January, 2021
JDLA

Study Group 'AI governance and its Evaluation'
Report on the Session #5

1. Introduction

The Japan Deep Learning Association establishes study groups as a forum for deepening knowledge and discussing domestic and international policy trends related to artificial intelligence (hereafter AI) and Deep Learning (hereafter DL). This study group, "AI Governance and its Evaluation," defines "governance" as a system of management and evaluation by various actors, and launched a study group in July 2020 to investigate what forms of governance are possible and conduct a year-long study to help build trustworthy AI systems.

In the 5th session (held on November 24, 2020), Mr. Ryoichi Sugimura, National Institute of Advanced Industrial Science and Technology (AIST), and Mr. Yonosuke Harada, Institute of Information Security (IISEC), gave presentations on the topic of standardization for AI governance.

This report is a reconstruction of the topical presentations and the discussions of the study group participants.

2. Current status and future issues of AI Standardization

Mr. Ryoichi Sugimura gave a presentation on "Current Status and Future Issues of AI Standardization".

Trends in the international standardization of AI

With the growing international interest in AI, various external organizations such as ISO and IEEE have been discussing industry standards for various issues related to the use of AI, such as ethical issues and reliability issues. In this context, ISO/IEC JTC1[1] （hereafter JTC1） plays a cross-cutting role as a forum to discuss international de jure standards for AI.

JTC1 and SC42

Since its establishment in 1987, JTC1 has been an organization in charge of international standardization in the field of information technology, and is divided into Subcommittees (SC), Working Groups (WG), Special Working Groups (SWG), and

[1] Joint Technical Committee 1 was jointly established by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Study Groups (SG) by theme. While international meetings of each Subcommittee (SC) and Working Group (WG) are held separately, the plenary is held annually in October or November on a rotating basis by the major participating countries. In October 2017, JTC1 plenary resolved to establish a new Subcommittee SC42, to provide a forum for discussing international standards related to AI, against the background of the rapidly growing global interest in AI, including the struggle for AI supremacy between China and the United States. For the past six years, general meetings have been held internationally. The outline of SC42 is shown in Table 1 below.

Table1: outline of SC42

<table>
<tr><td>Scope</td><td>Standardization in the area of Artificial Intelligence</td></tr>
<tr><td>Theme of Activity</td><td>● Serve as the focus and proponent for JTC 1's standardization program on Artificial Intelligence
● Provide guidance to JTC 1, IEC, and ISO committees developing Artificial Intelligence applications</td></tr>
<tr><td>Structure</td><td>● Secretariat-general: U.S.
● Member National Bodies (including major countries such as the U.S., China, Europe and Japan)
Permanent member[2]: 30 countries, Observer member[3]: 17 countries</td></tr>
<tr><td>Organizational structure of SC42</td><td>● Divided into WGs (and JWGs) for each theme.
<table>
<tr><th>Name</th><th>Themes</th><th>Convenor</th></tr>
<tr><td>WG1</td><td>Foundational standards</td><td>Canada</td></tr>
<tr><td>WG2</td><td>Data</td><td>U.S.</td></tr>
<tr><td>WG3</td><td>Trustworthiness</td><td>Ireland</td></tr>
<tr><td>WG4</td><td>Use cases and applications</td><td>Japan</td></tr>
<tr><td>WG5</td><td>Computational approaches and computational characteristics of AI systems</td><td>China</td></tr>
<tr><td>JWG1</td><td>Joint Working Group ISO/IEC JTC1/SC42- ISO/IEC JTC1/SC40: Governance implications of AI</td><td>Japan</td></tr>
</table></td></tr>
</table>

[2] A P-member, for short, is a member who is obligated to vote on all issues, actively participates in standards development work, and attends meetings.
[3] An O-member, for short, is a member who, as an observer, has the right to attend and submit comments on distributed documents.

Organizational structure in Japan	● Established the 'SC42 Technical Committee' as a domestic committee for SC42 within the Information Technology Standards Commission of Japan (ITSCJ) under the Information Processing Society of Japan (IPSJ). ● Number of participating organizations: 24 (Number of participants: 39)

Overview of the development of standards by SC42

Table 2 below gives an overview of the development of standards by SC42 after its 6th Plenary Meeting held on October 19, 2020. In parallel with the development of the standard, it is necessary to sort out the relationship among the themes (data quality, governance, lifecycle, functional safety, etc.) handled by SC42 as soon as possible, but the amount of work is enormous, and SC42 is short of time and personnel. The flow of the planning and development stage of JTC1 is shown in Figure 1, and the overview of the planning and development by SC42 is shown in Table 2.

Figure1: JTC1 standard development phase flow and explanation of terminology[4]

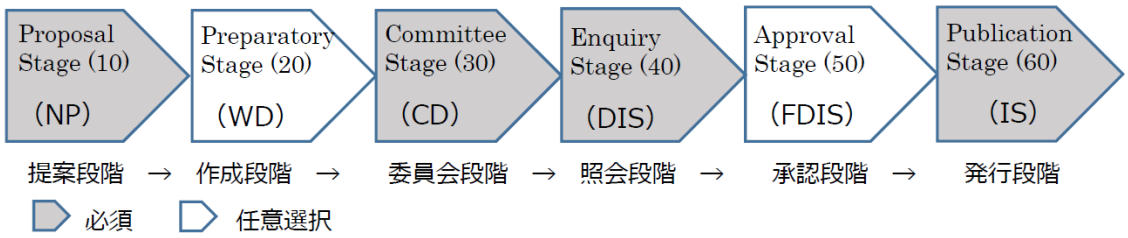


Table2: Overview of the development of standards by SC42

Name	Overview of the development of standards
WG1	Standardization of terminology related to AI and machine learning is being organized, and Draft International Standard (DIS) of ISO/IEC 22989[5] and ISO/IEC 23053[6] are about to be submitted. In addition, New Work Item Proposal (NP/NWIP) of ISO/IEC 42001[7], the AI version of the ISO/IEC Management standard has been submitted. Since the issues are extensive,

[4] Excerpts from the appendix of the Information Technology Standards Commission of Japan (ITSCJ)'s "FY2015 Activity Report of Technical Committee" https://www.itscj.ipsj.or.jp/hyojunka/h_sn_member/h_sn_katsudo/h_sn_katsudo2015/files/Glossary2015.pdf

[5] ISO/IEC 22989 "Artificial Intelligence – Concepts and Terminology"

[6] ISO/IEC 23053 "Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)"

[7] ISO/IEC 42001 "Artificial intelligence — Management system"

	discussions with experts other than engineers are required.
WG2	The International Standard (IS) for Big Data has been published as ISO/IEC 20547[8]. ISO/IEC 20547 consists of five parts, which are (1) requirements to be considered when deploying Big Data systems, (2) Architecture, (3) Security and privacy, (4) Use cases, and (5) other derived requirements. In addition, New Work Item Proposal (NP/NWIP) of ISO/IEC 5259[9], a standard on data quality for AI and machine learning has been submitted in a four-part structure, and discussions are underway[10].
WG3	Working drafts (WD) and Committee drafts (CD) of various standards for AI reliability are being developed, covering difficult topics such as risk management and bias in AI.
WG4	New Work Item Proposal (NP/NWIP) of ISO/IEC 5338[11], a standard for the life cycle of AI systems has been submitted and discussions are underway. A use case standard is scheduled to be published as ISO/IEC TR24030 soon.
WG5	A research proposal for AI computing devices has been made by China, but the content is vague and is still being debated.
JWG1	The governance implications of the use of AI by organizations is under development as ISO/IEC 38507[12].

3. International standardization of AI Governance

Next, Mr. Yonosuke Harada spoke on the topic of "International Standardization of AI Governance", starting from the background of the study of IT governance as a basis for international standardization of AI governance.

Social trends on IT Governance

Since 1960, computers have been introduced into the corporate economy with their technological advances such as the shift from host-based to distributed systems, the downsizing of computers themselves, and the increase in computer processing speed. Since 1990, the use of computers in corporate business (hereinafter referred to as "IT utilization"), as exemplified by the IT Revolution, has advanced and brought about major changes in the economy and society.

On the other hand, as the IT utilization progressed, its adverse effects began to surface

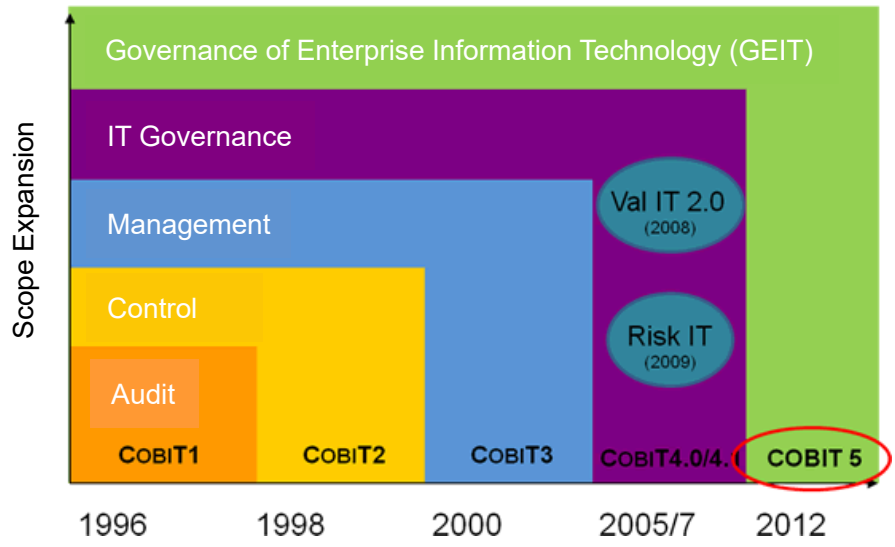
[8] ISO/IEC 20547 "Big data reference architecture"
[9] ISO/IEC 5259 "Data quality for analytics and machine learning"
[10] This standard is being discussed under the strong influence of the U.S. National Institute of Standards and Technology (NIST).
[11] ISO/IEC 5338 "AI system life cycle processes"
[12] ISO/IEC 38507 "Governance of IT – Governance implications of the use of Artificial Intelligence by organizations"

as business problems, and cases of negative impacts on corporate management, such as the "Year 2000 Problem," became widely known to the public. Since 2000, IT has been positioned as an essential infrastructure for corporate activities, and it has become necessary to recognize the adverse effects and risks of IT utilization as an issue for corporate management. Therefore, it has become necessary to establish a governance framework for IT as an integrated management and evaluation of IT to make corporate governance function.

International standards for IT governance

COBIT [13] and ISO/IEC 38500 [14] are representative international standards for IT governance. The first edition of COBIT was published in 1996 by ISACA[15] and ITGI[16], a research organization of ISACA. Since then, the scope of COBIT has expanded from Audit, Control, Management, and IT governance to IT governance of enterprise (see Figure 2).

Figure2: COBIT scope expansion[17]



ISO/IEC 38500 is an international standard for IT governance, published by SC40 in 2008. As a self-regulatory framework with its roots in the OECD's corporate governance, this standard presents the principles for realizing IT governance in the form of a detailed

[13] COBIT (Control Objectives for Information and related Technology)
[14] ISO/IEC 38500 “Information technology — Governance of IT for the organization”
[15] Since its establishment in the U.S. in 1976, ISACA has been playing a leading role globally in the areas of IT governance, control, security, and information systems auditing by creating information systems auditing standards and certifying certified information systems auditors.
[16] ITGI (IT Governance Institute)
[17] https://itgi.jp/index.php/cobit5/cobit5
Note that COBIT 2019, an update to COBIT 5, was published in November 2018.

examination of the framework for introducing IT governance and control such as COBIT. This standard is also based on the EDM model[18] and indicates that management should follow six principles (Responsibility, Strategy, Acquisition, Performance, Conformance, and Human Behavior). Since its publication in 2008, this standard has been used as a framework for IT utilization, pre-implementation assessment, and post-implementation, and has sequentially evolved through the 2015 revision and the development and publication of 38500 series.

Table3: Status of development of ISO/IEC 38500 series standards

Standards	Title	Development Status
38500	Information technology — Governance of IT for the organization	Published
38501	Information technology — Governance of IT — Implementation guide	Published
38502	Information technology — Governance of IT — Framework and model	Published
38503	Information technology — Governance of IT — Assessment of the governance of IT	In progress
38505	Information technology — Governance of IT — Governance of data	Published
38506	Information technology — Governance of IT — Application of ISO/IEC 38500 to the governance of IT enabled investments	Published
38507	Governance of IT – Governance implications of the use of Artificial Intelligence by organizations	In progress

From IT Governance to AI Governance

Since 2010, with the development of data collaboration business among related companies, examples of data utilization in business by AI (hereinafter "AI utilization") have been spreading worldwide. At the same time, problems that arise when using AI have surfaced that are difficult to deal with using conventional IT governance, so a new governance framework needs to be established. Nevertheless, since AI is technically based on IT, it was decided to view it as an extension of IT governance and build AI

[18] The current international standard is to have EDM (Evaluate / Direct / Monitor) as a governance model on top of PDCA (Plan / Do / Check / Action), which is the conventional management model.

governance in a form that takes into account the characteristics of AI.

The existing IT governance required Accountability and Transparency frameworks based on management self-regulation. On the other hand, AI governance requires a framework for establishing Trust in management, as interpretations and views on ethical issues of AI and other issues brought about by AI utilization vary depending on the economic and cultural background of each country.

Status of governance-related activities in ISO/IEC

There are currently 26 projects underway in ISO governance-related activities, and standards are being developed for IT governance, information security governance, data governance, and other forms of governance as components of corporate governance, as well as for AI governance.

The most recent major activity is to establish a standard for organizational governance as ISO 37000[19] in the second half of 2021. ISO37000 will provide a framework for organizational governance according to three outcomes, five principles, and six extended principles, as shown in Table 4 below. As for the status of the development of standards for AI governance, JWG1 of SC42, of which Dr. Harada is a convener, is currently developing ISO/IEC 38507 on the governance implications of AI utilization by organizations.

Table 4: Outcomes and principles of ISO 37000

Governance Outcomes	Effective performance	
	Responsible stewardship	
	Ethical behavior	
Governance Principles	Foundational	1. Purpose
		2. Value Generation
		3. Strategy
		4. Oversight
		5. Accountability
	Enabling	6. Stakeholder engagement
		7. Leadership
		8. Data and decisions
		9. Risk governance
		10. Social responsibility
		11. Sustainability

[19] ISO 37000 “Guidance for the Governance of Organizations”

4. Discussion points in the question and answer session

In the 5th session, AI and standardization were discussed and the following questions and answers were raised based on the topics presented.

Scope of responsibility of organizations subject to AI governance in ISO/IEC

- ✓ In terms of management accountability, the scope of organizational responsibility should first be examined based on current social methodologies (e.g., contractual agreements). In cases where it is difficult to specify organizational responsibilities, provide a standard for determining the scope of management's responsibility. Although AI utilization may take the form of services that go beyond the boundaries of a single company, the scope of responsibility in AI governance is currently being considered on a company basis. In this respect, the scope differs from that of "AI governance," which this study group considers to include auditing and insurance. However, in the future, it will be necessary to consider AI beyond the boundaries of companies in standardization.

Personnel, organizations, and institutions that need to be involved in the development of standards for AI governance.

- ✓ In addition to technical issues, AI governance also requires consideration of non-technical issues such as business. Therefore, it is necessary to involve experts from various fields of study and domain knowledge holders from various industries. Among them, it is essential to have personnel who can take a broad view of the entire society and facilitate existing stakeholders and engineers, as well as organizations and groups that will be greatly affected by the international standardization of AI governance.

Future prospects for the development of standards for AI governance

- ✓ While JTCI is a technical standardization body, AI governance will also need to consider how to deal with social issues brought about by AI utilization, such as ethical issues of AI. Therefore, the participation of the diverse human resources mentioned above will be necessary in developing standards for AI governance.
- ✓ Japanese people tend to affirm the reality of their current situation without questioning it, but when considering AI governance, it is necessary to work with an awareness of social infrastructure reform: "how to transform society, how to transform existing rules, or how to form new rules," and the same can be said for the development of standards.
  - ➢ **Differences in technological thoughts among nations regarding AI**

- As an example of the difference in approach between Japan and other countries when developing standards for AI governance, China uses the phrase governance = governing, which is similar to the idea of governing, and presented a governance proposal in line with its national strategy at a past SC42 plenary meeting.
- In Europe, there is a certain aversion to anthropomorphic expressions of AI, so when discussing AI with Europe, it is necessary to do so in a way that does not provoke anxiety.

How to deal with various guidelines related to AI governance

- ✓ We believe that the key is to unpack the guidelines from the following perspectives.
  - ➢ Organize what needs to be achieved in 5-10 years, taking into account stakeholders.
  - ➢ Consider the value that can be provided to fulfill corporate social responsibility.
- ✓ Guidelines are only a measure, not a binding constraint on corporate activities. The OECD's governance guidelines are principles-based as a self-regulatory framework (Comply or Explain: apply the guidelines or explain why not) for the above reasons.
- ✓ Similar to the concept of architecture mentioned by Professor Lawrence Lessig, a prominent cyber law scholar, the concept of AI governance needs to be extended to include not only hard law (enforceable statutes such as laws) but also soft law (unenforceable international standards and codes such as technical control measures for AI).
- ✓ In light of the expected technological innovations in AI, some NIST officials believe that it is better to remain calm at this time, because even if we develop a standard at this point in time, it is highly likely that the standard will soon become irrelevant.

Checks and balances between nations during the development of standards for AI governance

- ✓ In the case of SC42, if a country proposes a standard content that is suspected to be its own intellectual property, the content tends to be rejected without fail. In addition, if the above content is proposed, a fundamental discussion will be held on whether it can be applied fairly by each country, including its impact on existing standards.

- ✓ Many countries believe that AI business is a horizontal market[20], and therefore, measures that may give certain countries an advantage tend not to be adopted.

The final outcome of the standards for AI governance

- ✓ The publication of a standard is just the starting point, and the final form of the outcome will continue to change as the standard is used globally. On the other hand, governance will be the framework that management will refer to, and as a result, governance posture assessment will be required. Currently, SC40 is developing a standard for the evaluation of IT governance, and it is expected that AI governance will require a similar standard development in the near future.
  - ➢ It is assumed that the maturity model[21] will be used in the following assessment.
    - ・Management status of AI services
    - ・Status of AI governance systems in companies providing AI services
  - ➢ If there is a standard for AI, it is expected that the insurance industry will use the standardized guidelines and indicators as reference information during accident assessment.
  - ➢ As in the case of IT, it is expected that more and more companies will set up specialized departments for the evaluation of AI governance, but since AI is closely related to business, it is also necessary to have a good understanding of business when conducting evaluations.

Incorporating AI case studies from the private sector and others into standards

- ✓ The project to develop a standard for AI governance has just started. In the future, it will be necessary to consider how to incorporate AI case studies from private companies into the standard, just as the opinions of private non-life insurance companies were collected and organized to incorporate insurance issues in the development of cyber security standards.

We will continue to discuss AI governance in Japan and abroad through this study group.

Written by Keitaro Saito
Translated by Michiko Shimizu

[20] horizontal market (or horizontal): A new market that is developed through cooperation between companies/countries at the same stage, such as partnerships with other companies/countries in regions where the company/country has not yet entered.
[21] A framework for assessing business maturity from the perspective of standardization

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<Outline of the 5th Session of the Study Group>

Date & Time: Tuesday, November 24, 2020, 16:30-18:30 (Zoom)

Agenda:

- "Current Status and Future Issues of AI Standardization" provided by Mr. Ryoichi Sugimura (National Institute of Advanced Industrial Science and Technology (AIST))
- "International standardization of AI Governance" provided by Mr. Yonosuke Harada (Institute of Information Security (IISEC))
- Question and answer session / discussion