

AI Strategy 2022 (Overview)



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Secretariat of Science, Technology and Innovation Policy
Cabinet office, Government of Japan



Outline of AI Strategy 2022

- Realize Society 5.0 and contribute to SDGs, based on three principles (**Dignity for People, Diversity and Sustainability**)
- **Five strategic objectives** (Human resources, Industrial competitiveness, Technological Systems, International Cooperation, and Dealing with Imminent Crises) were established to implement three principles.
- Especially, **new objectives to enhance implementation in society** and specific efforts to **deal with imminent crises** such as pandemics and large-scale disasters were set.
- Taking into account actions related to economic security, government as a whole will effectively coordinate related measures in centralized manner and pursue synergies with other strategic fields such as quantum and biotechnology.

Strategic Objective 1 : Human Resources

-Establish a sustainable framework to develop and attract human resources suitable for the AI Era

Strategic Objective 3 : Technological Systems

-Realization of a framework to establish and operate a series of technological systems

Strategic objective 0 : Dealing with Imminent Crises

-Establishment of systems and technological infrastructures to maximize protection of people's lives and property against pandemics and large-scale disasters.

Strategic Objective 2 : Industrial competitiveness

-Promoting AI adoption in real-world industries and securing a position as the world's top runner

Strategic Objective 4 : International Cooperation

-Establishment of international AI research, education, social infrastructure network

Dealing with Imminent Crises

National Scale Crises	Planetary Scale Crises	Resilient Foundation
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Building a foundation for the future

Education Reform	R & D
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Infrastructure for industry and society

Implementation In society	Data Platform	Digital Government Support for SMEs and emerging industry
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ELSI

AI social principles

Set and promote new targets based on comparison with "advanced cases in other countries"

Progress of AI strategy

- ✓ **90% (154 of 171) of measures** due by the end of FY2020 were **progressing as planned**
- ✓ However, there are many ongoing measures that **have not yet been widely recognized.**

Main results of AI strategy

【 Education Reform 】

- Launch of the "**Mathematics, Data Science and AI Education Program Certification System (Literacy Level)**" (78 certifications by 2021.8)
- Accelerated implementation of "**GIGA School Concept**"

【 Restructuring of R& D System 】

- Establishment of "**Artificial Intelligence Research and Development Network**" and promotion of information coordination among participating organizations (116 organizations participated as of 2021.9)

【 Implementation in Society 】

- Demonstration of the **Smart Agriculture Project** (carried out in 148 districts in fiscal 2020)
- Construction of land transport platforms
- Construction of infrastructure for cooperation of port-related data to improve productivity of container logistics

Changes in the domestic & international situation regarding AI technology

International

AI technology is essential for maintaining fundamental functions of society such as "national security" and "preservation of democracy"



- ✓ Overhaul AI Policy and strengthen budget (bring AI budget (non-defense) to \$32 billion per year by 2026)



- ✓ Accelerate "intelligence" to utilize mechanization, informatization, and AI to improve the military's strategic capabilities (new 5-year plan (2021-25) announced in March 2021).



Europe

- ✓ "Proposed comprehensive regulations on AI Use" (April 202) (AI systems used in the EU are classified into 4 stages, such as "Unacceptable" and "High Risk" categories. Violators will face a maximum fine up to EUR 30 million.)

Domestic

Changes in social & economic systems

- Progress in teleworking and changes in lifestyles due to the pandemic
- Promotion of digitalization (establishment of Digital Agency, government cloud)

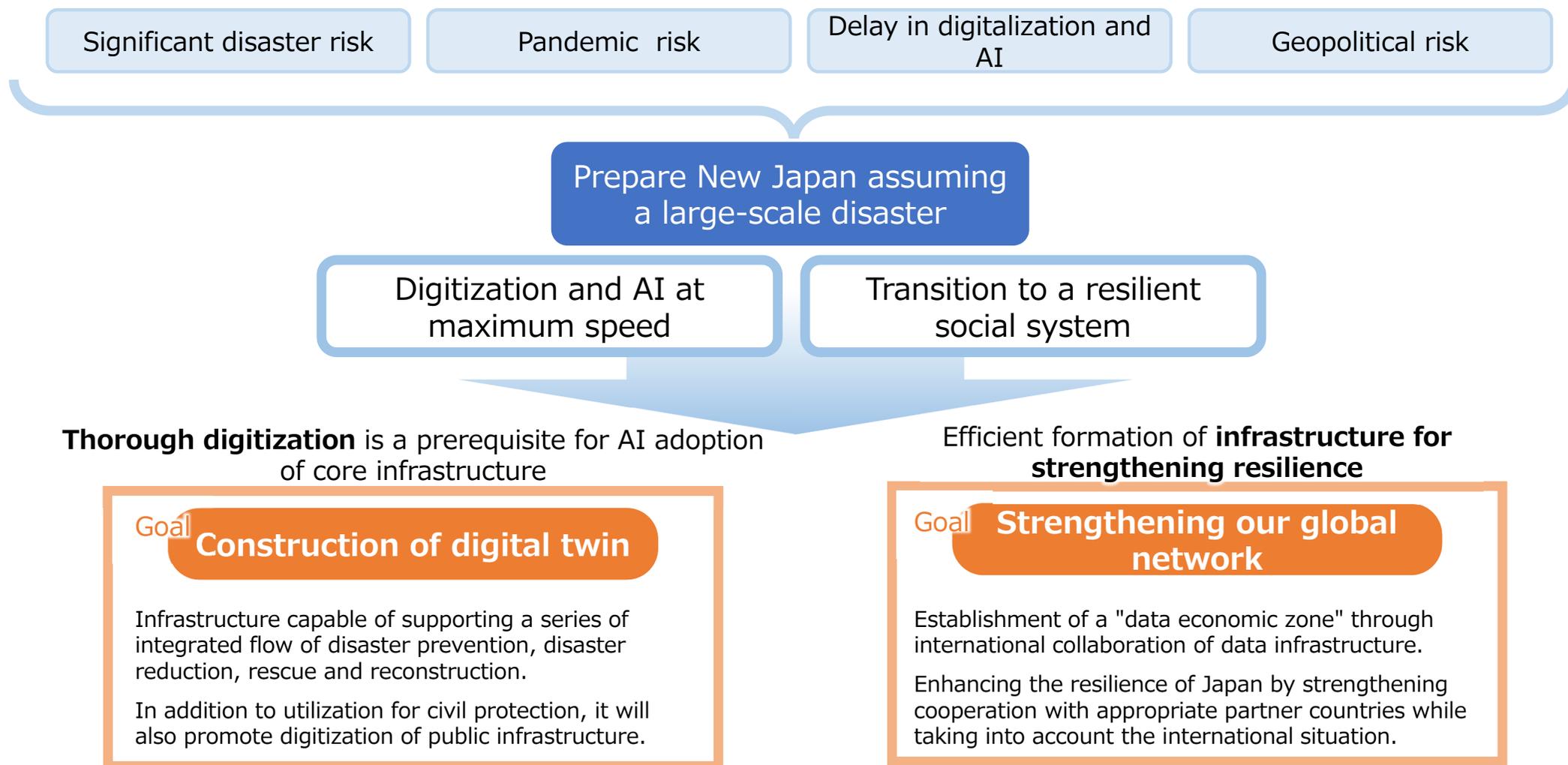
Preparation for large-scale disasters & pandemics

- Disaster-Ready for events such as an earthquake directly beneath Tokyo, Nankai Trough earthquake etc.
- Pandemic-Ready for not only COVID-19 but also emerging infectious diseases

Necessity of new AI strategy

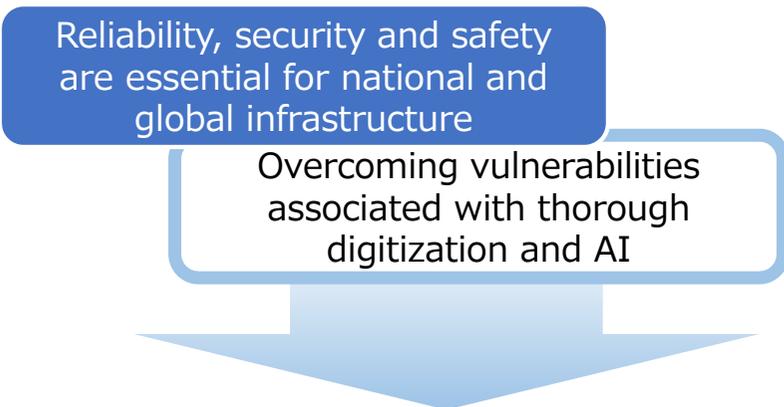
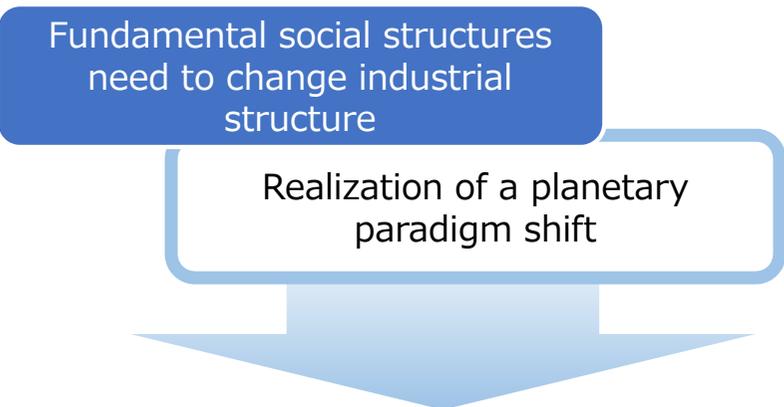
Strategies (setting new targets, etc.) are needed to **promote implementation in society of AI that will create significant value** based on domestic and international situations and technological trends.

- Needless to say, efforts should be made to minimize damage **from large-scale disasters** and other disasters. Another major challenge is how to reconstruct Japan after that. This could lead to a critical situation due to the risk of a new pandemic, **the decline in Japan's physical strength due to population decline, and delays in digitalization.**
- These problems cannot be overcome by AI alone, but **AI should be used extensively as a catalyst to break the current impasse.**
- To this end, it is necessary to **build digital twins** and **strengthen resilience by strengthening global networks.**



- In the future, our social and economic activities will require a **paradigm shift** that will contribute to an increase in biological diversity and the restoration of nature.
- AI can be an important **core technology** for realizing this paradigm shift.
- Japan should hone its strengths and establish leadership in **AI applications in the field of sustainability**.

- AI and digitization are technologies that play a central role in achieving national and planetary resilience.
- Technologies such as "**explainable AI**" that constitute the concept of "**responsible AI**" ensure the reliability of the information infrastructure and create competitive advantages in terms of high quality, security and safety in Japan.



Japan's leadership in finding great value in safety and security and in harmony with nature

Enhancing competitiveness through high-quality, reliable, safe and secure AI

Goal **AI applications in the field of sustainability**

Applying AI in areas such as contributing to unstable food supply, responding to energy supply, improving access to health care and education, and resource recycling.

Goal **Initiatives for Responsible AI**

Establishing leadership in technology development and operations, such as "explainable AI," and ensuring that AI platforms are robust will enhance competitiveness.

- In order to promote the implementation of AI in Japan, it is necessary **to further promote the digitization of society.**
- Also, regarding AI, it is necessary to discard **the following assumptions.**

Assumption

AI substitutes human work?

Many tasks performed by humans actually require extensive informed judgment or are severe in that even the slightest error can be tolerated.

Utilization tends to be limited under the recognition that it substitutes for human work.

AI works with people

Collaboration between people and AI can minimize effort and maximize profits.

Assumption

Only engineers can understand AI better?

AI adoption tends to be delayed if engineers who can build AI systems are required.

From the business case
AI can understand.

The search for AI utilization measures is progressing globally.

Even if you don't build your own AI, using existing AI and differentiating yourself in other areas is an effective way. (Not everything needs to be developed.)

Assumption

All the data?

AI adoption tends to be delayed if we wait for sufficient data to be obtained prior to its utilization.

Loop formation is important

Data is certainly important.

However, it is important to form a loop in which data is acquired through service provision using AI, and to balance service provision and data collection.

Deep learning, which is expected to be widely and effectively used in image recognition and natural language processing, **is positioned as an important field** in order to lead to the creation of large profits. With **implementation by companies** in mind, we will work on the following.

- There is a view that it is difficult to introduce AI in Japan because there is a **strong tendency to expect excessively high quality** from AI.
- Therefore, it is expected to **accelerate the development of technologies that can break the black box nature of AI, such as ensuring transparency and accountability of AI, to realize highly reliable AI in the first place, and to take initiatives on ELSI.**

Goal **Improve AI reliability**

- There is a view that although Japan **has accumulated a considerable amount of data in each field, it has not been able to utilize it more effectively than other countries.**
- Therefore, it is expected that **data supporting AI utilization** will be enhanced and that a large-scale data area will be constructed with a view to linking with overseas.

Goal **Enhancement of data supporting AI utilization**

- In Japan, there are **environmental constraints such as a shortage of human resources and restrictions on sharing of technical information and handling of data.**
- In addition to **further enhancing efforts to secure human resources**, it is expected that the environment will be improved by **supporting the activities of young human resources and actively providing technical information held by national research institutes.**

Goal **Development of environment for securing human resources**

- In some cases overseas, **the public sector has been actively engaged in AI utilization**, thereby suppressing negative elements.
- **Active AI utilization by government agencies** is expected to improve socioeconomic efficiency, improve the QOL of people, and promote the use of AI throughout society.

Goal **Promotion of AI utilization in the government**

- By combining AI with fields in which Japan has strengths, such as physics, chemistry and machinery, we can create highly competitive products and services.

Goal **Integration of AI with fields where Japan has strengths**

	Target	Major Initiatives
<p>Establishment of "AI for National Scale Resilience"</p> <p>(Dealing with National Scale Crises)</p>	<ul style="list-style-type: none"> ● Building digital twins as a foundation for AI-driven utilization ● Construction of infrastructure to support the global expansion of private companies, including the construction of a "data economic zone" through international collaboration of domestic data infrastructure 	<ul style="list-style-type: none"> • Development of technology for collection, analysis and distribution of high-precision remote sensing data (MIC) • Promoting R & D for the construction of forecasting systems for weather, earthquake ground motion, flood and sediment disasters (MEXT) • Technology development for design, verification and implementation of digital architecture (METI) • Construction of national land and transport data platform, establishment of infrastructure database, and realization of digital twin by developing,utilizing and promoting open data conversion of 3D urban models (MLIT) • Building a system that uses AI to ensure the safety of marine traffic and improve the efficiency of marine transportation (MLIT) • Full-scale operation of "Smart Food Chain System" and overseas expansion for the export of Japanese agricultural and marine products and foods (©SSTIP, MAFF)
<p>Establishing leadership in "AI for Planetary Scale Resilience"</p> <p>(Dealing with Planetary Scale Crises)</p>	<ul style="list-style-type: none"> ● Application of AI in the area of sustainability such as planetary environmental issues 	<ul style="list-style-type: none"> • Development and demonstration of technologies including AI to realize the Green Food System Strategy (MAFF) • Promotion of utilization and analysis of remote sensing data obtained by greenhouse gas observation satellites using computational resources (MOE) • "Visualization" of biodiversity with the aim of restoration of healthy ecosystems and promotion of linkage using OECM (MOE)

	Target	Major Initiatives
<p>Establishment of leadership through "Resilient and Responsible AI"</p> <p>(Building a Resilient Foundation)</p>	<ul style="list-style-type: none"> ● Initiatives to realize "responsible AI" such as "explainable AI" ● Promote technology development in the area of integration of cyber security and AI leading to improved reliability 	<ul style="list-style-type: none"> • Promoting R & D for the construction of forecasting systems for weather, earthquake ground motion, flood and sediment disasters (MEXT) • Promoting R & D to establish security technologies using explainable AI (MEXT) • Promoting R & D for utilization of AI technology in material science fields (MEXT) • Promoting R & D for the development of AI-driven medical diagnostic systems and diagnostic reliability assessment systems (MEXT) • R & D of explainable AI systems that evolve together with humans (METI) • Upgrading of "Machine Learning Quality Management Guidelines" for the establishment of AI quality assessment and management methods, and construction of measurement testbed (METI) • Development of natural language processing technology to accelerate domestic understanding and acceptance of latest information on cyber security incidents, Malware, etc. (MIC)

Targets and Major initiatives (promotion of implementation in society) 10

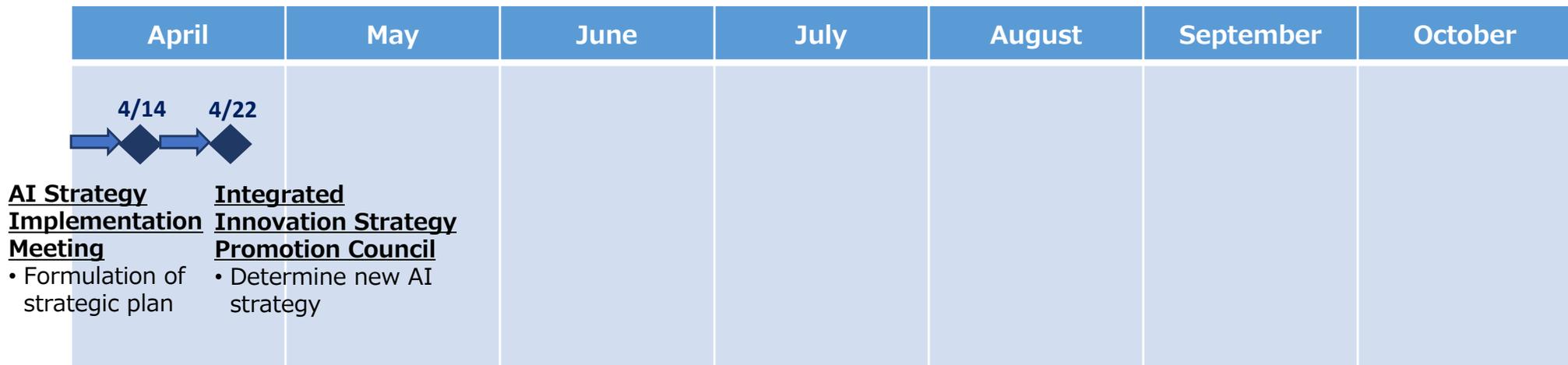
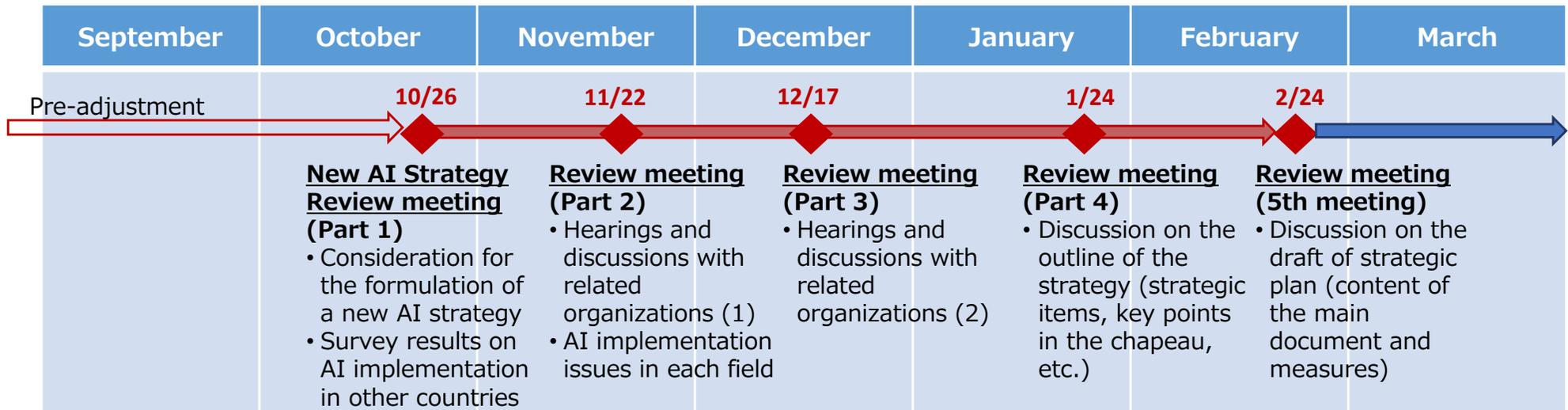
	Target	Major Initiatives
<p>Improve AI reliability</p>	<ul style="list-style-type: none"> ● Initiatives to realize "responsible AI" such as "explainable AI" (<i>repeated</i>) ● Promote technology development in the area of integration of cyber security and AI leading to improved reliability (<i>repeated</i>) 	<ul style="list-style-type: none"> • Promoting R & D for the construction of forecasting systems for weather, earthquake ground motion, flood and sediment disasters (MEXT) • Promoting R & D to establish security technologies using explainable AI (MEXT) • Promoting R & D for utilization of AI technology in material science fields (MEXT) • Promoting R & D for the development of AI-driven medical diagnostic systems and diagnostic reliability assessment systems (MEXT) • R & D of explainable AI systems that evolve together with humans (METI) • Upgrading of "Machine Learning Quality Management Guidelines" for the establishment of AI quality assessment and management methods, and construction of measurement testbed (METI) • Development of natural language processing technology to accelerate domestic understanding and acceptance of latest information on cyber security incidents, Malware, etc. (MIC)
<p>Enhancement of data supporting AI utilization</p>	<ul style="list-style-type: none"> ● Building digital twins as a foundation for AI-driven utilization (<i>repeated</i>) ● Improvement of research data base and clinical data base to promote AI utilization ● Promotion of technology development in the area of integration of cyber security and AI leading to effective use of confidential data 	<ul style="list-style-type: none"> • Development of technology for collection, analysis and distribution of high-precision remote sensing data (MIC) • Promoting R & D for the construction of forecasting systems for weather, earthquake ground motion, flood and sediment disasters (MEXT) • Technology development for design, verification and implementation of digital architecture (METI) • Construction of national land and transport data platform, establishment of infrastructure database, and realization of digital twin by developing, utilizing and promoting open data conversion of 3D urban models (MLIT) • Building a system that uses AI to ensure the safety of marine traffic and improve the efficiency of marine transportation (MLIT) • Collection and construction of Japanese-related data sets, large-scale language models, etc. (MIC) • Examination of the usefulness of public databases in the field of health care and nursing care in AI development (MHLW) • Research and development of multi-modal and cross-modal AI technology that enables cross-field behavioral risk prediction in real space without sharing IoT data in edge environments (MIC) • Development of secure distributed processing technology to promote industrial data distribution (MLIT)

Targets and Major initiatives (promotion of implementation in society) 11

Target		Major Initiatives
Additional environmental improvements such as securing human resources	<ul style="list-style-type: none"> ● Improvement of international brain circulation in advanced technology fields such as AI ● Active provision of technological information from national research institutes and practical human resources development to promote AI implementation through practice by private companies ● Review of rules for handling data subject to AI learning and processing 	<ul style="list-style-type: none"> • Promoting a new flow mode for young researchers entering the international brain circulation (MEXT) • Enhancement of advanced AI human resources development at AIST (creation of educational opportunities for young AI personnel utilizing computational resources and simulated environments, and enhancement of systems for overseas personnel dispatch and acceptance) (METI) • Improvement of environment for use of patient data in development and research of medical devices using AI (MHLW)
Promotion of AI utilization in the government	<ul style="list-style-type: none"> ● Strengthening the promotion system to promote the introduction of AI in government agencies, and thereby strengthening and improving administrative functions ● Formation of sustained improvement cycle, including data collection through AI application 	<ul style="list-style-type: none"> • Development of a nationwide unified tool that contributes to judgment of urgency using AI at Child Guidance Centers (MHLW) • Promotion of introduction of new technologies including AI and big data through initiatives of the National Council for Infrastructure Maintenance (MLIT) • R & D of multilingual translation technology for smooth collection of information from various countries and smooth dissemination of information to various countries, which is the foundation for promotion of AI utilization (MIC)
Integration of AI with fields where Japan has strengths	<ul style="list-style-type: none"> ● Further focus on AI applications in fields such as medicine, drug discovery, and materials science ● Promotion of AI use and application in cultural industries where Japan is strong ● Pursue integration of AI with where Japan has strengths to address challenges unique to Japan ((1) health, medical care, and nursing care; (2) agriculture; (3) infrastructure and disaster prevention; (4) transportation infrastructure and logistics; (5) regional revitalization; (6) manufacturing; and (7) security) 	<ul style="list-style-type: none"> • Promoting R & D for utilization of AI technology in material science fields (MEXT) • Promoting R & D for the development of AI-driven medical diagnostic systems and diagnostic reliability assessment systems (MEXT) • Development and demonstration of innovative catalyst technologies utilizing regional resources and digital technologies such as AI (MOE) • Creation of drug discovery targets through AI analysis using omics and clinical information in addition to whole genome analysis (MHLW) • Research and development of multi-lingual simultaneous interpretation technology (MIC) • Upgrading of inbound reception environment at tourist sites using ICT (MLIT) • Promotion of development and demonstration of energy-saving AI-related technologies modeled on brain mechanisms (©MIC, MOE) • Promotion of process informatics to improve efficiency and streamline manufacturing processes (METI) • Upgrading and improving the efficiency of maintenance and management through automatic identification of abnormal locations in infrastructure facilities using AI and other technologies (MLIT) • Promotion of research on the application of AI technology that contributes to the defense of Japan (MOD)

Flow of New AI Strategy Formulation

- The New AI Strategy Review Meeting has been held five times since October 2021.
- A new AI strategy plan was formulated at the AI Strategy Implementation Meeting in April 2022 and formally decided through the Integrated Innovation Strategy Promotion Meeting.



Advisory Council(AI Strategy Implementation Council)

Chairman : Yuichiro ANZAI, CEO, the Tokyo Foundation for Policy Research
Hiroaki KITANO, President and CEO, Director of Research, Sony Computer Science Laboratories Inc.
Atsushi SHINJO, Professor, Department of Environment and Information, Keio University

New AI Strategy Review Council

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Kazuhito ATAKA, Professor, Department of Environment and Information, Keio University,
CSO, Yahoo Japan Corporation
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