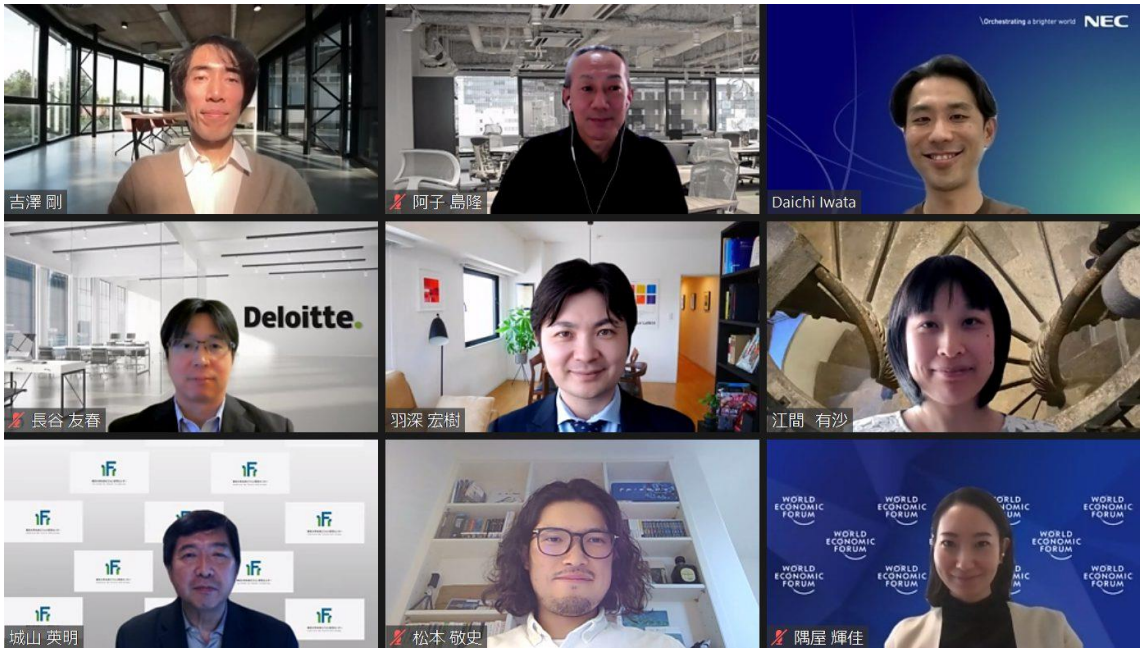
■ Moderator
- Go Yoshizawa (EY Ernst & Young ShinNihon LLC)

■ Panelists
- Tomoharu Hase (Deloitte Touche Tohmatsu LLC / Certified Public Accountant)
- Takashi Akoshima (Japan Digital Design)
- Daichi Iwata (NEC Corporation)

- Hiroki Habuka (Commerce and Information Policy Bureau, Ministry of Economy, Trade and Industry)

■ Organized by: Institute for Future Initiatives, The University of Tokyo

■ Supported by: Centre for the Fourth Industrial Revolution Japan, World Economic Forum



As artificial intelligence becomes ubiquitous across society, it is becoming increasingly important to inspect whether AI is functioning as intended by the engineers and whether it is not causing any unintentional disadvantages to its users. In this event, we invited people from the artificial intelligence industry, CPAs from audit firms, and government officials responsible for designing AI governance to discuss the definition of AI auditing and attempts to audit such technologies used by corporations.

Dr. Arisa Ema of the University of Tokyo Institute of Future Initiatives expressed her eagerness to contemplate the evaluation of AI services and the impact of AI auditing on society through this event.

The first keynote speaker, we welcomed Mr. Teruka Sumiya, Centre for the Fourth Industrial Revolution Japan, World Economic Forum. She made a presentation on the importance of practicing audit on artificial intelligence and how to conduct it through the introduction of agile governance. One of the main reasons for the increasing need for agile governance is heavily due to the change in social structure led by the social implementation of technologies.

Corresponding to the evolution of technology in society and external factors such as changes in the social environment, it is necessary to modify the style of governance accordingly as well. Understanding the consequence of new governance, and continuing the cycle of improvement is critical for regulating ever-evolving technologies. The key to agile governance is flexibility carried out by government entities but also in collaboration with various stakeholders. Agile governance is essential to embrace the benefit of modern technologies and react appropriately to risks. In particular, auditing must be incorporated in the agile governance scheme to ensure the reliability of the algorithmic models and their services. Ms. Sumiya stated that auditing itself should change from a static method to a dynamic model as well. She claimed that open discussions on how to maintain public credibility in the new audit system for AI, and how to gain trust from citizens on unfamiliar technologies are essential for the further social implementation of AI.

The second topic was on current issues surrounding AI auditing presented by Mr. Takashi Matsumoto from Deloitte Touche Tohmatsu LLC and a visiting researcher at the University of Tokyo IFI. He claimed that determining the scope and definition of AI is critical for auditing. For instance, artificial intelligence is a sophisticated product of algorithms but it is heavily and constantly influenced by training data and the users of the AI-based services and products. For this reason, he pointed out the value of a comprehensive approach expanding the auditing coverage to the user's environment to manage risks. Next, he introduced the three topics that will be discussed in the panel discussion.
The first topic was how to gain public trust in the ever-changing artificial intelligence. We must consider whether auditors have the capability to audit a constantly upgrading entity. The second theme was how to establish an audit methodology suitable to various objectives and risks unique to each AI-based service. Mr. Matsumoto claimed that it is necessary to examine whether the objectives are aligned and consistently reflected in the performance evaluation indicators of AI models used in the auditing process. Additionally, we must consider creating independent microscopes of evaluation such as AI model, system infrastructure, service operation, user environment for an in-depth analysis. The third topic puts emphasis on the audit industry and auditors to adjust to diversifying auditing needs to guarantee the reliability and quality of their assessments. In the past, we have maintained the quality among auditors by improving the audit manual, which is the basis of the evaluation process. However, it is very difficult to develop an audit manual tailored to AI considering the rapid pace of technological innovation. The AI auditing manual itself will be outdated by the time it is officially implemented in the fields. Another issue that was raised was whether the professionals working for audit firms could attain sufficient technical knowledge as well as

familiarity in social issues and policies related to AI to accurately understand and fairly evaluate artificial intelligence.

Then the event moved to a panel discussion session moderated by Dr. Go Yoshizawa, Manager of FAAS Division at Ernst & Young (EY) ShinNihon LLC. We have invited four expert stakeholders in AI auditing. Mr. Daichi Iwata, General Manager of the Digital Integration Division at NEC Corporation, for representing the business implementation of artificial intelligence. Mr. Takashi Akoshima and Mr. Tomoharu Hase were invited to represent auditing professionals. Mr. Akoshima is involved in IT-related internal audits at Japan Digital Design, and Mr. Hase is an auditor extensively involved in technology related audits and external evaluations at Deloitte Touche Tohmatsu LLC. Mr. Hiroki Habuka from the Commerce and Information Policy Bureau of the Ministry of Economy, Trade and Industry (METI) also participated in the discussion to bring the government's perspective on technology governance.

The first part of the panel discussion tackled the foundational question of "What is an audit for AI-based services?". Mr. Iwata initiated the discussion by suggesting that the concept of risk control should be the primary focus during the AI auditing and proposed a two-phase auditing system. In the first phase, the AI algorithm is trained with supervisory data and the model is ready for implementation, and the results are checked to see if it is functioning as intended by the designer or engineer. The second step of the auditing emphasizes the real-world implementation of the AI model as auditors must evaluate and monitor the quality of the input data and check whiteboxing the algorithmic decision making is possible. However, it was pointed out that to conduct such institutionalized auditing, the technology used in AI services must be in an auditable state. Mr. Akoshima, an internal auditing specialist, mentioned that auditors need to clarify the evaluation criteria and the definition of a correctly functioning system for confirming the normality of the AI model. Mr. Habuka claimed that a common perspective towards auditing artificial intelligence such as creating a list of Key Risk Indicators is essential for AI audit. In addition, Mr. Iwata advised that future discussions on AI audit should be held with the stakeholders specialized in each case. Dr. Yoshizawa pointed out whether the discussion including both audit-side and the audited-side would destroy the premise of independence and objectivity essential for auditing. Mr. Iwata responded that all the parties involved in AI development, auditing, and governance need to work together to set rules and review them on an ongoing basis. However, because the core business objectives of AI-based services vary from service to service and product to product, continuous discussion is required to determine the purpose, scope, and methodology of AI auditing.

The next topic of the panel discussion was "How should auditing methods be adapted to various AI-based services?". First of all, Mr. Habuka explained that the major difference between auditing AI services and conventional auditing is the difficulty to evaluate whether the functions and results envisioned in advance have been achieved because it is simply impossible to foresee the actual performance of the AI until it is officially implemented. Moreover, AI auditors are demanded to perform audits based on the results that are intermingled and affecting AI components since it is simply impossible to establish a common benchmark for AI to assure the quality. Taking an AI that evaluates users for example, algorithm could suffer from unfair judgment if the algorithm is heavily restricted to feed user information data in the name of privacy protection, Mr. Habuka has insisted on the importance for nurturing discussion among internal and external stakeholders, such as system designers, AI service operators, and users for balancing the list of objectives to be achieved during the auditing process. Mr. Hase referred to the definition of "right" and "wrong" in the decisions made by AI algorithms. He claimed that what constitutes "correct" AI may be subjective to the auditors, including cultural and historical context when auditing is taking place. An additional tricky factor to consider unique to AI audit is the continuous training of algorithms through the use of new data. Hence, it is unclear how long the external audit results could be trusted as the audit is only capable of assessing the performance in the past one moment. Mr. Iwata suggested that we should provide users with safety and trust in AI services by working on comprehensive governance driven by cooperation among stakeholders rather than auditing given the constant updating nature of AI. Mr. Habuka proposed a system to change the scope of governance promptly, rather than periodically at predetermined intervals as in the case of laws to correspond to the constant transformation of artificial intelligence. He further stated that stakeholders cannot be predetermined in advance and those who are unsatisfied with the specific AI service must be included in the discussions when the form of governance is updated from time to time. In the end, the public trust in the AI service can be built through an agile approach.

The final topic for panel discussion was on "The future of the auditing industry including the response to AI auditing". First, Mr. Hase raised the issue of what kind of human resources would be appropriate to realize AI service auditing. He also mentioned that audit firms, which are not traditionally AI specialists, need to improve their expertise in AI to become a credible entity for AI auditing. At the same time, it is necessary to establish an education system and qualifications/certifications that guarantee the proficiency to audit AI services. Mr. Hase addressed concerns for major corporations with abundant financial resources to gain unfair

advantage for accessing AI auditing services if auditing functions as a primary source of credibility in a society where implementation of AI is accelerating. Therefore, he pointed out that an introduction of alternative ways to ensure the quality of AI may be required. Mr. Akoshima pointed out that internal audit is important to ensure public trust in AI in addition to the statutory audit process through audit firms. He urged corporate management to understand the significance of internal audit to create an environment for internal auditors to seamlessly perform evaluation during the development and operation phases. Mr. Iwata has emphasized the importance of collaborating with research institutes and audit firms that have expertise in AI to implement the conventional-level external audit for AI-based services. He also pointed out that the roles and responsibilities by each actor in the new auditing process which naturally involve cooperation between AI developers/researchers from the audited-side and auditors should be reconsidered. Finally, Mr. Habuka shared the government's vision of AI governance including AI auditing. He mentioned it is necessary to conduct evaluations to ensure the safety and reliability of AI. He continued that the government needs to create incentives for companies to conduct proper governance, such as increased corporate value for conducting AI auditing. In the larger context of AI governance, governments should not unconditionally impose strict sanctions and penalties on AI service providers when they cause problems. He stated that he would like to establish a governance system that fosters innovation, where companies can be exempted from punishments if they meet certain conditions, such as proactively cooperating in investigating the causes of problems.

The closing remarks were given by Professor Hideaki Shiroyama, Director of the University of Tokyo Institute for Future Initiatives. He expressed his gratitude towards the active dynamic discussions among the stakeholders from AI development, internal audit, external audit, and the government that should guide the future of AI auditing. He further mentioned that this event was valuable to recognize the multidimensional aspects required for auditing artificial intelligence. The road to optimal governance for AI is simply impossible to attain through regulations alone to catch up with the fluid development of AI. He insisted on stakeholders to have a trial-and-error mentality, thus recognizing every AI-related incident as a learning opportunity as a whole.

The IFI of the University of Tokyo will continue to organize opportunities to nurture and encourage discussions regarding AI auditing and technology governance in cooperation with the World Economic Forum’s Center for the Fourth Industrial Revolution.