Google

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A Policy Framework for Building the Future of Science with AI in Japan

Executive Summary

Artificial Intelligence (AI) is ushering in a new era of scientific discovery in Japan. AI is revolutionizing the way research is conducted and accelerating the pace of scientific breakthroughs. Unlocking AI's potential will be integral to maintaining and strengthening Japan's global competitiveness in science & technology. Delivering on the promise of AI to power scientific research will drive scientific discovery across healthcare, education, and industry to improve the lives of people across Japan.

Japan has the advantage of a deeply embedded focus on research in science and technology. The global data shows the strength of Japan's position:

- The fifth-highest gross domestic spending on research and development (R&D) as a percentage of GDP in 2023.
- The third-highest number of patent applications in 2024.
- The second-highest number of researchers per 10,000 population in 2023.

This longstanding emphasis on high-quality research provides Japan with a natural advantage in using AI to power scientific discovery aimed at Japan's economic and social challenges.

The tangible benefits of AI applications in various sectors are already unfolding in Japan. From accelerating the drug discovery process to improving diagnosis for diseases such as breast cancer and skin conditions, AI's impact on medical research could lead to better health outcomes for Japan's population. Japan is also using AI to predict and prevent natural disasters, drive scientific progress in industrial applications, protect marine biodiversity, and drive scientific progress in quantum computing research.

In a Google survey in 2024, about 65% of the Japanese respondents felt that AI would have a positive impact on science and medicine. Japan is taking major steps to capitalize on the AI opportunity in science. Japan's recently enacted Act on the Promotion of Research and Development and the Utilization of AI-Related Technologies (hereinafter "Japan AI Promotion Act"), and its accompanying documents currently undergoing discussions such as the AI Basic Plan and guidelines under the Act, will provide certainty and clarity to researchers in their responsible use of AI, without inhibiting AI-based innovation and experimentation. The law will set a precedent for countries around the world considering their approach to AI governance and safety. Aligning the AI Basic Plan and guidelines under the Japan AI Promotion Act with the recommendations set out in this report will help ensure Japan's balanced approach becomes a model for other countries to follow.

Japanese industry and academia are also working to realize the benefits of AI. Japanese companies and academic institutions have also developed their own large language models (LLMs). This includes the Fugaku LLM, open-source models released by Sakana AI based on its unique 'model-merging' technique, and models released by major Japanese conglomerates such as NTT, NEC, and Rakuten. These models, in addition to models provided by global companies such as Google DeepMind's Gemini models, are providing Japanese scientists with a rich choice of options on which to build as they consider how best to incorporate AI into their research. Using Gemini 2.0, Google researchers built an AI co-scientist system to help scientists generate novel hypotheses and research proposals, and to accelerate the clock speed of scientific and biomedical discoveries.

To build on these steps, maintaining an enabling policy environment will allow Japan to unlock the complete potential of AI to transform scientific research and promote economic growth and societal well-being.

This paper outlines three specific policy pillars- the "three Is"- that provide a holistic, multi-pronged policy framework that can help Japan become a leader in using AI for scientific innovation:

- **Infrastructure** — Increase Access to AI Infrastructure:
  Powerful AI hardware is required for advanced scientific research and to develop or use AI models for such research. Given the exponential cost of AI infrastructure, the Japanese government can consider further investment in creating common infrastructure pools that can be accessed by different stakeholders (like startups, researchers, academic institutes, etc.), whether through public-private partnership or international collaborations with other countries. Initiatives to enable infrastructure access should also cover open data access initiatives. Importantly, safe and responsible data access through anonymized and aggregated datasets is crucial for developing AI applications that would benefit specific sectors.

- **Investment** — Invest in the Science of AI:
  Government support schemes for organizations working on AI-related scientific innovations can help them to operate sustainably. Through schemes such as loans, grants, and innovation challenges, more Japanese organizations will be incentivized to work in this area, creating a vibrant ecosystem of AI-based scientific research. The Japanese government can also consider creating interdisciplinary research centers that bring together different domain experts to examine various AI use cases in their respective domains. To remain globally competitive in the AI landscape, Japan will also benefit from introducing dedicated AI education programs and attracting global talent to work on AI R&D.

- **Innovation** — Implement Pro-Science and Innovation Legal Frameworks:
  Many countries are assessing the best way to ensure that AI is developed and deployed safely. The recently enacted Japan AI Promotion Act is focused, balanced, and drafted in a way that will allow AI to continue to be used for scientific research. Importantly, Japan has also emphasized the value of aligning with international initiatives and standards. It is crucial that any future regulations are developed in a way that does not impact pre-market AI R&D. Regulatory sandbox mechanisms act as catalysts for innovative AI applications. Finally, scientific research will benefit if Japan's copyright and privacy laws continue to create an enabling environment for the use of publicly available training data.

The recommendations in this paper are based on Google and Google DeepMind's experience over many years of scientific research. These recommendations will help inform the AI Strategy Headquarters' ongoing deliberations on the AI Basic Plan and guidelines under the Japan AI Promotion Act. By taking decisive action along the "three Is", the Japanese government can harness AI to drive scientific advancement that could exponentially enhance the quality of life in Japan. Building an enabling policy environment will help Japan ensure it remains attractive for AI-based scientific research in an increasingly competitive global landscape. This is the moment to realize the potential of AI for science in Japan.

02 Introduction:
A New Age of AI-Powered Scientific Innovation

Science has been the cornerstone of human progress, from Galileo's telescope revealing the cosmos to the Large Hadron Collider's potential to revolutionize physics and our understanding of matter. It has empowered us to understand our world, whether at the subatomic level or its place in the vast expanse of the universe. Japan has made significant contributions to scientific progress. In recent times, innovations to come out of Japan include the Shinkansen bullet train, the video home system (VHS) format video recorder, and the QR code. Japanese innovators have won Nobel Prizes for fundamental scientific discoveries, including the Nobel Prize for Physics for the prediction of the existence of "mesons" in 1949, the Nobel Prize for Chemistry for discovery and development of conductive polymers in 2000, and the Nobel Prize in Physiology/Medicine for the discovery that mature cells can be reprogrammed to become pluripotent in 2012, and the discovery of cancer therapy by inhibition of negative immune regulation in 2018. There are 27 Nobel Laureates of Japanese origin till date in the areas of physics, chemistry, and physiology/medicine. With the rapidly advancing capabilities of AI, we are entering a new age of scientific discovery. AI tools are enhancing researchers' ability to process immense volumes of data, identify complex patterns, and generate novel hypotheses to tackle problems previously considered unattainable using traditional methods.

Google itself has been on the frontline of harnessing AI to dramatically accelerate scientific discovery:

1. Google DeepMind's AlphaFold revolutionized structural biology by solving the 50-year-old challenge of protein folding "decades earlier than anticipated", enabling the prediction of 200 million protein structures in 5-6 years. To date, over 150,000 Japanese researchers, learners, and innovators have leveraged the AlphaFold database, with over 1,500 papers citing AlphaFold involving researchers affiliated to Japanese institutions. This makes Japan one of the leading adopters of AlphaFold globally, ranking among the top six countries in the world for AlphaFold usage.
2. Google DeepMind's Graph Networks for Materials Exploration (GNoME) helped discover 2.2 million new crystal structures, an achievement equivalent to approximately 800 years of knowledge gained from classical research techniques. This has accelerated advancement in critical areas like battery and semiconductor technology.

Beyond speed, AI tools are also making complex data analyses accessible to a broader community of researchers than ever before — from Japan's leading research centers to technical institutes and research labs across the country. In essence, AI is not just making scientific discovery faster, it is making it broader, deeper, and more accessible.

In recent years, the Japanese government has focused on building institutional capabilities at the intersection of AI and science & technology. In November 2024, Japan announced a massive investment of JPY 10 trillion by 2030 for the AI and semiconductor industries, expecting it to have an overall impact of JPY 160 trillion. It has also established reputed research institutes such as the Artificial Intelligence Research Centre (AIRC) at the National Institute of Advanced Industrial Science and Technology (AIST) and the RIKEN Centre for Advanced Intelligence Project (AIP Centre).

Building on this foundation, public and private sector institutions across Japan are already achieving tangible results in their use of AI in science. Whether it is promoting research to improve healthcare for Japanese people, making Japan safer through better prediction and prevention of natural disasters, or protecting and conserving Japan's natural environment, AI is playing a transformative role in science in Japan.

Raising the quality of health and care

With an ageing population, Japan may face challenges in keeping its people healthy.

AI is helping to accelerate healthcare research aimed at addressing these challenges. Chugai Pharmaceuticals, which hosts its IT infrastructure on Google Cloud, uses AI for drug discovery to increase the probability of success in drug development, significantly reducing the time and cost of the drug discovery process. Similarly, Astellas Pharma's Mahol-A-Ba drug development platform combines AI with image analysis and robotics. AI can help with tasks such as culturing cells for testing new treatments, where its deployment reduces the time needed from a month down to an hour and a half.

The potential of AI to support earlier diagnosis could help Japanese people lead longer, healthier lives. Google has signed joint research agreements with Japanese medical and educational institutes to verify the effectiveness of Google's machine learning (ML) model to detect breast cancer from screening mammography and the effectiveness of AI-based skin condition detection models. This could help in the early diagnosis of one of Japan's most widespread forms of cancer.

Separately, ONSEI, an AI tool developed by Nippontect Systems, uses AI-powered voice analysis to detect potential signs of cognitive decline that can lead to dementia or Alzheimer's.

AI has a valuable role to play in raising the standard of care for elderly people. Japan has one of the world's highest shares of elderly people in its population, with 29.4% of its population over 65 years of age. AI-powered scientific discovery can help address the challenge of caring for an increasing number of elderly people. AI robots are being explored as a possible resource for elderly care to address the severe shortage of elderly care workers in Japan. These robots/devices can help with tasks such as monitoring the sleep condition of the elderly and reducing the need for human attendants to do night rounds, or shifting elderly patients in their beds to prevent bedsores which can otherwise be a physically challenging task.

Finally, AI is supporting the administrative work of hospitals, helping them to deploy personnel and resources more efficiently. CocktailAI, a unique generative AI tool developed by Kyoto University Hospital, helps to streamline document creation by doctors (such as referrals and patient medical records), reducing workload for overburdened medical professionals. The project uses Google Cloud's Vertex AI as the back-end AI service with Gemini and MedLM.

Breaking barriers for individuals with special needs

AI can hold the key to dramatically improving the quality of life for people with physical disabilities and help them participate in everyday activities.

Google's Project VOICE (Valuing Our Individual Communication Expression) aims to enable easier communication for people who are unable to use their voice properly due to diseases such as Amyotrophic Lateral Sclerosis (ALS) and Spinal Muscular Atrophy (SMA) through the use of its AI model, Gemini. Google has partnered with Office Yui Asia Co., Ltd., a Japanese company that develops communication applications for people facing difficulty in speaking. With Google's support through Project VOICE, this company is collecting feedback from users facing communication difficulties to improve its applications.

Similarly, Google's Project Guideline uses AI technology to enable visually impaired individuals to run freely. Google has partnered with local governments, non-profit organizations, and sports facilities in Japan to allow people to experience the technology.

Predicting and preparing for natural disasters and extreme weather

The use of AI has improved Japan's capability to predict and respond to extreme weather events and natural disasters.

Ōita University, with the assistance of SAP and Zynas Corporation, built an emergency-response collaboration tool named EDiSON that uses AI to help the island of Kyushu detect and mitigate natural disasters such as typhoons, earthquakes, and heavy-rain events. Another example is Google's new rainfall prediction model built in partnership with Weathernews Inc., a Japanese private weather information company. The model allows users to see 'nowcasts', which are precipitation forecasts every 5 minutes, up to 12 hours in advance.

Accurate weather forecasts not only help people plan their daily tasks but can also help prepare for any extreme weather events with economic or social impacts. Google has been working with the University of Tokyo, Japan's Weathernews Inc., UK Met Office, and other experts to improve its models for better tropical cyclone prediction.

Protecting the environment through AI-based innovation

AI-driven scientific research is supporting Japan's work to make its economy greener and to protect its natural environment.

Take the example of energy transition efforts. Japan's Seventh Strategic Energy Plan sets a target of securing 40-50% of Japan's power supply from renewables by 2040. Japan is investing in AI to support its energy transition, with a focus on AI-driven solar energy optimization. Companies like SoftBank and Tokyo Electric Power Company (TEPCO) are using AI to predict energy demand, manage energy storage, and stabilize the grid.

AI is also working to unlock new, more sustainable methods of energy generation. Google DeepMind has collaborated with the Swiss Plasma Centre at EPFL to develop the first deep reinforcement learning (RL) system to autonomously discover how to successfully contain the plasma in a 'tokamak', a doughnut-shaped vacuum surrounded by magnetic coils that is used to contain a plasma of hydrogen that is hotter than the core of the Sun. The plasma contained in a tokomak is inherently unstable, which makes it challenging to sustain the nuclear fusion process. This collaborative research initiative could help open new avenues to advance nuclear fusion research. This research has particular relevance to Japan's ambition to establish itself as a global leader in nuclear fusion.

A unique example at the intersection of carbon sequestration and AI is the use of seaweed beds for carbon absorption. Toyota Motors is working with Kyushu University to promote seaweed cultivation for carbon absorption. AI is used to measure and analyze data collected through underwater cameras and drones about seaweed beds, which can ultimately help to enhance and protect seaweed cultivation.
Finally, AI is supporting the preservation of marine biodiversity. Though coral reefs cover only 0.1% of the ocean's surface, they host 25% of all known marine species. Japanese startup Innoqua Inc. uses AI and Internet-of-Things (IoT) to create artificial marine ecosystems that replicate ideal conditions to cultivate coral reefs, mangroves, and seaweed beds.

This has not only allowed artificial cultivation of coral reef, but also created an objective tool for assessing how specific substances affect marine ecosystems. Similarly, Google developed an AI model called SurfPerch. This model has already helped with understanding differences between protected and unprotected reefs in the Philippines, restoration outcomes in Indonesia, and relationships with the fish community on the Great Barrier Reef in Australia.

Pushing the boundaries of quantum computing research

With the processing limitations of classical computing infrastructure for AI, quantum computing infrastructure has become the next frontier in technology. Advances in AI can power progress towards a stable quantum computer, and breakthroughs powered by quantum computing would advance AI itself by uncovering novel algorithms or solving computationally infeasible problems. Google announced a partnership in May 2023 with the University of Tokyo and the University of Chicago, committing up to USD 50 million to quantum computing research through this partnership over a ten-year period.

Making Japanese industry more competitive and efficient

The application of AI-based research in industry is key to maintaining and sharpening the Japanese industry's competitive edge.

In September 2023, Japan's National Institute of Material Sciences announced that it succeeded in increasing the high-temperature strength of alloys by using AI. While there are approximately 3.5 billion possible patterns for checking the high-temperature strength of nickel-aluminum alloys, 110 patterns that produce better results than conventional processes were identified by using an AI algorithm. This has significant applications for industries such as oil and gas, aerospace, and power generation.

Separately, Toyota Motor Corporation developed an in-house "AI platform" using Google Cloud to develop and integrate AI applications into various functions on its manufacturing site. For example, the company has been automating visual inspection-related work through its AI platform. Expanding its partnership with Google Cloud, Toyota has also added Speech On-Device — a Google Cloud AI product that embeds AI-based speech recognition and synthesis available in the cloud — to Toyota and Lexus vehicles.

Providing a better education to Japanese children

Traditionally, teachers relied on years of experience to track students' learning progress. However, AI-based research is pioneering new methods to analyze students' learning trajectories, making a more personalized learning experience a reality.

Furthermore, AI is proving effective in addressing the long-standing issue of teacher workload reform. Generative AI can automate administrative tasks and create initial drafts for materials like newsletters and lesson plans. This allows teachers to focus on more essential and creative aspects of their work, improving their overall efficiency and job satisfaction. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has also highlighted the use of generative AI by school teachers and staff to improve the efficiency and quality of school affairs.

These wide-ranging applications across healthcare, accessibility, environmental conservation, disaster mitigation, and education demonstrate the profound impact that AI-driven scientific discovery is already having on Japanese society.

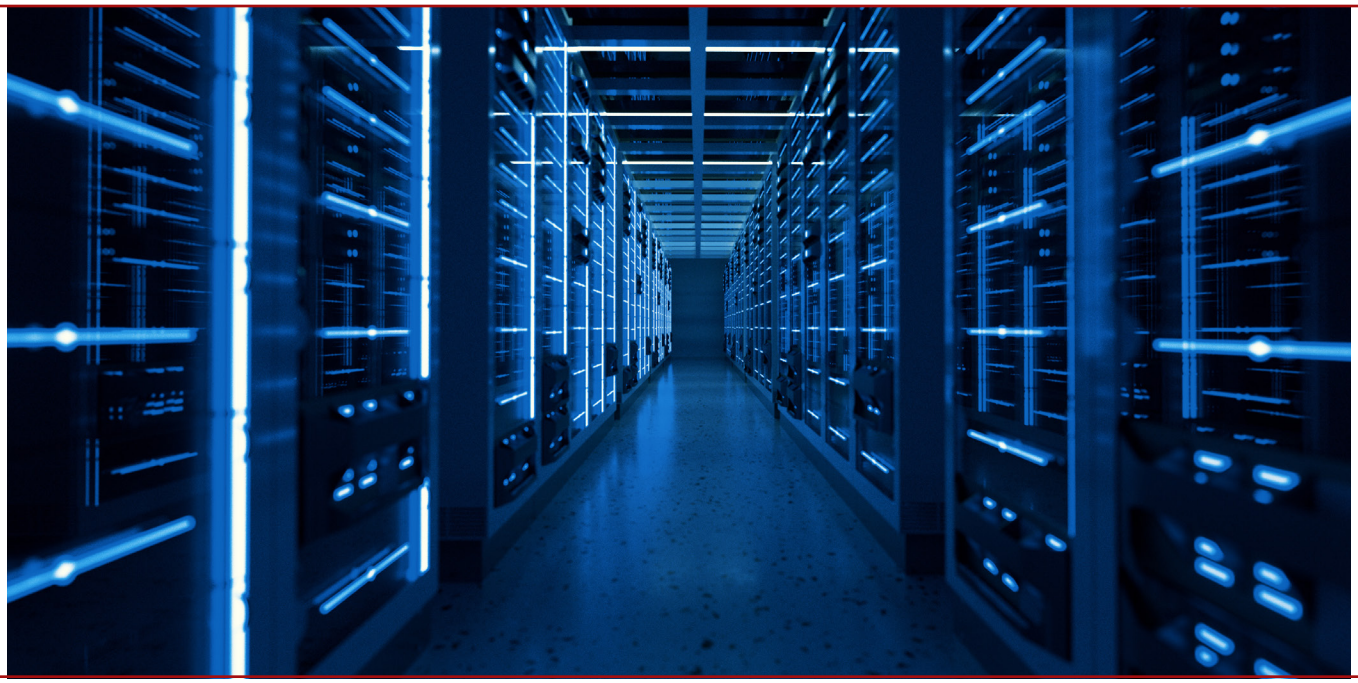
These breakthroughs — unprecedented in human history — represent only the beginning of AI's potential to advance science and drive progress in Japan. Unlocking the full benefits of AI for scientific discovery will require close collaboration across the Japanese government, academia, and industry.

Japan's scientists cannot realize these opportunities alone — they rely on an enabling ecosystem supported by infrastructure investment, sustained funding, a strong talent pipeline, and education and training systems that equip the people of Japan with the skills to thrive in an AI-enabled future. Beyond these foundations, the Japanese Government plays a critical role in shaping pro-innovation policies that unlock scientific and technological breakthroughs to tackle the nation's most pressing challenges.

Japan's government is working actively to address barriers to AI adoption across industry and academia. Japan's AI Strategic Council has noted how Japan had significantly lower usage rates for generative AI compared to other countries and how excessive AI regulation could impact AI R&D by Japanese companies. The recently enacted Japan AI Promotion Act is focused on facilitating AI adoption while mitigating potential risks, as are the proposed outlines of the AI Basic Plan and guidelines under this Act.

Looking forward, Japan stands at a pivotal moment. Google shares and supports Japan's vision to prioritize AI promotion and innovation with appropriate safeguards. Japan has the potential to position itself as a global exemplar of practical, balanced AI policymaking. With the right policy frameworks in place, Japan is well-positioned to unlock the potential of AI in science which could deliver lasting benefits for the nation.

03 Pillar One: **Infrastructure —** Increase Access to AI Infrastructure



AI adoption in scientific contexts is particularly challenging due to several factors, such as access to high-quality specialized data, constraints on access to computing power, and the need for interdisciplinary collaboration among AI and domain experts.

In the absence of an orchestrated infrastructure for AI-powered scientific R&D, scientists must spend significant time and effort to coordinate data and model access, secure computing power, and become proficient with AI tools, all of which detract from their core research activities.

Lowering the entry barriers to developing, using, and deploying science-focused AI techniques is essential to ensure broader access to resources for scientists. An estimate suggests that between 2019 and 2025, the hardware cost for AI supercomputers increased by 1.9× every year. Governments globally have announced multi-billion AI investment programs such as the European Union's (EU) InvestAI initiative with EUR 200 billion investment, or the UK's GBP 1 billion investment in AI compute infrastructure.

Japan's government has recognized the scale of the challenge. In 2024, the Ministry of Economy, Trade and Industry (METI) acknowledged the need to develop and strengthen the resilience of computational infrastructure necessary for generative AI services. Building on existing efforts, further expanding access to compute capacity, data, AI models, software, and tools for a broader community of researchers is key to accelerating AI-driven scientific discovery in Japan.

1.1 National and International pools of data, models, compute, and software

Continue to support national AI for science resource centers to make data, AI models, compute capacity, software, and tools accessible for scientific research.

Japan is making progress in building the infrastructure needed to equip its scientists with the tools to tackle the nation's most pressing challenges. The recently enacted Japan AI Promotion Act mandates the national government to develop and promote shared access to essential infrastructure like computing power and datasets. There are already examples of institutional initiatives in Japan that have successfully followed this approach.

A good example is the AI Bridging Cloud Infrastructure (ABCI). It is an open computing infrastructure complex built by Japan's AIST to provide computational resources primarily for public use by domestic industry, academia, and government, particularly national research institutes, universities, startups, etc.

Japan is also home to the Fugaku supercomputer. Jointly developed by RIKEN Institute and Fujitsu, it has been one of the world's top 10 most powerful supercomputers since its completion in 2021. RIKEN's AI for Science Platform Division is working to establish and enhance the computational infrastructure necessary to support the development of AI models tailored for scientific discovery, integrating the Fugaku supercomputer. In May 2025, Japan's AIST announced one of the world's most powerful supercomputers for quantum computing research called ABCI-Q. Google has also partnered with METI to provide subsidized access to Google's supercomputers for start-ups and research institutions working on the development of generative AI.

Furthermore, many scientific breakthroughs have also resulted from international collaboration, and Japan stands to gain significantly from such partnerships. In April 2024, Japan and the USA signed a Project Arrangement on High-Performance Computing and AI as part of bilateral cooperation efforts on AI and Science. Japan can build on these efforts by working with like-minded partners to pool compute and data resources for scientific research.

1.2 Data Accessibility

Increase the accessibility of government datasets and data from government-funded research

The importance of enhancing access to, and sharing data has only increased with the advent of generative AI, especially considering the challenges AI system developers face in obtaining sufficient high-quality data.

Open data can have significant economic implications. Data access and sharing can help increase the value of data to data holders. As per the OECD, it can create 10 to 20 times more value to data users, and 20 to 50 times more value to the economy. Importantly, datasets held by government agencies can hold valuable insights for scientific research that can further societal progress and welfare. For example, NASA's EMIT, Germany's EnMAP, and Japan's HISUI offer invaluable data for developing AI models for climate science.

Japan has recognized the importance of facilitating sharing of public and private sector data. The Basic Act on Promotion of Public and Private Data Utilization (2016) and successive government strategies have identified this as a priority. However, challenges remain. For example, a 2022 study found that around 20% of Japan's open datasets are inaccessible.

Adopting an 'Open by Default' policy, similar to the UK's approach, can mandate the release of public sector data, fostering transparency and economic growth. This will empower innovators to develop AI solutions tailored to local needs, while ensuring robust safeguards for data privacy and security. The Japanese government can consider creating a list of priority areas for which the scientific community lacks data and focus its efforts on improving the availability and quality of datasets relevant to those areas. India's 'AIKosh' or the IndiaAI Datasets Platform launched under the IndiaAI Mission is a good example. It is a centralized repository of AI datasets across critical sectors like healthcare, agriculture, finance, and education. The platform's objective is to democratize access to high-quality data and spur innovation in key sectors for societal well-being in India.

Facilitate the creation of anonymized, aggregated, and varied datasets in sensitive contexts

In sensitive contexts such as healthcare, relevant data can help drastically improve access and detection capabilities. Importantly, enabling access to Japanese data can be a crucial factor in ensuring that AI models and applications provide outputs that take into consideration Japanese cultural and societal context. A 2021 medical study found that AI algorithms trained on chest radiographs showed lower performance for underrepresented patient populations. While Japan is among the leading countries in the number of MRI and CT scanners per capita, it still lacks open, large-scale medical imaging databases. This poses a major limitation for developing health-related AI applications for the Japanese population.

It is important to implement policy frameworks that enable responsible access to sensitive datasets. Examples of such frameworks in Japan include its personal data protection law and the Next Generation Medical Infrastructure Act, discussed in more detail under Pillar Three
(see section 3.2).

The private sector and academia are also developing different solutions to enhance access to Japanese data for generative AI applications. A consortium formed under the Japanese government's Generative AI Accelerator Challenge (GENIAC) program intends to construct a dataset comprising one million question-and-answer dialogues from 30,000 survey participants. Japanese researchers built a large Japanese web corpus for building LLMs, consisting of approximately 312.1 billion characters (approximately 173 million pages) by independently extracting and refining Japanese text from a vast amount of web texts. This led to the creation of the 'Swallow' LLM built on Google DeepMind's Gemma 2, which has stronger base-level Japanese capabilities compared to other popular models.

Looking ahead, the National Institute of Information and Communications Technology (NICT) plans to develop and expand a large amount of high-quality and safe language data for training, mainly in the Japanese language. Scaling initiatives to improve the availability and quality of data will be critical to providing the data resources required to enhance Japanese science's global competitiveness.

04 Pillar Two: **Investment —** Invest in the Science of AI

Government investment is crucial for long-term scientific projects that may not yield immediate commercial returns, such as constructing large telescopes, building high-speed particle accelerators, restoring coral reefs, or developing and deploying carbon management technologies. This also holds true for achieving transformative scientific outcomes through AI.

For Japan to become a global pioneer in AI-based scientific research, government support for academic and private sector initiatives at the intersection of AI and scientific research will be key. This can be in the form of: (a) programs to incentivize stakeholders working on AI and science; (b) supporting interdisciplinary research, given the wide scope of AI applications across research sectors, and (c) promoting comprehensive AI education programs and initiatives to build a pool of technical AI talent in Japan.

2.1 Invest in building a vibrant AI ecosystem for scientific innovation

Extend existing and establish new mechanisms to support organizations advancing AI-enabled scientific applications.

Government schemes can be an effective tool to accelerate AI innovation and adoption and build a vibrant AI ecosystem. They can provide much-needed support to AI startups and labs working on scientific questions that may otherwise find it difficult to attract capital. Such organizations may hold the potential to address a wide range of society's needs, whether through commercial or altruistic models. These schemes can be in the form of targeted grants, low-interest loans, or hackathon-type challenges.

A prominent example of such a scheme in Japan is the Generative AI Accelerator Challenge (GENIAC). Launched jointly by the METI and the New Energy and Industrial Technology Development Organization (NEDO), its objective is to promote the development of a platform model for generative AI which will act as the core technological foundation to support various services that utilize generative AI. The GENIAC involves providing computing resources, assisting in demonstration projects for data utilization, organizing matching events, and facilitating collaboration with global tech companies.

Being at the forefront of international cooperation, Japan has also launched collaborative research grants with research agencies from different countries to promote AI research for socially beneficial purposes. For example, the Japan Science and Technology Agency (JST) and the Agency for Science, Technology and Research of Singapore (A*STAR) launched a joint research grant in 2024 for projects focused on 'Cutting-Edge AI Technologies Aimed at Societal Transformation', which included the use of AI for smart cities, sustainability, cybersecurity, user privacy, and to promote linguistic diversity.

Collaborations with not-for-profit organizations can supplement government capacity and target specific social challenges. For example, Wadhwani AI, a non-profit organization focused on AI research for solving social issues in India, designed a pest control app which was later rolled out by the Indian government across the country. It increased farmer profits by 20% and decreased pesticide use by 25%. Wadhwani AI has also set up AI units in various Indian ministries, including health and agriculture.

Japan is demonstrating its potential to be a leader in the application of AI to science. Sakana AI, the Japanese AI lab whose co-founders include a former Google employee, has developed the world's first 'AI Scientist', the first comprehensive AI system for fully automated scientific discovery. With consistent policy measures focused on promoting the deployment of AI to R&D, Japan can scale these efforts and establish an AI ecosystem for scientific innovation. Japan can become a global leader in AI research and consequently excel in the adoption of AI in science.

2.2 Interdisciplinary research to strengthen collaboration across disciplines

Establish and fund interdisciplinary research centers and programs in AI for science to tackle complex scientific challenges

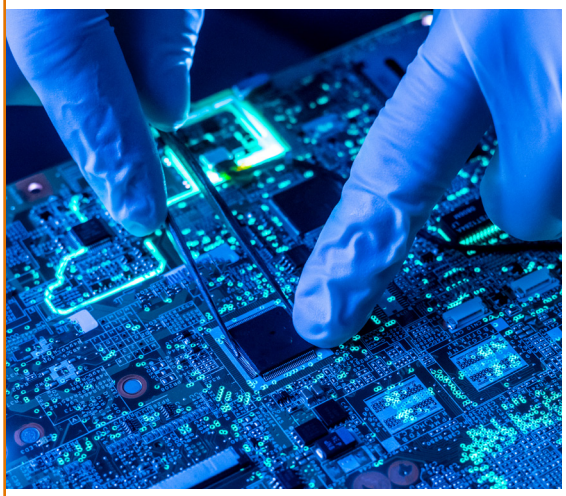
Interdisciplinary teamwork between AI specialists and scientists from diverse fields is vital to create AI tools that are truly effective, reliable, and tailored to scientific discovery. Unfortunately, this collaboration often suffers due to siloed academic environments and institutional structures. Governments and universities could fund centers or programs that co-locate AI experts alongside specialists in fields like genomics, environmental modelling, or education, thus blending algorithms, data, and domain knowledge. This will allow the development of AI systems designed from the outset to address real-world scientific problems, rather than retrofitting technology into ill-suited contexts.

An example in this direction in Japan is the AI Japan R&D Network. Launched in December 2019 to consolidate Japan's strengths and encourage advancements in AI R&D, this was initially a consortium headed by AIST, RIKEN, and NICT. It brought together universities, public research institutions, and other organizations actively involved in AI R&D across Japan to foster collaborative efforts. In April 2023, the network turned into a voluntary organization, expanding its membership to include private sector companies.

Another way of promoting interdisciplinary research is through establishing dedicated "AI for Science" institutes and research centers that would formally incentivize joint projects between AI engineers and domain experts — covering areas such as healthcare, energy, or climate science — by offering shared infrastructure, funding, networking opportunities, and career pathways. The USA's National Science Foundation (NSF) has successfully established interdisciplinary research programs to motivate interdisciplinary research to solve complex research problems, although sustained funding is required to support research centers and pursue long-term research agendas.

Fund research at the intersection of AI and other emerging technologies

Blending cutting-edge advancements in AI with fields like quantum computing (QC), biotechnology, and nanotechnology unlocks exceptional potential for transformative, cross-disciplinary breakthroughs. Among these, quantum computing stands out as a multidisciplinary domain — bridging computer science, physics, and mathematics — to harness quantum mechanics for solving computational challenges that resist classical approaches. Japan has recognized the potential of quantum computing and made major strides in investing in this area.



In its 'Vision of Quantum Future Society' document, the Japanese government announced multiple ambitious goals in quantum computing for 2030. This included having 10 million quantum technology users in Japan, raising industrial production to JPY 50 trillion, and fostering quantum unicorn companies. Delivering on Japan's ambitions will be key to keeping pace in a competitive global landscape. For example, the UK announced an investment of GBP 670 million to accelerate the impact of quantum computers in different sectors like energy and healthcare.

2.3 Building a strong pool of talent

With increasing global competition for building AI competitiveness, creating a strong pool of AI talent has become an urgent priority for all countries. The USA's Council of Economic Advisors noted in its 2025 AI Talent Report that growth in the supply of AI talent is lagging behind growth in demand.

Japan's government has highlighted developing highly skilled AI talent as a priority. In the recently enacted Japan AI Promotion Act, one of the 'Basic Measures' to be taken by the national government is to foster a skilled workforce. This will be a key determinant of the extent to which Japan can harness the benefits of AI-powered research across its economy. It is important for the Japanese government to consider investing in AI education in all scientific disciplines, attracting interested students and researchers through AI-focused academic programs, scholarships, fellowships, and grants. Additionally, targeted policies and incentives to attract global talent in science, technology, engineering, and mathematics (STEM) to work and develop AI in Japan can also be considered.

Invest in AI education across relevant scientific disciplines to develop the next generation of AI-skilled scientists and developers.

AI education should be integrated more deeply into Japan's STEM curricula from an early age. It is an essential tool to cultivate a generation of researchers and technologists who not only harness AI for scientific progress but also push the boundaries of AI innovation itself. Japan has recognized the value of AI-specific education in STEM. An example is MEXT's Approved Program for Mathematics, Data Science & Smart Higher AI Education. Under this program, the Ministry certifies, selects, and encourages programs that provide systematic education on knowledge and technologies related to mathematics, data science, and AI.

In a separate MEXT initiative, the 'KOSEN Mathematics, Data Science and AI Smart Higher Educational Community', two Japanese technology colleges are implementing mathematics, data science, and AI education in collaboration with other nationwide KOSEN technology colleges.

Japan has also launched initiatives for human resource development focused on AI R&D. The MEXT launched 'Broadening Opportunities for Outstanding Young Researchers and Doctoral Students (BOOST): Next Generation AI Human Resource Development Project' for next-generation AI fields and cutting-edge R&D. The project aims to increase the number of researchers in national strategic areas by providing funding to doctoral students for their research and living expenses. Continuing to iterate and scale this kind of initiative will be vital for equipping the next generation of Japanese scientists with AI skills.

Attract global talent across STEM fields

STEM talent is global, and to remain competitive, Japan will benefit from tapping into international and increasingly mobile pools of expertise across science and AI. As per Stanford's Global AI Vibrancy Ranking, Japan ranked 16th globally on AI skill penetration (i.e. the intensity of AI skills within a country) and 17th on AI talent concentration in 2023, which indicates scope for improvement.

In its Priority Plan for the Realization of a Digital Society (2024), Japan's Digital Agency identified development of digital human resources as a priority initiative. Japan has also dedicated visa categories for highly skilled individuals, including the Japan System for Special Highly-Skilled Professionals (J-Skip) and the Japan System for Future Creation Individual Visa (J-Find). In June 2025, Japan announced a JPY 100 billion emergency package to attract overseas science and technology researchers.

Other countries have also adopted innovative measures for AI skilling that could be adopted in Japan. In 2023, Singapore announced an AI reskilling initiative to train 18,000 individuals in tech roles in AI and analytics with an emphasis on generative AI and three other AI-related areas — software engineering, cloud, and mobility. Similar efforts tailored to scientific and AI domains would further bolster Japan's talent pipeline and innovation capacity.

05 Pillar Three: **Innovation —** Implement Pro-Science and Innovation Legal Frameworks

Japanese policymakers, like their counterparts around the world, have been working to keep pace with digital innovation by assessing the adequacy of existing laws and considering new regulatory frameworks. The task is challenging not only because AI is a general-purpose technology that will affect a wide range of economic and social activities, but also because the implications of AI vary depending on the context for its use.

Despite efforts among some policymakers to ensure R&D is not overburdened by new requirements, scientists are not exempt from regulatory ambiguity. In fact, uncertainty is especially burdensome for scientific researchers, who are already grappling with the challenges of gaining access to AI tools and relevant datasets. Meanwhile, regulatory fragmentation can slow scientific collaboration across borders.

AI is too important not to regulate well. Getting AI regulation right is a key public policy responsibility for every government. Decisions governments make today on the 'how, what, and when' of regulation will profoundly influence the trajectory of AI innovation and adoption. Google supports well-designed, evidence-based regulation that fosters certainty and predictability within the scientific domain.

In particular, AI regulation should be focused in its scope, must balance innovation and regulation through measures proportionate to the risk, and, as far as possible, be aligned with international standards.

The Japan AI Promotion Act has the potential to set a global example in providing certainty and confidence in the responsible development and deployment of AI. The legislation will be successful if businesses and researchers are not deterred from using AI in research, but instead have clarity on what they need to do to meet their ethical and regulatory responsibilities.

Japan has also taken important steps to lead practical work in ensuring the safe development and deployment of AI. Japan was the first country in the Asia-Pacific region to launch its AI Safety Institute in November 2024. It has published guidance documents on various AI safety topics, including data quality management, red-teaming, AI system attacks, and an AI Safety Approach Book. Google looks forward to continuing to work with the Japanese Government on making sure there are appropriate guardrails around the development and deployment of AI.

3.1 Regulations facilitating responsible AI progress

Identify and address regulatory gaps based on existing laws

When developing regulatory frameworks for AI, the first step should be to examine existing laws that already govern similar activities. If an action is unlawful without the use of AI, it is likely still unlawful when AI is involved. After identifying the specific legal or ethical challenges that AI uniquely presents or amplifies, governments can choose from a range of targeted responses. These might include issuing regulatory guidance, clarifying existing provisions, or amending current laws to reflect AI's evolving impact.

Japan has been careful to take account of existing laws before moving to put in place new ones. In its report, Japan's AI Strategic Council outlined how multiple AI-related risks are already addressed under existing Japanese criminal/penal, civil, and intellectual property laws.

Balance: A proportionate and risk-based approach

Regulation should seek to not just avoid harms, but also enable AI's immense potential. A balanced, proportionate, and risk-based approach to AI regulation, supported by innovation-enabling policies and frameworks, will help governments deliver the transformative benefits of AI to their citizens.

The context of use is critical in determining risk. It is vital to ensure that any regulatory framework is targeted at the applications of AI in areas with the highest risk of harm and misuse, while recognizing that these high-risk applications often also bring high value, such as in medical applications of AI. In determining risk, governments should not only consider the likelihood and severity of harm, but also the opportunity cost of not using AI.

Separately, obligations under any AI regulation should be determined based on the different actors involved in the AI ecosystem. These actors — typically developers, deployers, and end users — play distinct roles in the AI lifecycle, and the actor that has control over a specific step in the AI lifecycle should bear the responsibility. Singapore's Model AI Governance Framework for Generative AI (May 2024) provides a useful approach to assigning responsibilities to different actors in the AI development chain under its 'Accountability' dimension.

Align: Prioritize international cooperation and interoperability, and adopt international benchmarks and standards

It is critical for each country to strive to achieve alignment and coherence between national regulations and international frameworks to facilitate the wide adoption of AI tools and technologies. Increased global alignment on AI regulations, including in the context of trade, will facilitate the adoption, use, and interoperability of AI technologies across different jurisdictions. Japan is a leading advocate of greater interoperability between countries on AI governance.

Japan has played a leading role in promoting global multilateral dialogue and consensus on AI governance. Under the Japan AI Promotion Act, the 'Basic Measures' to be implemented by the national government include promoting international cooperation and creating guidelines in line with international standards.

At the international level, the G7 under Japan's presidency launched the Hiroshima AI Process (HAIP) in May 2023, with member countries launching deliberations on addressing the risks arising from AI. In December 2023, these deliberations culminated in the historic HAIP Comprehensive Policy Framework. In May 2024, Japan announced the launch of the HAIP Friends Group, which was an initial group of 49 countries supporting the implementation of the HAIP Comprehensive Policy Framework. Japanese organizations form the highest number of participating members of the HAIP Friends Group Partners' Community, which consists of private sector and international organizations.
Building on the HAIP, the OECD operates a voluntary reporting framework known as the HAIP Reporting

Framework. It involves companies voluntarily submitting publicly available reports to the OECD demonstrating their AI risk management practices as per the HAIP Comprehensive Policy Framework. Google has submitted its report under this framework.

International cooperation in AI is incomplete without achieving international consensus on ensuring free cross-border flow of data, which is a fundamental building block of AI. Japan is also credited with creating the first international initiative on free cross-border data flows called 'Data Free Flow with Trust' (DFFT). First proposed by Japan in 2019, the DFFT is operationalized through the Institutional Arrangement for Partnership (IAP) which was endorsed at the G7 Summit in Hiroshima in 2023. Under the IAP, G7 members agreed to establish an international framework with a permanent secretariat to facilitate the DFFT.

Another way to promote international interoperability is to incorporate international standards on AI released by organizations such as the International Organization for Standardization (ISO) or the Institute of Electrical and Electronics Engineers (IEEE) in domestic regulatory measures. Standards make it easier for countries to exchange goods or services consistent with each other's regulatory requirements. In August 2023, Japan's METI introduced the JIS X 22989, which is based on ISO/IEC 22989 that deals with AI concepts and terminology.

Exempt pre-market AI R&D for scientificpurposes from AI regulations

Early-stage scientific research using AI should not be burdened by the same regulations intended for market-ready products.

The EU AI Act provides a useful reference, including exemptions for "any research, testing or development activity regarding AI systems or AI models prior to their being placed on the market." This approach ensures that regulation addresses real-world risks arising from deployment, rather than constraining the exploratory and iterative nature of scientific inquiry.

Any rules should prioritize use cases that present a significant risk of harm or misuse due to deployment, rather than imposing blanket restrictions during testing and development. Doing so would help foster scientific innovation and ensure that AI-powered technologies with public benefit are not unduly delayed in reaching the market.

Establish vendor-agnostic regulatory sandboxes for fast experimentation

Regulatory sandboxes offer a key way to accelerate the transfer of research into tangible products and services. Participating firms obtain a waiver from specific legal provisions or compliance processes to be able to rapidly innovate. Sandboxes are particularly beneficial for resource-constrained small businesses and startups, helping them navigate complex regulatory landscapes.

Japan temporarily introduced a regulatory sandbox in 2018, which was later made permanent in 2021. The purpose of Japan's regulatory sandbox framework is to allow 'demonstrations' of products that utilize new technologies or new business models that may not conform to existing Japanese regulations. In some cases, existing laws were also modified after a sandbox demonstration. For example, after the testing of an electric scooter sharing service, the Road Traffic Act was modified. Between 2018 and 2023, 29 projects were approved through this framework, including AI-related projects.

Japan will benefit from continuing to consider the applicability of sandboxes for allowing for controlled experimentation of AI use-cases, including in specific sectoral domains. For example, Singapore created a regulatory sandbox for autonomous vehicles by providing regulatory exemptions to operators of self-driving vehicles; similarly, Indonesia introduced a regulatory sandbox for digital health applications. By adopting vendor-agnostic AI sandboxes, the Japanese government can support rapid development of AI-enabled scientific tools while testing adaptive regulatory models in partnership with industry, academia, and civil society. This would ensure that regulation keeps pace with innovation.

3.2 Establish privacy and copyright frameworks that enable the use of publicly available information

Establish harmonized data privacy laws that focus on responsible and reasonable data collection and use

Access to datasets holds the key to unlocking AI's potential to provide solutions for various problems. This can also involve the use of personal data, especially in sensitive contexts such as healthcare or financial decisions. Pro-innovation privacy laws should strike a balance between safeguarding personal data and enabling technological progress. Privacy regulations should aim to be adaptive, risk-based, and technologically neutral, and focus on mitigating the potential harms of outputs rather than regulating the inputs used in development.

Japan's balanced regulatory framework supports the responsible use of anonymized personal data. Japan's personal data protection law does not subject anonymized and pseudonymized data to the same obligations as personal data. Sectoral regulations also provide further clarity. Japan enacted the Next Generation Medical Infrastructure Act in 2018 to enable improved access to both pseudonymized and anonymized medical data, recognizing the value of such data in developing valuable healthcare applications. However, only a limited number of medical institutions in Japan have so far provided access to data under this law.

As the Japanese Personal Information Protection Commission (PPC) reviews the application of privacy law to AI development, it will be vital to ensure that privacy protections are applied proportionally, safeguarding user privacy while recognizing the transformative potential of AI and its scientific applications.

To further bolster privacy and innovation, it is important to actively encourage the development and adoption of privacy-enhancing technologies (PETs). The LDP's 2024 AI White Paper included a recommendation to develop new AI models with enhanced privacy protection, including through the use of PETs. Investing in PETs can unlock Japan's full potential of data for scientific advancements, particularly in fields such as medical science and healthcare, while ensuring individuals' privacy and data confidentiality are upheld. For further recommendations and insights, readers can explore Google's Policy Recommendations on Generative AI and Privacy.

Maintain copyright frameworks that enable the safe use of publicly available information for training and testing AI-powered systems

It is important that copyright laws allow training on publicly available content on the open web, including through relevant limitations and exceptions such as fair use or text and data mining (TDM) exceptions. A key objective of these exceptions in copyright law is to provide researchers the necessary flexibility to access datasets without having to undergo lengthy negotiations with data holders for every instance of data use.

Recognizing the importance of providing certainty for AI developers, Japan amended its copyright law in 2018 to make it 'AI-friendly' with a clear exception for using copyrighted works. The Japan Cultural Agency also provided further guidance in 2024 by clarifying specific circumstances where the use of copyrighted works for training generative AI models would not fall within the exception.

Maintaining a globally competitive approach to AI and copyright will be crucial in providing researchers with legal certainty in using certain types of data for various AI development purposes.

06 Conclusion

AI holds the promise to transform the very process of scientific discovery. Public policies will play a significant role in shaping whether and how Japan achieves AI's full scientific potential, harnessing AI to drive new scientific discoveries across industry, healthcare, education, and the environment.

AI has the power to accelerate scientific discovery in Japan, while also lowering the barriers to participation in Japanese science. To unlock this potential, it is vital that Japan actively cultivates the right conditions — expanding access to computational infrastructure, making targeted investments in AI-driven scientific inquiry, and ensuring that regulation supports — rather than hinders — AI innovation and adoption.

For decades, Japan has been recognized as a global leader in advanced research and scientific capabilities in areas such as consumer electronics, automotives, and pharmaceuticals. The three Is — Infrastructure, Investment, and Innovation — can similarly help Japan to become a global leader in the use of AI to drive scientific discovery.

07

Appendix:
Global Illustrations of AI's Transformational Impact on Science

Natural Sciences

AlphaGenome
bioRxiv 2025

- A new AI tool that predicts comprehensively and with greater accuracy how single variants or mutations in human DNA sequences impact a wide range of biological processes regulating genes.
- Preview available via the AlphaGenome API for non-commercial research; model to be released in the future.
- The model analyzes up to 1 million DNA letters and makes predictions at the resolution of individual letters.

Connectomics
Science 2024

- Mapping a 3D, nanoscale-resolution map of a piece of the human brain to a level of detail never previously seen.
- This work may change our understanding of how the brain works which could help researchers better understand neurological diseases such as Alzheimer's and also answer fundamental questions (eg. how memories form).

AlphaFold
Nature 2024, Science 2023, Nature 2021

- Predicts the structure of all of life's molecules including proteins, DNA, RNA, ligands and how they interact.
- Researchers have used AlphaFold for scientific discovery - ranging from developing new malaria vaccines, to tackling antibiotic resistance to developing new gene therapy methods for treating diseases like Cancer, tackling pathogens that blight our crops, and developing plastic-eating enzymes.

AlphaMissense
Science 2023

- Predicts the pathogenicity of missense variants by integrating knowledge gained from both protein structure and evolutionary characteristics.
- Helps researchers determine whether a specific genetic variant is likely to cause a disease, e.g., to help unpick the genetic drivers of epilepsy.

Human Pangenome
Nature 2023

- The first draft human pangenome that combines assembled genomes from 47 people from diverse ancestries around the world.
- This draft pangenome is a new resource that better represents human genetic diversity, allowing scientists and doctors to more accurately diagnose and treat diseases and develop new therapeutics.

GNoME
Nature 2023

- Helps generate novel candidate crystals and predict their stability.
- Discovered 2.2M new crystals - equivalent to nearly 800 years worth of knowledge from classical research techniques.

AlphaProteo

- Generates new protein binders for diverse target proteins.
- Can lead to the discovery of new drugs, the development of biosensors and improve our understanding of biological processes.

Climate Science & Sustainability

Flood Forecasting
Nature 2024

- AI model that achieves reliability in predicting extreme riverine events at up to a five-day lead time.
- Integrated into Google's Flood Hub platform Google Search, Google Maps, and available in over 100 countries, covering 700M people.

NeuralGCM
Nature 2024

- Produces ensemble weather forecasts.
- It can simulate over 70,000 days of the atmosphere in the time it would take a physics-based model to simulate only 19 days; it is 1K to 1M times more computationally efficient than SOTA physics models.
- Openly available, which, combined with its ease of use and efficiency, could make climate modeling more accessible to researchers.

GraphCast
Nature 2023, Science 2023

- AI model that predicts weather conditions up to 10 days in advance.
- Openly available model, which predicts the tracks of cyclones with great accuracy further into the future, identifies atmospheric rivers associated with flood risk, and predicts the onset of extreme temperatures.

Contrails
arXiv 2023, arXiv 2023

- AI model that identifies areas where airplane contrails are likely to form, allowing for flight rerouting to reduce the climate impact of air travel.
- Reducing the frequency of contrail formation could have a significant impact on emissions from air travel as they account for ~35% of the global warming impacts of the aviation industry.

Wildfire Detection
arXiv 2022

- AI model that analyses satellite imagery to map real-time boundaries of large wildfires.

FireSat

- An AI-powered global satellite constellation designed to detect and track bushfires the size of a classroom (5x5 metres) within 20 minutes.

Energy

Magnetic Plasma Control

Nature 2022

- The first deep reinforcement learning system that autonomously discovers how to stabilise and shape the plasma within an operational tokamak. Stabilising plasma is a critical step on the path toward stable fusion.

TORAX

- An open source plasma core simulator, which enables new directions for plasma scenario design and accelerates the research in the fusion space.

Health Sciences

MedGemma

A family of open models built from Gemma and fine-tuned for the medical domain. Designed to be accessible for a wide range of applications, MedGemma can assist with tasks like summarizing clinical documents and accelerating biomedical research, helping to democratize innovation in healthcare.

Breast Cancer Prediction

Nature 2020

- An AI-powered system, which integrates into breast cancer screening workflows to help radiologists identify breast cancer earlier and more consistently.

Lung Cancer Detection

Nature Medicine 2019

- Lung cancer leads to over 1.8 million deaths per year worldwide, accounting for almost one in five cancer deaths, and is the largest cause of cancer mortality.
- This research shows AI can help physicians more accurately screen for lung cancer and identify the disease.

Preventing blindness

JAMA 2016

- Automated Retinal Disease Assessment (ARDA) uses AI to detect diabetic retinopathy.
- Currently being used to detect diabetic retinopathy in India and the European Union.
- Almost 3,000 new screenings are supported by ARDA weekly.

Multimodal Medical AI

MedGemini

- A Gemini-based multimodal medical model, which has demonstrated important advances in clinical reasoning, multimodal, and long-context capabilities across various modalities such as images, surgical videos, genomics, ultralong health records, ECGs, and more.

MedLM

- A family of foundation models fine-tuned for healthcare.
- Encompasses a range of applications, including answering medical queries, summarising complex medical information, and extracting insights from unstructured data.

Mathematics

AlphaEvolve

- An evolutionary coding agent powered by large language models for general-purpose algorithm discovery and optimization.
- Among other applications, it can propose new approaches to complex mathematical problems.
- When applied in over 50 open problems in mathematical analysis, geometry, combinatorics and number theory, it rediscovered state-of-the-art solutions in about 75% of the cases.

AlphaGeometry

- Solved 83% of all historical International Mathematical Olympiad (IMO) geometry problems.
- Prior version demonstrated AI performance on geometry problems approaching the level of a human Olympiad gold-medalist.

AlphaProof

- A reinforcement-learning-based system that trains itself to prove mathematical statements.
- A significant advancement for formal math reasoning.

Quantum Computing

Willow

State-of-the-art quantum chip

- Can reduce errors exponentially as we scale up using more qubits.
- Cracks a key challenge in quantum error correction that the field has pursued for almost 30 years.

AlphaQubit

Nature 2024

- An AI-based decoder that identifies quantum computing errors with state-of-the-art accuracy, which is a critical step to accelerate progress on building a reliable quantum computer.

Continuous Quantum Error Correction

Nature 2023, arXiv 2022

- Researchers developed an ML algorithm for continuous quantum error correction that uses a recurrent neural network to identify bit-flip errors.
- This breakthrough, and others like it, will accelerate progress towards a large-scale error-corrected quantum computer.

Quantum Gravity

Nature 2022

- Researchers were able to explore quantum gravity by replicating the dynamics of a traversable holographic wormhole on a 9-qubit quantum computer.
- Represents a step towards being able to study quantum gravity in a laboratory setting.

Quantum Chemistry Simulations

Nature 2022

- The largest chemistry simulations to date on a quantum computer using Fermionic quantum Monte Carlo (QMC) methods.
- These simulations will offer accurate predictions of chemical reactivity and kinetics.

Education

LearnLM

- A family of models fine-tuned for learning, based on learning science principles.
- Helps simplify and improve the process of lesson planning to help teachers discover unique activities, find engaging materials, and differentiate their lessons and content to meet each of their students where they are.