An AI Opportunity Agenda for Japan

Google

Executive Summary

We stand at a pivotal moment in the development of artificial intelligence in Japan. Japan has made positive strides towards unlocking the potential of AI for raising productivity, driving economic growth, and addressing social challenges. On the global stage, Japan has played a leading role in driving action on AI safety through the development of the G7 Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems. There is now an opportunity for all stakeholders to build on this progress and come together on a **comprehensive AI opportunity agenda**, to take the further steps necessary to realize AI's full potential for Japan.

If fully harnessed, AI can ignite an era of transformative economic and social progress. A study produced by Access Partnership and GLOCOM has estimated that generative AI can unlock JPY 148.7 trillion (USD 1.1 trillion) of productive capacity in Japan, equivalent to over one-fifth of Japanese GDP in 2023. AI in Japan is already being used to address labor shortages and drive the digitalization of the economy, to improve the health and well-being of Japanese people, to produce award-winning cultural output, and to help make the country more resilient to national disasters.

Digitalization and AI have a key role to play in supporting Japan's transition to becoming a more productive, dynamic and competitive economy. AI's impact can be profound in sectors where labor shortages are more acute, such as manufacturing and construction. Toyota has developed an "AI platform" in its manufacturing sites using Google Cloud's products. This can help create models that use AI to perform visual inspections, improving efficiency at Toyota's sites.

AI is enabling new discoveries and applications in medicine, nursing care, education, and childcare. Osaka University and Google are partnering on an AI-based tool to help people detect skin conditions based on photographs. As explained by Professor Manabu Fujimoto of the Osaka University Graduate School of Medicine, "we hope to contribute to improving the quality of life of people suffering from skin diseases by taking on the challenge of innovative technologies like this". This is just one of the many ways in which AI is already helping to improve health outcomes.

AI has an important part to play in the response to climate change. This includes both driving the transition to Net Zero emissions and addressing the impact of climate change, including strengthening Japan's national resilience to natural disasters. Japanese energy company, Sumitomo, has partnered with Finnish utility company, Vantaa Energy, to develop an AI solution for maximizing energy efficiency at power plants.

Japan has a key opportunity for the next stage of AI -- to be a leader globally both on the development and deployment of AI. Japan has a wealth of industry strengths (manufacturing, robotics, energy, biopharmaceutical, pop culture etc) ripe for deeper deployment of AI, together with rich AI talent and technological strengths.

A robust strategy across government, industry, and civil society is a key to achieve this leadership position, and to utilize AI to improve Japan's international competitiveness and address major societal challenges. We offer the following recommendations, recognising that Japan has already taken important steps in these areas:

- **Invest in innovation infrastructure** – meeting the moment of this technology by investing in AI research and development, digital infrastructure and compute capacity, and policies that enable ideas and data to be translated into new discoveries, products, and services.

- **Build an AI-empowered workforce** – investing in people to make sure they can use and benefit from AI, from students to workers, and from small businesses to traditional industries.

- **Promote widespread adoption and universal accessibility** – harnessing AI across the government and industry to address major societal and economic challenges and ensure the benefits of AI are widely shared, while adopting a regulatory framework that supports a healthy AI ecosystem.

Introduction

The choices made by governments, industry, and civil society at early stages of technological development will determine if it will be adopted at scale and unlock opportunities for all.

AI has the potential to fundamentally change the ways we live, work, and learn, through its ability to assist, complement, empower, and inspire people in almost every field of human endeavor. It is already opening up new possibilities by enabling people to communicate across languages and abilities, helping people stay safe with fire and flood forecasting, reducing energy emissions, and improving our ability to detect and treat cancer and other diseases.

Take AlphaFold, Google DeepMind's AI system that uncovered the 3D structure of 200 million proteins – the building blocks of life. That single initiative is accelerating research in nearly every field of biology, speeding up progress on important real-world problems including finding new drugs to treat liver cancer, developing fully effective malaria vaccines and breaking down single-use plastics. To date, over 78,000 Japanese researchers, learners and innovators have leveraged the AlphaFold database, with over 1,000 papers citing AlphaFold involving researchers affiliated to Japanese institutions.

Similarly, the development of the world's first human pangenome reference – a resource that better represents human genetic diversity – will open doors to more inclusive and equitable genetic testing and treatment globally, enabling more accurate diagnoses and development of new therapeutics.

We believe AI can do so much more to help address some of the defining challenges of our time. The possibilities are immense: from addressing major public health challenges to boosting living standards and re-invigorating economies struggling from a lack of productivity growth.

Together we must ensure that AI makes lives easier, helps solve complex challenges, and enables us to reach big goals. To date, there has been a strong and appropriate focus on addressing potential future risks from AI. We have seen governments take important steps together with companies and other civil society stakeholders to address and mitigate these risks.

But to fully harness AI's transformative potential for the economy, for health, for the climate, and for human flourishing, we need a broader discussion about steps that governments, companies, and civil society can take to realize AI's promise. We must focus not only on the harms we want to avoid and the risks we want to mitigate, but on the potential we want to achieve.

Building on Google's three-pillar agenda for responsible AI progress – unlocking **opportunity**, promoting **responsibility**, and enhancing **security** — this paper proposes three key recommendations for Japanese policymakers, companies, and civil society to deliver AI's benefits to as broad a range of people as possible. To achieve this, it is important to work in partnership to:

1. **Invest in innovation infrastructure;**

2. **Build an AI-ready workforce; and**

3. **Promote inclusive adoption and accessibility.**

Japan's AI Opportunity

With its established strengths in robotics and advanced manufacturing, Japan holds enormous potential for becoming a leading AI nation. **If done right, AI has the ability to raise living standards and productivity growth across Japan**, driving economic efficiency and addressing social challenges, such as caring for an aging population and adapting to climate change.

From industry to healthcare and culture, **AI is already creating new possibilities for Japanese people in tangible and immediate ways.**

Raising Industrial Productivity

Japanese automobile manufacturers have for many years held a leading share of the global market, excelling due to strengths in engineering and industrial production. Automobile manufacturers now face an increasingly competitive global climate. The shift towards electric vehicles is reshaping global supply chains and bringing new competitors into the market. Recent data suggests that Japan was no longer the world's largest vehicle exporter in 2023.

As Japanese manufacturers adapt their processes to meet this challenge, AI can help to improve the efficiency of industrial production, particularly in the production of electric vehicles. The Toyota Research Institute has developed a new generative AI tool for the design of electric vehicles that allows designers to integrate initial design sketches and engineering constraints into generative AI tools at an early stage in the creative process. This can significantly accelerate the design of electric vehicles. Expanding its partnership with Google Cloud, Toyota is adding Speech On-Device - a Google Cloud AI product embedding AI-based speech recognition and synthesis available in the cloud - to Toyota and Lexus vehicles. These are important examples of the potential value of AI in helping Japan to maintain its competitive strength in manufacturing.

Increasing Agricultural Production

Japan's aging workforce presents a particular challenge to sectors such as agriculture. 43 percent of Japanese farmers are aged over 75 and the average age of all farmers is almost 68. This will make it challenging to hit the Japanese government's target of achieving 45 percent of caloric self-sufficiency by 2030.

Faced with labor shortages, more and more Japanese farmers are innovating with the use of AI technology to perform agricultural tasks. Takeshi Yoshida, head of a cucumber farm in Hanyu, Saitama Prefecture, is using an AI-powered robot developed by Japanese robotics company, AGRIST, to harvest cucumbers. The robot checks the size of cucumbers based on images it captures from a camera mounted on the robot, recognizing ripe ones and cutting off between one and three roughly every two minutes before placing them in a case. If this success can be replicated across the Japanese farming sector, it could have a big impact on agricultural production and productivity.

Powering Drug Discovery

The process of conceptualizing a drug to ultimately using it in clinical settings is long and complex. The use of AI to analyze medical data has been shown to significantly accelerate drug discovery. As studies have found, AI can be used to virtually screen and optimize compounds and predict protein-drug interactions.

In Japan, pharmaceutical companies are incorporating AI to speed up breakthroughs in drug discovery. Astellas Pharma's Mahol-A-Ba drug development platform combines AI with image analysis and robotics. It can help with tasks such as culturing cells for testing new treatments, cutting the time needed from a month down to an hour and a half. Similarly, Eisai's laboratory uses AI to crunch past research data to model chemical compounds, then quickly narrow them down based on their potential as drug candidates. AI-enabled accelerated drug discovery could ultimately lead to substantially improved health outcomes on a range of diseases from cancer to Alzheimer's disease.
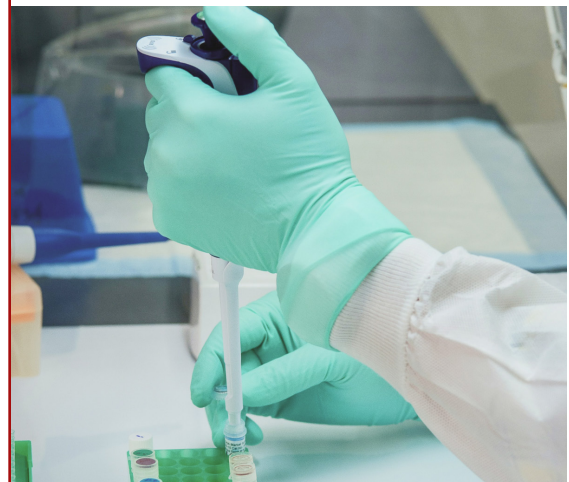
Improving Healthcare for People with Dementia

In Japan, as is the case in other developed economies, aging populations are leading to rising numbers of people living with dementia. The Alzheimer's Association estimates that over 4.6 million Japanese people are living with dementia, a number that is expected to rise. This presents a challenge to nursing homes that want to provide dignified and high-quality care for their residents.

In 2019, Japanese nursing care provider, The Harmony, decided to build a robot capable of communicating with nursing home residents. Instead of following a script, The Harmony's robot uses AI to guide the conversation, asking follow-up questions on a topic if the person seems interested. This has already had an impact in keeping residents calm and engaged, while alleviating the burden on staff members' time. As one staff member commented, "Someone who used to spend all of their time alone now happily asks me to bring [robot] Dai-chan…I saw a new part of them". AI tools such as The Harmony's robot can raise the quality of life for people with dementia.

Enhancing Resilience to Disasters

Japan's position across three tectonic plates and the resulting frequency of earthquakes underlines the continuing importance of building national resilience to natural disasters. The Japanese government's AI Strategy specifically envisages AI for National Resilience, aiming to improve resilience in dealing with national crises.

With the technology and assistance of SAP and Zynas Corporation, Ōita University has built an emergency-response collaboration tool named EDiSON that draws on AI technology to help the island of Kyushu detect and mitigate natural disasters. EDiSON records weather-forecast data up to 15 hours ahead and observation data from IoT seismometers. Combined with accumulated data from evacuation centers and Oita prefecture records from the past 1,300 years, this information, when analyzed with AI, allows real-time disaster-risk evaluation. With further iteration and advancements in the technology, the use of AI to analyze large-scale datasets can support public authorities in anticipating and responding to natural disasters, helping to save lives.
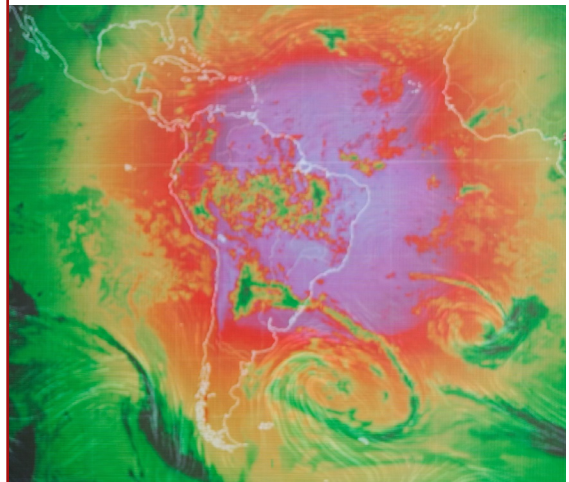
Unleashing Creativity

Authors and artists are only beginning to explore the possibilities that generative AI presents for artistic creativity. Alongside carefully considered human prompts and editing, AI is already contributing to the creation of award-winning artwork, with Japanese creators leading the way.

Japanese novelist, Rie Kudan, won the Akutagawa Prize in January 2024 for her novel, Tokyo-to Dojo-to, which drew on generative AI. The novel has received national and international acclaim. Shuichi Yoshida, a member of the judging committee, described it as flawless with high perfection. It underlines how the combination of human creativity and AI can lead to enhanced possibilities for the production of art.

In March 2024, YouTube announced a collaboration with Crypton Future Media Inc., a leading Japanese music technology company, to have its virtual singer software and creator "Hatsune Miku" join YouTube's Music AI Incubator as the first Japanese partner. Through the Music AI Incubator, YouTube is collaborating with artists, songwriters and producers to test, learn, gain feedback and hear ideas on how emerging AI technologies in music can be most valuable for artists and fans and how they can enhance creativity. This underscores YouTube's belief that AI has the power to augment creativity and create new opportunities, not replace human artistry. It also reflects YouTube's partnership-first approach to work closely with our industry partners on AI to innovate and explore new opportunities together responsibly.


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Enhancing Cyber Defenses

Japan has suffered a wave of cyberattacks in recent years targeting its critical infrastructure and a wide range of sectors, including defense, transportation, energy, and aerospace. The country also faces one of the world's most acute cybersecurity talent shortages. Recognizing the growing threat of cyberattacks, the Japanese government has taken steps to enhance the country's cyber defense, including approving a National Security Strategy in 2022 that called for increasing investment in cybersecurity R&D, increasing the security of critical infrastructure, and strengthening international cooperation.

Surveys conducted by the Cloud Security Alliance show that 63 percent of security professionals believe AI has the power to enhance security measures. In Japan, a recent study shows that 50 percent of IT professionals in small and medium sized businesses are confident that AI tools can enhance their cybersecurity needs. Already, AI has allowed security professionals and defenders to scale their work in threat detection, malware analysis, vulnerability detection, vulnerability fixing and incident response. By harnessing AI, Japan can help close its talent gap and build greater security and resilience to the cyber threats it is facing.

Preserving Japan's Past

Historic cultures and languages often face being forgotten as time passes. Old scripts such as the ancient Japanese script, Kuzushiji, become extinct when they are no longer known or read.

Literary scholar, Tarin Clanuwat, is one of a small number of people who could understand Kuzushiji. With billions of documents written in Kuzushiji, Tarin taught herself how to use TensorFlow to transcribe them into modern Japanese. This has made Kuzushiji accessible to more people in a way that would not have been possible without AI technology. This is just one way in which AI is helping to unlock rare Japanese history, science and culture dating back to the eighth century.

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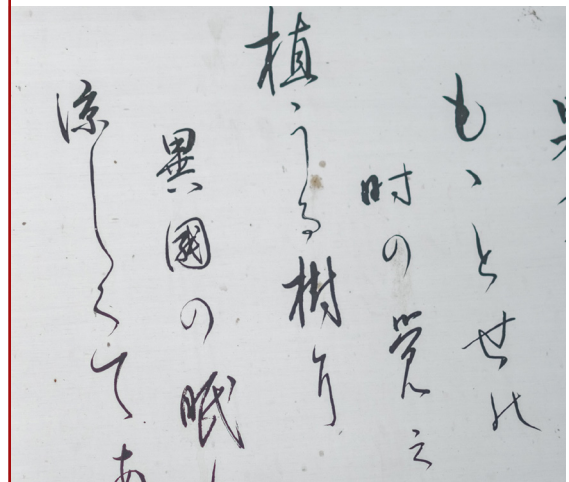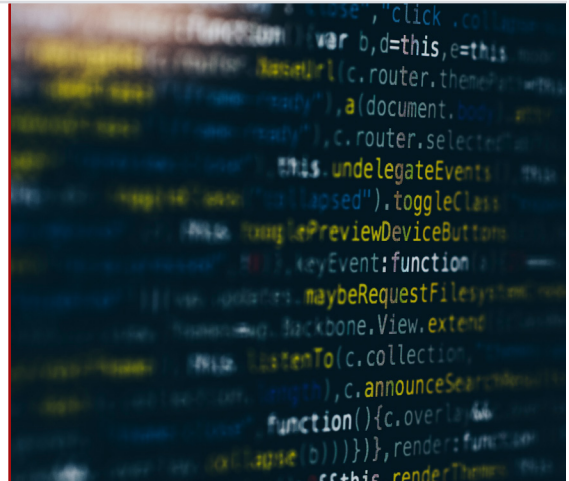
An AI Policy Vision for Japan

The examples above only scratch the surface of what's possible. There is potential for AI to do so much more for Japan, significantly improving the lives of people across the country. But as we've learned from prior waves of technology, these benefits are not automatic. Unless people trust and see the benefit in using the technology, and unless governments enable deployment, it will not be adopted at scale.

Japan has ambitions to be the world's most AI friendly country, and has been working towards an AI policy framework that builds trust and promotes responsibility, while enabling innovation and adoption and enhancing Japan's economic security. If Japanese policymakers want to fully harness AI's transformative potential, it is important to continue to focus attention on what to achieve, not just what to avoid.

We offer three key recommendations on how the Japanese government, industry, and civil society can harness AI responsibly and to its fullest potential:

Investing in Innovation Infrastructure – meeting the moment of this technology by investing in AI research and development, digital infrastructure, compute capacity, and open government datasets; and establishing policy frameworks that enable responsible innovation.

Building an AI-ready Workforce – investing in people to make sure they can use and benefit from AI, from students to workers, and from small businesses to traditional industries.

Maximizing AI Accessibility and Adoption – harnessing AI across the government and all sectors of the society to address major societal and economic challenges and ensure the benefits of AI are widely shared, while adopting a governance framework that supports a healthy AI ecosystem.

We recognize that Japan has already taken important steps in many of these areas. **Building on this progress will require collaboration and deep engagement between the government, industry and civil society.** No single company or organization will be able to build the AI future on its own. We will only succeed together.

Investing in Innovation Infrastructure

Countries have historically excelled when they support technological change and harness it to improve living standards. The historic growth of Japanese industry in consumer electronics, automobiles, optical media, and semiconductors highlights the importance of policies that enable technological adoption. Similarly, for Japan to harness the benefits of AI, it is important to have the right policy conditions in place to allow AI to be built and developed.

As Japan considers its own approach to AI policy, governments around the world are also dramatically accelerating efforts to support the development of AI technology. Sustained attention from decision-makers at the top of government and the ability to coordinate across agencies is key to long-run success. The establishment in Japan of the AI Strategy Council last year, attended by the Prime Minister and other relevant ministers, is very important.

Investing in R&D and AI Infrastructure

Governments and the private sector have a critical role to play in investing in R&D and AI infrastructure, including digital infrastructure, compute capacity, and data, to ensure that researchers, technologists, and businesses have access to the tools needed to research, build and deploy AI.

There is no one AI investment strategy that will work for all governments, but one basic formula for success is to invest in basic and applied research and technologies (such as graphics processing units and supercomputers) at a national or regional level – and then to put in place policies encouraging innovation and product development that builds on top of these foundational initiatives. Such a model can drive innovation leadership by creating a sense of shared responsibility between the public and private sectors for developing AI and other emerging technologies.

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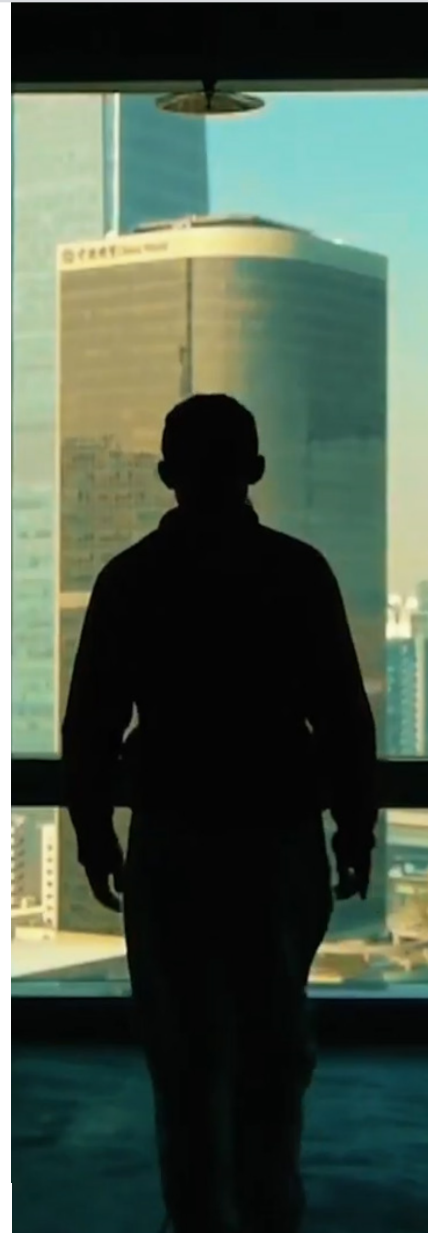
Increasing computing power is key to driving AI innovation in Japan. Japan is taking important measures, including to increase the computing power of the supercomputer at the National Institute of Advanced Industrial Science and Technology (AIST) and to develop the Kotogaku supercomputer, which aims to match the world's best supercomputers. Together with government support for the new supercomputer being built in Hokkaido by cloud service provider Sakura Internet, this will go part of the way to addressing the compute needs of Japanese industry.

Google is playing its part in supporting Japan to increase its computing capacity. We are partnering with the Ministry of Economy, Trade and Industry (METI) to provide subsidized access to Google's supercomputers for start-ups and research institutions working on the development of generative AI.

Additionally, Google announced a US$1 billion investment in digital connectivity to Japan, which includes the expansion of the Pacific Connect initiative and delivers two new subsea cables, Proa and Taihei. These cables will create new fiber-optic routes between the continental US and Japan in support of Google's Japan Digitization Initiative, while improving the reliability and resilience of digital connectivity between the US, Japan and multiple Pacific island countries and territories.

Excellence in research and development is also critical to realizing Japan's AI ambition. There are already important examples of outstanding AI-based research in Japan. At Hokkaido University, Professor Hidenori Kawamura's Harmo-lab aims to harness AI technologies for substantial societal impact. The allocation in Japan's Supplementary 2023 Budget of ¥29 billion for the research and development of AI will help to further drive research and innovation.

In a competitive global landscape, Japan will benefit from continually reviewing examples from other jurisdictions on how governments seek to work with industry and academia to advance AI research. The United States's National Artificial Intelligence Research Resource (NAIRR), for example, is a pilot that brings together computational, data, software, model, training and user support resources in support of US AI-related research. The UK government has established competitive grant processes for AI hubs for scientific and engineering research, involving co-creation between AI developers and those organizations applying AI innovation to real-world problems.

It is also important that Japan leverages its longstanding and strong relationships with countries in the Global South to create a conducive global R&D environment for AI. A novel approach which the Japanese government could consider supporting globally to augment local AI research could be the establishment of a Global Resource for AI Research (GRAIR) that would pool financial, technical and data resources across borders to help countries overcome resource constraints. If successful, the initiative could make AI accessible to many more of the world's entrepreneurs and scientists, enabling them to propel the technology forward, ensure it is more representative, and accelerate discoveries in other fields.

Support the establishment of a Global Resource for AI Research

Inspired by successful models such as European Center for Nuclear Research (CERN) and the International Space Station (ISS), the GRAIR would be a collaboratively governed, multinational AI research infrastructure and research consortium working to ensure ethical development, equitable access, and the pursuit of AI applications that foster local innovation. A collective computing resource such as the GRAIR would also help to address concerns about AI's carbon footprint, as it would reduce duplicative efforts and environmental impact.

The proposed GRAIR would comprise three key elements. A cloud-hosted Global Dataset Library would feature diverse, curated, high-quality datasets, with continuous programs addressing representational gaps. A Distributed Compute Network would span data centers across multiple countries, particularly those currently lacking dedicated AI infrastructure, providing researchers worldwide with essential computational resources. An Operations Team would manage infrastructure, outreach programs, and user initiatives to ensure smooth functioning of the resource.

A GRAIR could undertake a range of activities, depending on the priorities of its members, Including:

- Issue periodic requests for proposals (RFPs) that would allow researchers and organizations to apply for compute time.

- Solicit proposals focused on creating high-quality datasets where gaps exist e.g. data related to low-resource languages and cultural knowledge.

- Support in-person or remote safety testing, evaluations, and red-teaming on AI models for locally relevant characteristics and development of associated benchmarks and testing suites.

- Support countries at different levels of development in building up domestic AI workforce capabilities, including application developers, tech entrepreneurs and researchers, through training and accreditation programs.

Finally, utilizing public and private sector datasets for the training of AI models will accelerate the innovation of AI applications that benefit society. Japan has an opportunity to build a flourishing data ecosystem that reflects Japanese language and context, while ensuring robust safeguards for data privacy and security. As one example, India's government has compiled a curated collection of datasets to facilitate AI research, which it aims to make "one of the largest publicly gathered datasets in the world". The Japanese government can take the lead in establishing robust national data infrastructure and making high-quality Japanese public data more available and accessible to empower innovations that are tailored to local needs. Investing in interoperable technical standards, machine-readable formats, capacity-building support, and open licensing is crucial in this regard.

Pro-Innovation Policy and Legal Frameworks

In addition to investing in AI infrastructure, it is also important that policymakers adopt strategies to enable researchers and innovators to convert ideas and data into new discoveries, products and services. This will require advancing pro-innovation policy and legal frameworks that spur dynamism across the entire ecosystem.

AI is too important not to regulate – and too important not to regulate well. At this moment, the challenge faced by all policymakers globally is how to govern AI in a way that mitigates risks and potential harms without impeding beneficial innovation. There is a risk that misaligned and fragmented regulatory approaches will block innovators and governments around the world from harnessing trustworthy and beneficial AI applications to achieve strengthened economies, find cures for cancer and other scientific breakthroughs, and ensure longer, better lives for billions of people.

We recognize that Japan has so far taken the soft-law based approach and is now carefully further considering its domestic approach to managing AI risks while seizing the AI opportunity, including with the recently published proposal from Liberal Democratic Party (LDP) PT for a "Responsible AI Promotion Basic Act". As mentioned in the LDP paper, AI risks must be addressed in an agile manner so as to achieve a balanced approach which manages risks without impeding innovation. This is a goal that is shared by industry, and close consultation amongst all stakeholders — government, industry, civil society — will help Japan pave a solid path towards its aspirations of being the most AI-friendly country in the world and to attract the best global AI talent and investment. Google is actively contributing to the ongoing debate on Responsible AI, including through the global Digital Futures Project. As part of this $20 million USD fund, Google.org has provided a grant to the Japan Deep Learning Association (JDLA) aimed at facilitating cross-sector discussion on responsible AI practice.

Here are five recommendations for considering the next steps on AI governance, and how to ensure AI researchers and innovators can convert ideas and data into new discoveries, products, and services.

1. First, adopting a **risk-based and proportionate approach to AI regulation focused on use cases** is crucial to provide clarity to developers, deployers, and regulatory agencies about which risks to mitigate in specific contexts and which uses are completely disallowed. A risk-based approach will encourage alignment around addressing the most severe concerns related to particular AI applications. The AI Guidelines for Business published by the Japanese government in April outlined Japan's intention to adopt a risk-based approach on use cases, determined by a combination of impact and probability of risk. As Japan considers its position on AI regulation, a continuing focus on those specific applications of AI that present the greatest risk to individuals and society will provide important clarity without restricting continued innovation in -- and deployment of -- the majority of AI use cases which are benign and beneficial.

   It is important regulators also assess how existing regulatory frameworks apply to particular AI applications within their domains, before moving to introduce new regulation. For example, many countries have existing anti-discriminatory laws that already apply, regardless of whether it is an AI-use case. This will ensure a true risk-based approach that builds on existing regulation, recognizing that AI is a general-purpose technology that will be applied in different ways in different contexts. This approach can also increase confidence in AI developers and deployers that they will be able to incorporate AI into their business.

2. Second, **ensuring a balanced copyright framework that supports innovation and cumulative creativity** – including **mechanisms that enable developers and deployers to train AI models on publicly available data** – will be critical to maintaining Japan's competitive advantage in promoting AI innovation. This is important not just for the development of cutting-edge AI models in Japan but also their deployment across the Japanese economy and society. We recognize that this has been the focus of discussions led by Japan's Cultural Affairs Agency. For AI systems to learn from and engage with diverse information sources and datasets, it is important that copyright frameworks allow for broad usage of data inputs and ongoing learning. Japan's pragmatic approach to ensuring that data can be used in a wide range of beneficial AI applications under certain rules gives it a strong advantage to be a global leader on AI innovation.

3. Third, it is important that **policymakers encourage privacy and security-by-design principles** so that individuals' personal data is safeguarded, they are given appropriate notice and controls related to their personal data, and the outputs of AI systems protect individual privacy. At the same time, privacy frameworks in Japan should also continue to preserve the ability to process publicly available data, while supporting privacy preserving technologies throughout AI systems. This is also echoed in the LDP's proposal of the use of privacy enhancing technologies (PETs) in model development.

   On AI security, we recommend focusing efforts on identifying ways to make AI-powered development tools to guide engineers towards code and configuration that is secure by design, and verify formal properties of a system to ensure that it does not create new safety, privacy, or compliance risks. There is much scope to collaborate across multiple stakeholders on this important issue, including through initiatives such as <u>Google's Cybersecurity Center of Excellence</u>. This central hub, collaborating with leading Japanese institutions, will leverage Google's expertise to facilitate cybersecurity policy dialogues, training, and research. By working together, parties can address AI security vulnerabilities and solutions.

4. Fourth, as a general principle, given the cross-cutting nature of AI, it is **important to avoid siloed, competing, or contradictory approaches to AI regulation**. While we need case-specific answers for the unique issues of each sector, it will often be true that a regulatory debate on an issue like data can implicate multiple discussions and interests within a government and the same topic can be governed by several regulations without a holistic perspective. For example, privacy regulators have an interest in ensuring the integrity of personal data, and may take a strict view on the use of personal data for AI development. But one size may not fit all; health applications require very different insights than models related to weather prediction. Companies and start-ups also require access to publicly accessible data to train models and come up with innovative AI products and services, but this same data may contain personal information that is difficult to eliminate completely. These trade-offs should be carefully weighed and considered holistically. We commend the Cabinet Office and the AI Strategy Council acting as the "control tower" for bringing together relevant government agencies and stakeholders and ensuring a consistent and well-balanced approach.

5. Fifth, because AI is by its nature a cross-border technology, it is important Japan continues to champion **international interoperability and global collaboration on AI safety** through investment in research, expertise, standards development and cooperation around evaluation and testing. Japan is a leader in this space, having guided the development of the <u>G7 Hiroshima Process International Guiding Principles and Code of Conduct for Organizations Developing Advanced AI Systems</u>, promoted ongoing efforts to broaden support for the Hiroshima outcomes across international organizations such as the OECD, and advanced efforts to integrate the Hiroshima principles and code of conduct in the recently published AI Guidelines for Business to foster greater coherence between domestic and international AI governance regimes.

    Equally, it is important to continue efforts to promote trusted cross-border data flows which are essential to AI development and deployment. Japan has been a global leader in advocating for facilitating data flows through the concept of <u>Data Free Flow with Trust</u> (DFFT), which aims to promote the free flow of data while ensuring trust in privacy, security, and intellectual property rights. Japan's leadership on this issue sends a strong message to global investors and innovators about the openness of Japan's economy to digital trade and investment, including on AI. Maintaining supportive trade and investment policies is possible even in the context of an increased emphasis on economic security in Japan and elsewhere. In the era of AI, we must connect longstanding trade principles on the free and trusted flow of data, regulatory interoperability, least-trade-restrictive regulation, and non-discrimination to new trade principles such as responsible and ethical standards governing the use of AI and emerging technologies, while ensuring and respecting economic security.

    There is now a chance for Japan to expand international alignment on AI by adopting an affirmative strategy to promote the development and deployment of AI with key foreign partners. This could take the form of an AI Opportunity Summit or Dialogue, or a new AI Opportunity Alliance. Through this alliance, Japan and its partners could agree to take on some of the biggest challenges and opportunities around AI, including: building up infrastructure and research capacity; ensuring access to AI skills and training; encouraging AI adoption by small businesses and traditional industries; and leveraging AI to make progress on the UN's sustainable development goals (e.g., flood forecasting, earthquake alerts, and food security). This initiative would ensure that countries at all levels of development are working together to achieve major public objectives around health, scientific research, climate, cybersecurity, and economic growth. One initial partner for this alliance would be the US, which recently released a digital solidarity strategy focused on building AI with allies while combating "digital sovereignty and protectionism."

Finally, we welcome the establishment of the Japanese AI Safety Institute (AISI) as the national nodal point on AI safety, which will help Japan maintain and develop globally competitive research and expertise in this area. Fully funding its important work will be critical for its success. We also support the LDP's proposal of a high-level network of AI Safety Institutes (AISI) for international coordination on AI safety and testing. In this growing area of international coordination, it is important for the Japanese AISI to work with other national AISIs on arrangements to share insights and provide unique governmental expertise to the global community of AI safety researchers, and to avoid duplication of testing or efforts across national AISIs. For example, governments often have a comparative advantage in nuclear expertise compared to industry. Coordination and division-of-labor among AISIs and between AISIs and industry will be critical to preventing fragmentation, and provides a platform for mutual sharing and development of technical expertise on AI safety.

Building an AI-Ready Workforce

AI presents immense opportunities to catapult Japan forward through increased productivity and economic activity that can benefit everyone. Japan is uniquely positioned to combine its strategic position in robotics with AI technology to dramatically raise productivity and living standards. AI applied to robotics could help reduce dependence on human commands and enable businesses to better manage their supply chains and meet the challenge of labor shortages. Japan can lead the world on AI-enabled industrial innovation.

But AI can also be a disruptive force, and it will present unique challenges compared to prior waves of technology that will require new solutions. Given these dual possibilities, the question becomes: how can we equip Japanese workers to harness AI – so that it empowers workers, helps them become more productive, bumps up their expertise level, and makes their skills more valuable? And how can we mitigate any potential risks to the workforce through partnerships between governments, industry, and civil society? The government will maximize the chance of a successful AI transition if it considers its approach to both developing and attracting top-tier AI talent and to equipping the broader workforce for the AI era.
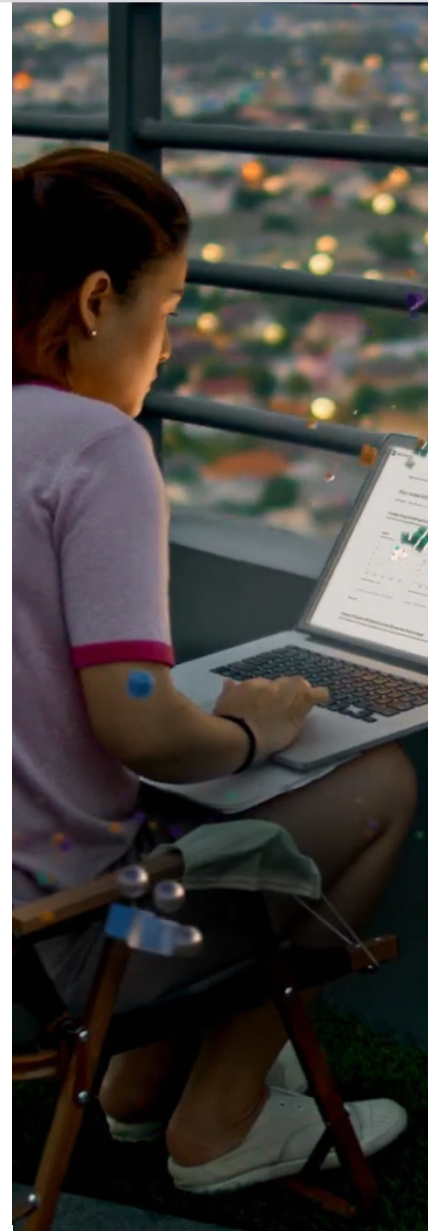
Building an AI-empowered workforce will require a shared vision – and a shared responsibility – across three sets of stakeholders:

- **Industry** has a critical role to play in developing new skilling programs that focus on AI preparedness. Google has developed the Japan Reskilling Consortium, bringing together over 40 partners from business, local government, and the non-profit sector to provide individuals with training and job opportunities in the technology sector.

- **Civil society, foundations, and academics** must drive new research aimed at informing insights on what works in helping workers to adapt to new technologies. In Japan, the Foresight Center at the Mitsui & Co. Global Strategic Studies Institute has conducted research aimed at expanding the base of Japanese professionals who can use AI.

- **Policymakers** can help scale up AI training programs so that they reach all communities, while building more effective "trampolines" – to catch workers that are impacted by AI and reskill them so they can quickly bounce back into new and better jobs. Singapore's nationwide AI skilling initiative is a strong model for this.

Modernizing Skilling Programs for the AI Era

To design proper policy, **it will be important to understand how AI is both similar to and different from prior waves of technology**. Early research indicates that generative AI may help uplevel certain skills, enhance labor productivity, create new occupations, and democratize access to higher paid occupations. But because generative AI can automate non-routine cognitive tasks, it may impact a wider range of tasks and occupations than earlier technologies.

We are still in the process of understanding what kinds of new skills AI-enabled work will require. There are some things we know already – including the importance of workers having basic AI literacy and how human talents like critical thinking and empathy are likely to increase in value. But there are other open questions about AI's impact on work that will need further study, such as how AI can best be used to support re-skilling, and how to minimize the risk of "skill atrophy" as routine tasks are increasingly automated. **Companies, civil society, and policymakers will need to constantly evolve skilling programs** to address these questions and manage these transitions.

Education and workforce training programs will become all the more important to help workers and learners apply AI to meet their goals. And this must extend beyond the secondary education system – AI requires a lifelong approach to education that equips all students and workers with foundational AI skills.

Japan's government has displayed the clear ambition to equip its workforce for the AI era. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has prepared guidelines on education and generative AI as well as a program for the certification of mathematics/data science/AI education. METI has reviewed the "Digital Skills Standards" (DSS) and added courses on how to use generative AI to the "Manabi-DX" website, which provides educational content aimed at private companies and universities.

Looking ahead, there is the opportunity for the Japanese government to work with partners in industry and academia to provide businesses with further guidance on how they can effectively upskill their employees. In the UK, the government has worked with a consortium of academic and policy institutes such as the Alan Turing Institute to develop guidance aimed at helping employers and training providers to boost their employees' understanding of AI so they can use it safely. The guidance systematically maps the skills that different types of workers will need to confidently apply AI in workplace settings.

Supporting Workers in Transition

AI is already helping to democratize access to skills and expertise such as coding, language and writing skills, and promises to enable more individuals to use productivity strategies that were once exclusively available to workers at the certain level of the income ladder.

But as we know from history, it's not inevitable that all workers will realize the economic benefits from new technologies. IPSOS research found that only 43% of Japanese adults expressed confidence in their understanding of what AI is, compared with a global average of 67%. To bridge this gap, Japan can draw on existing initiatives in building strategies for helping workers who are impacted by technologies.

Google has developed the Japan Reskilling Consortium, bringing together over 40 partners from business, local government, and the non-profit sector to provide individuals with training and job opportunities in the technology sector. In the area of AI, it may be important to have **comprehensive cross-sectoral skilling and certificate programs** that reflect the full spectrum of skills needed for an AI-driven future. The JDLA runs certification schemes for generalists to apply knowledge of deep learning in business. There may be opportunities to increase uptake of this and similar schemes to ensure that more Japanese workers can benefit.

Developing a Strong Pool of Japanese AI talent

Global competition to nurture and attract AI talent is intensifying, with countries investing heavily to seek a competitive advantage in AI research. For example, last year, Germany committed to double its public funding for AI research to nearly EUR 500 million within two years. Singapore has put in place an AI Visiting Professorship to attract world-class AI researchers who will work with local collaborators to anchor their research in Singapore.

The recent launch in Japan of the AI Safety Institute is one example of how Japan can maintain a strong position in AI research in the global landscape. Further, there is scope to do more, for example, to train new researchers within a short timeline (e.g., 18 months) to **strengthen national AI research capabilities** and increase the local supply of AI talent. This can be done in partnership with industry. The Google PhD Fellowship Program for instance, supports promising PhD candidates in areas relevant to computer science and related fields, including in Japan.

We could also consider increasing the **uptake of STEM (Science, Technology, Engineering, Mathematics)** by university students. The IMD World Digital Competitiveness Ranking for 2023 placed Japan as 39th out of 64 countries on its Graduates in Science metric. Japan's AI Strategy aims to increase the interest of all Japanese students in science and mathematics. One way to encourage uptake would be to ensure that school children have access to diverse and successful STEM role models from industry and academia, including through in-school talks.

Building on this effort, Google.org has launched a $15 million AI Opportunity Fund: Asia-Pacific to support underserved workers and job-seekers to build AI capabilities and confidence across the region, including Japan, led by the Asian Venture Philanthropy Network and supported by the Asian Development Bank.

Maximizing AI Accessibility and Adoption

In addition to building AI innovation infrastructure and preparing workers and students, Japan will benefit from taking measures to maximize adoption across the country. We must harness AI to **help solve real world problems** – in governments, in factories, in hospitals, and at kitchen tables. To do this, we have three key recommendations:

1. Increase governmental adoption of AI to make people's lives easier and better and address major public priorities;

2. Ensure that small businesses and traditional industries are able to adopt AI applications; and

3. Regulate AI applications in a way that facilitates their adoption across different industries.

Governmental Adoption of AI

The Japanese government stands to gain from adopting AI in two ways. First, it can leverage AI to improve the delivery of services to citizens, which has the additional benefit of familiarizing people with the underlying technologies and building trust that AI can be used in helpful ways. Second, by adopting AI, it can model a forward-looking approach for the Japanese domestic technology sector, and help other sectors understand the importance of AI.

Japan's government has acknowledged the opportunity for AI to raise public sector productivity and the quality of public services, particularly in the context of the rapid aging of society and increases in administrative costs for local governments.

To identify the most beneficial uses of AI for citizens, the Japanese government can conduct **national AI opportunity assessments** for public services. The first step in such assessments should be to examine existing solutions that are showing promise, such as the use of AI-powered learning analytics tools to improve education outcomes for individuals with different learning needs. Investing in and scaling up these programs could be one way to deliver near-term positive impact on service delivery.

Japanese government agencies can also **identify barriers to the deployment of AI in key sectors and industries**. In Japan, human resource and knowledge factors are important obstacles to AI adoption, especially in local government. To help address this, the Ministry of Internal Affairs and Communications (MIC) has prepared a guidebook on the use of AI by the local governments. There are examples of local governments incorporating AI into service delivery, such as in Yokosuka, Kanagawa Prefecture. Further work to raise awareness of potential use cases in public service delivery may help to raise adoption.

It is important that the use of AI by administrative bodies adheres to high standards around transparency, fairness, accountability, and security. **Providing guidance on the safe and responsible use of AI** to public officials serves to build confidence that AI can be used to improve public services while responsibly managing risks. The UK government has funded The Alan Turing Institute to conduct an AI Ethics and Governance in Practice Program, aimed at providing public officials with the tools, training and support they need to apply principles of AI ethics and safety to the design of AI systems. Japan's National Center of Incident Readiness and Strategy for Cybersecurity (NISC) participated in the formation of new Guidelines for Secure AI System Development. Producing a Japanese-language version accessible to different types of Japanese public body, as the UK National Cyber Security Center has done, will help improve practice and confidence around secure AI development.

Finally, we will need more AI expertise to effectively harness AI. The Japanese government could **build and scale up in-house AI skilling for the government IT workforce**; Google took a similar step a few years ago requiring all software engineers to enroll in an internal machine-learning curriculum. In addition, to support the Japanese government and public servants globally, Google.org has funded Apolitical to build the Government AI Campus. This program includes courses, events, and content focused on enabling government employees to upskill on AI. The content is available globally and will be translated into Japanese this year. The government may also consider creative ways to draw on the deep reservoirs of **private-sector talent** at leading Japanese and global technology companies, such as AI Fellows modeled on the U.S. Presidential Innovation Fellow program and the UK's Government Digital Service.

Helping Traditional Industries and Small Businesses Use AI

Accelerating the adoption of AI across the economy is key for realizing the benefits of the technology in Japan. Positively, surveys show a willingness among Japanese businesses to use AI, but many are holding back for now. A survey in mid-2023 by Teikoku Databank found that 61% of Japanese companies had a positive attitude towards using AI, but that only 9% were actually using it. METI's Study Group on Human Resources Policy in the Digital Age has found that many companies in Japan ban the business use of generative AI, suggesting possible factors including a lack of management awareness and digital literacy and concern over risks.

Small businesses and traditional industries have often lagged behind their peers in adoption of innovative technologies. In Japan, AI adoption tends to focus on a small core of highly advanced technology companies. There is room to rapidly accelerate adoption among both large companies in traditional industries and small companies. Among larger companies, recent IBM research found that 34% of Japanese companies with 1,000 employees or more have actively deployed AI, compared to 59% in India, 53% in Singapore, and 50% in China. Japan's SMEs may similarly need further support and guidance to unlock the potential of AI to drive increases in efficiency.

There can be measures as follows to address those issues:

- **Identify priority national sectors that have the highest need and/or the lowest uptake of AI tools**, such as the agriculture, manufacturing, health care, and energy sectors, and work with these sectors on "proof of concept" initiatives to model effective AI deployment. For example, Singapore's National AI Strategy 2.0 aims to encourage AI innovation in leading economic sectors and smart nation priorities such as healthcare and education.

- **Give small businesses a "digital jumpstart"** through new models of **technical assistance** and engagement, including digital coaches who can help businesses understand and leverage AI to capitalize on new opportunities. One model could be the Australian government's funding of AI Adopt Centers to help small and medium businesses grow their business through AI. Improving access to capital, including through low-interest loan and grant programs designed to support AI-driven transformation will also be tremendously helpful.

- **Target AI training resources towards small businesses and traditional industries** in underserved communities. Surveys suggest that this is key to helping Japanese businesses become more confident in their ability to effectively manage the risks associated with AI deployment. The JDLA has developed draft guidelines to facilitate the adoption of generative AI by businesses.

- **Improve access to capital**, including by introducing low-interest loan and grant programs designed to support AI-driven transformation. Singapore's Infocomm Media Development Authority (IMDA) recently announced a plan to provide funding support to up to 300 SMEs to trial generative AI enterprise solutions developed by IMDA.

Enabling Regulation and Standards

Any AI regulation should be proportionate, risk-based and focused on specific applications, recognizing that AI is a general purpose technology. Regulatory requirements should be calibrated to the particular risk and use case so as to provide SMEs with the necessary legal certainty and confidence to ensure all sectors and regions can benefit from AI.

Japan can also play a critical role in promoting the use of common technical standards. Where a business is required to show its compliance with a regulation, it can do so by showing adherence to a common technical standard based on best practice and science, rather than having to meet a bespoke requirement. The Japanese government has played a significant role in discussions on internationally harmonized AI technical standards both through the G7 Hiroshima AI Process and work at the International Standards Organization (ISO), including the recent adoption of the ISO/IEC 42001 international standard for the responsible development and use of AI systems.

Towards an AI Future

Japan is well-positioned to benefit from the AI opportunity. Putting in place balanced and enabling AI policy frameworks, and driving international cooperation and interoperability will be critical to securing Japan's AI future, and to show that safety, security, innovation, and opportunity can go hand-in-hand. We look forward to partnering with the Japanese government, industry, and civil society to build an AI-driven future that benefits everyone.