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# SINGAPORE

## Using artificial intelligence to build a world-leading science and research ecosystem

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### Key takeaways

- Singapore's AI journey illustrates how a small state with strong institutions can leverage technology for national advantage.
- The launch of the *Singapore National AI Strategy 2.0* in 2023 shifted AI policy away from project-based pilots towards a comprehensive, systemic strategy.
- Efforts to mainstream AI literacy across the workforce, including training for mid-career workers and adoption programmes for small and medium-sized enterprises, have made Singapore one of the most AI-fluent nations in the world.
- The release of a governance framework on generative AI in 2024, and the launch of AI safety initiatives in 2025, demonstrate Singapore's ambition to shape global norms for responsible AI.

Singapore is widely recognized as a global leader in digital governance and AI adoption. Since the release of its first *National AI Strategy* (NAIS) in 2019, the country has rapidly scaled up investments in AI research, applications and governance. The updated NAIS 2.0 (2023) reflects a transition from flagship projects to embedding AI across the entire economy and society. In July 2024, the Government of Singapore rebranded the Ministry of Communication and Information as the Ministry of Digital Development and Information, to better reflect the ministry's role in the country's national digital agenda. These developments highlight Singapore's approach of positioning AI as a pillar of social and governance infrastructure while also being an economic enabler.

### Opportunities and challenges

Singapore has embraced AI across multiple domains. For example, in health care, AI supports precision medicine, drug discovery and predictive diagnostics, with the Agency for Science, Technology and Research (A\*STAR) and leading hospitals conducting cutting-edge research (A\*STAR Research, 2022). And in urban planning, AI powers smart transport systems, energy optimization and flood mitigation, as part of the country's sustainability agenda.

Education and workforce development remain central to AI development, with programmes like the AI Apprenticeship Programme (AIAP) and TechSkills Accelerator (TeSA) scaling up to ensure mid-career reskilling and youth engagement. In addition, businesses including small and medium-sized enterprises (SMEs) benefit from targeted grants and digital leaders' programmes designed to integrate AI into business processes. These include the Productivity Solutions Grant, the Enterprise Development Grant, and the Enterprise Commute Initiative.

Nonetheless, Singapore faces challenges. Talent shortages remain acute despite extensive domestic training initiatives, with the country continuing to rely heavily on foreign expertise. Initiatives to develop AI talent have been underway since 2017, when the government launched the TeSA under the Infocomm Media Development Authority (IMDA) to upskill the national workforce in data analytics, AI and cybersecurity (IMDA, 2018). The following year, the partnership organization AI Singapore introduced the AIAP to provide nine-month applied training in machine learning and data science; this has produced more than 600 graduates to date (AI Singapore, 2024).

These training programmes have been complemented by the GovTech Digital Academy for public officers and the SkillsFuture for Digital Workplace 2.0 programme, both focused on AI literacy across industries. They are also supported by the AI Professionals Association and certification framework, announced by the Government of Singapore in 2023 to standardize competencies and link training outcomes to career pathways (SNDGO, 2023).

Ethical and governance challenges are equally complex: balancing rapid deployment with accountability in areas like data privacy, algorithmic bias and surveillance is an ongoing struggle. The rise of generative AI has further heightened these tensions, requiring regulators to adapt frameworks such as the NAIS quickly. Regionally, Singapore's advanced capabilities create disparities with other states in the Association of Southeast Asian Nations (ASEAN), raising concerns about inclusivity and equitable adoption of AI.

### **Institutional arrangements and stakeholders**

Singapore's AI ecosystem is underpinned by strong institutional leadership. The Smart Nation and Digital Government Office oversees digital transformation in the public sector, while the IMDA drives AI governance and industry adoption (IMDA, 2025). The newly reformed Ministry of Digital Development and Information integrates these functions into a coherent policy framework, and the National Research Foundation ensures consistent funding for research and development (R&D).

Research institutions such as A\*STAR, the National University of Singapore, the Nanyang Technological University and the Singapore Management University conduct world-class AI research (NUS, 2022), while private sector giants like Google, Microsoft and OpenAI operate regional hubs in Singapore (Kao, 2024). Internationally, Singapore participates in the Organisation for Economic Co-operation and Development, the Global Partnership on Artificial Intelligence and ASEAN frameworks, ensuring that its governance approaches are globally relevant and regionally connected.

## **Ethical and transparency considerations**

Singapore has been proactive in setting standards for AI governance. Published in 2019, and updated in 2020, the *Model AI Governance Framework for Generative AI* provided a foundation for responsible AI adoption. In 2024, the *Digital Forum for Small States (Digital FOSS) AI Governance Playbook* (IMDA, 2024) expanded these principles to address the risks of frontier models such as large language models.

The AI Verify toolkit, developed by IMDA (IMDA, 2022), offers organizations a practical means to validate their AI systems against governance principles. More recently, in 2025, Singapore announced AI safety initiatives in partnership with international agencies at the *AI Action Summit* in France, further consolidating its leadership in AI governance. However, debates about surveillance, fairness and data rights continue domestically, reflecting the difficulty of aligning rapid technological adoption with societal expectations of trust and accountability.

## **Capacity building and funding**

Capacity building remains central to Singapore's AI strategy. IMDA reported in 2025 that 75 percent of workers already use AI tools in some form, reflecting high levels of digital integration. At the same time, Government initiatives are scaling up, with 800 new training slots and 500 enterprise projects underway. In addition, programmes like the AIAP and the TeSA help new graduates and mid-career professionals gain applied AI skills.

AI also remains a central pillar of the *Research, Innovation and Enterprise 2025 Plan*, which allocates SGD 25 billion for R&D (National Research Foundation, 2020). Enterprise Singapore and IMDA provide grants and incubation support for SMEs, ensuring that smaller firms also benefit from the adoption of AI. Beyond its borders, Singapore provides training and capacity support to ASEAN states – including Cambodia, Laos and Vietnam – reinforcing its role as a regional AI hub.

## **Accelerating discovery and impact**

Beyond governance and workforce development, Singapore is emerging as a leader in AI-augmented scientific research – where AI directly accelerates discovery processes and innovation cycles. Through its *Singapore National AI Strategy 2.0*, the Government of Singapore has prioritized building a scientifically literate AI workforce, and equipping researchers across disciplines with digital and data competencies. In addition, programmes such as the AI for Science Initiative, supported by a further SGD 120 million investment in 2024, aim to help scientists apply machine learning to complex problems in climate, health and materials research (AI4Science, no date).

One area in particular has demonstrated outsized impact as a result of recent innovations: health care research (A\*STAR and EVYD Technology, 2023). AI tools are already being deployed in diagnostic imaging in public clinics, and initiatives like the A\*STAR–EVYD Joint Lab for AI in Population Health are advancing predictive analytics for early disease detection and system-level health management (Agency for Science, Technology and Research, 2023; A\*STAR and EVYD Technology, 2023). And in 2024, a national behavioural health trial

involving more than 80,000 participants showed that AI-driven nudges improved physical activity by more than 6 percent, illustrating how AI can support both individual health outcomes and population-level impact.

Significant investments underpin these efforts. Singapore has committed more than SGD 500 million to expand high-performance computing capacity and support shared data infrastructures. At the same time, the AI for Science Initiative, national computer clusters, and partnerships through SGInnovate and the National Research Foundation ensure that researchers can access the tools and resources needed to integrate AI into scientific inquiry. Collectively, these efforts reflect Singapore's systemic approach: building capacity, embedding ethics, and investing in enabling infrastructure to make AI a core pillar of its science and research ecosystem.

Singapore's AI ecosystem extends deeply into the production of scientific knowledge, reflecting an intentional strategy to make AI a core component of national R&D. Under the *Research, Innovation and Enterprise 2030* plan and through the AI for Science Initiative, the National Research Foundation and A\*STAR have introduced guidelines for the responsible use of AI in research funding, emphasizing transparency, data sharing and algorithmic reproducibility.

*Singapore's experience shows that small states with strong institutions can punch above their weight in shaping global AI trajectories.*



The Government of Singapore's *Trusted Data Sharing Framework* and AI Singapore's *Model AI Governance Framework for Generative AI* guidelines support ethical use of AI-generated insights across universities and laboratories. Public-private collaborations have strengthened this ecosystem. For example, NVIDIA and the Singapore Institute of Technology (SIT) launched the SIT x NVIDIA AI Centre in October 2025 to accelerate applied AI research, drive adoption across industries and train a strong AI workforce (Singapore Institute of Technology, 2025); Google Cloud and the National University of Singapore co-launched the AI for Science Research Hub in 2025 to apply AI to materials discovery and bioinformatics (Lim, 2025); and the National Supercomputing Centre Singapore expanded its infrastructure to support AI-driven simulations and data-intensive experiments (National Supercomputing Centre Singapore, 2024). Collectively, these efforts mark Singapore's shift from deploying AI in applied sectors to embedding it within the process of knowledge creation itself – defining a new model for AI-augmented science in small, advanced economies.

### **Achievements and next steps**

Singapore's achievements are substantial. The release of NAIS 2.0, the *Model AI Governance Framework for Generative AI*, the *Digital Forum of Small States (Digital FOSS) AI Governance Playbook*, and the AI Verify toolkit have established Singapore as a global reference point for AI governance. Sectoral successes are visible across health care, finance, logistics and public services. Global engagement has expanded, with Singapore hosting international dialogues on AI safety and partnering with global firms to develop governance tools. Looking

forward, Singapore aims to deepen AI integration into sustainability and green technology, broaden adoption among SMEs, enhance ASEAN cooperation and expand domestic talent pipelines to reduce reliance on international recruitment.

In conclusion, Singapore's experience shows that small states with strong institutions can punch above their weight in shaping global AI trajectories. By combining investment, regulation, talent development and global engagement, Singapore has positioned itself as a leader in responsible AI. The challenge ahead lies in ensuring inclusivity, so that SMEs, vulnerable workers and regional neighbours all benefit from AI, and in maintaining public trust with technological advances. If Singapore can balance these demands, it will remain a model for AI governance and adoption worldwide.

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