

2022 Trustworthy Artificial Intelligence

in the Asia-Pacific Region

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About the AI ASIA PACIFIC INSTITUTE

The AI Asia Pacific Institute is an independent and interdisciplinary research organisation. It examines the implications of learning algorithms in society in order to advance the adoption of trustworthy intelligent technology across Asia Pacific.

Authors

Mark Bryan Manantan, Bryson Lee, Joshua O'Hara, Siena Chandler and Kelly Forbes.

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Executive Summary

In October 2021, the AI Asia Pacific Institute convened a roundtable discussion featuring key representatives from government, private sector, academia, and civil society from Singapore, Japan, South Korea, and India with two key aims. First, to examine recent AI policy developments in the four countries, with the addition of Australia, and the broader consequences for the Asia Pacific region of increasing regional debate on the ethical, social, and legal implications of AI. Second, to identify potential convergence pathways presenting opportunities for collaboration among and between the five countries.

This report combines a synthesis of the salient points shared during the roundtable discussion with comprehensive and comparative research into the AI landscape in the region. It provides continuity to the work the AI Asia Pacific Institute published in 2021 "Trustworthy Artificial Intelligence in the Asia-Pacific Region"¹, but adopts a more in-depth focus on Singapore, Japan, South Korea, Australia and India.

Compared to previous reports on AI policy and strategy in the Asia Pacific region, which have tended to rank countries based on AI maturity level, the report is one of the first few studies to undertake a deep dive into some of the region's countries using specific and discrete indicators. Through an in-depth case study approach, the report analyses the underlying social, political, and economic factors, which shape each country's unique approach to AI development and acknowledges the geopolitical polarity of the region. The report assesses each country based on the following indicators: *best practices; opportunities and challenges; and prospects for collaboration*, for the end goal of assessing each country's unique approach to Trustworthy AI², and identifying mutual grounds as impetus for regional and international collaboration.

Key findings of the report suggest that there is inclination and capacity among the stakeholder nations to collaboratively shape the AI ecosystem in the Asia Pacific, including through harmonisation of regulatory approaches within the region. While acknowledging the realities of binary, geo-technological competition between the US and China, the five countries are customising their responses to the complexities of the AI environment to reflect their own socio-political and economic circumstances and priorities.

As a way forward, this report proposes the establishment of the Tiered AI framework for International Collaboration (TAFIC) outlining how Singapore, Japan, South Korea, Australia and India can identify areas of common interest to drive deeper collaboration in order to achieve a vibrant, dynamic, and cross-cutting regional AI ecosystem. Using TAFIC as an organising framework, countries can pursue collaboration based on existing and similar mechanisms or even cross-pollinate best practices and ideas.

Through insights drawn from TAFIC, we advance the following recommendations: (1) exploring Smart City to Smart City Cooperation; (2) integrating Trustworthy AI in digital and multilateral trade agreements and (3) advancing an AI Asia Pacific Working Group.

Although this report is limited in scope to five nation-stakeholders, we hope to include a broader representation of nation stakeholders in our future work in this area.

Introduction

With minimal human intervention and increasing machine-to-machine interaction, the advent of digital transformation facilitated by cloud services and the Internet of Things (IoT) has generated large pools of big data. It has enabled the emergence of new synergy structures in cyber-physical systems. Industries and businesses are rapidly adopting more horizontal and functional-based types of interactions that transcend existing vertical structures. With advancements in Artificial Intelligence (AI), specifically Machine Learning (ML) and Deep Learning (DL), sophisticated analysis of large datasets is possible, thereby yielding significant developments in natural language processing, speech and image recognition, robotics, and automation. The introduction of Fifth Generation Technology (5G)—which permits the production of high-speed connectivity with low latency communication—a steady stream of big data is guaranteed that allows feedback and refinement of AI or ML models. These developments ushered in much anticipation and optimism on how AI can help both public and private sectors leapfrog to industry 4.0.

Given Al's transformative promises, media reporting on Al developments over the last few years has conceptualised its development as a 'race', both technological and geopolitical in nature. A revival of interest in Al is warranted by the ever-increasing stream of data, availability of high-powered computing chips and sophisticated super computers. To date, development of general-purpose Al —a state where Al machines and technologies can simulate human intuition and reasoning—is yet to be reported in the scientific literature, however prominent world leaders and notable figures in the tech industry have trumpeted a new era, making bold claims about Al's stratospheric impact. The strategic rivalry between the US and China - both leaders in Al technological development - has further galvanized the competitive rhetoric surrounding Al: reminiscent of the space race during the Cold War,³ the two superpowers are portrayed to be locked in a competitive race to secure the first mover advantage.

Reverberations of the purported AI race have reached the Asia Pacific region—a highly complex and heterogeneous geographic construct constituted by distinct economies and societies. The US and China, as the technological superpowers in AI, may have the gravitas to shape the global roadmap for AI, but technologically advanced and emerging countries in the Asia Pacific led by Japan, South Korea, Singapore, Australia, and India are partaking in the process constructively, and carving out their niches within it at the national and regional levels. Rather than being adversely affected by the binary of geo-technological competition, these five technologically capable states in the region are adapting to the complexities of AI through their own socio-political, economic institutions and processes that reflect their own interests and priorities.

This report puts the spotlight on the emerging AI landscape in the Asia Pacific from the viewpoint of Japan, South Korea, Singapore, Australia, and India. The five case study nations were chosen based on their current dynamism in the AI sphere characterized by a distinct sense of openness to collaboration and innovation amid the strong undercurrent of great power competition in the Fourth Industrial Revolution.⁴ These countries also demonstrate another common feature: they already have a defined national strategic plan for AI.

This report is a continuation of our 2021 Trustworthy Artificial Intelligence in the Asia-Pacific Region report, where we have attempted to unify the principles of trustworthy AI addressed within the context of the Asia-Pacific, which noted the degree of coherence and overlap between (AI) principles in the region. Using the AI Principles Comparison table and extensive industry consultation, we analysed existing developments across four countries: China, Australia, Singapore, and New Zealand. Based on our research findings, we arrived with the following principles to encourage the development of Trustworthy AI in the region: *human-centricity, fairness, explainability, transparency, privacy, and accountability* which we refer to as Unified Principles.

In this report, we employed these Unified Principles to assess how Singapore, Japan, South Korea, Australia, and India address the issue of trustworthiness in AI development. We note that there are no universally accepted principles to inform the development and use of AI, however an attempt to identify the growing convergence of such principles in the region provides a baseline for regional cooperation.

Methodology

Going beyond the prevailing hype on AI, this report examines recent developments in AI policy, strategy and roadmaps among the five case study nations to conduct a cross-country comparison in fostering Trustworthy AI. The report also establishes common and feasible grounds for regional and international collaboration, against a backdrop of intense geotechnological competition and increasing anxiety of the socio-economic impact of AI-enabled technologies.

To accomplish this task, data collection was undertaken in two stages. First, the AI Asia Pacific Institute organised a round table discussion involving key experts from government, private sector, academia, and civil society from each country to obtain first-hand information and cross-cutting perspectives on the current AI developments. This was followed by rigorous desktop research using open-source data from academic literature, policy reports, white papers, and media articles. Combining the insights drawn from the roundtable discussion and desktop research, authors of this report used qualitative analysis to uncover the fundamental positions of each country on AI and evaluated each case study country using the following indicators:

- Best practices
- Opportunities
- Challenges
- Prospects for collaboration

Best Practices. We review each country's public and private sectors' best practices to encourage or improve public and private partnerships based on *co-regulation, industry outreach* and *incentives*. Under *self-regulation*, we assess how industry is voluntarily adopting non-binding rules and regulations prescribed by the government's AI policy and strategy particularly in fostering Trustworthy AI. We note however, that self-regulation can also be synonymous with co-regulation. Such as the case of Japan where co-regulation is used to describe the voluntary adoption and implementation of non-binding rules or principles. In this report, self-regulation and co-regulation are one and the same, but to reflect consistency and accuracy based on the existing data, self-regulation and/or co-regulation are used appropriately. We also examine how each government is advocating for such rules and regulations through industry outreach and if there are any positive inducements or incentives for the private sector to adopt non-voluntary or internationally recognised technical standards, set-up international compliance programs and mechanisms, and implement authentication standards or risk-management principles.

Opportunities and Challenges. As most countries are still in the nascent stages of developing and implementing AI policies and strategies, we surveyed various factors that can contribute to their success or failure in this rapidly evolving technological arena. Under **opportunities**, we consider the distinct strengths that each country possesses to acquire a competitive edge. These range from the country's ability to lead in rulemaking in regional and multilateral fora and trade-agreements, access to global supply chain on hardware and software, through to the availability and accessibility of large and diverse pools of data. **Challenges** pertain to existing roadblocks that can restrict or limit a country's potential to achieve significant gains such as inadequate talent, lack of vibrant startup ecosystems, or insufficient physical and digital infrastructure.

Prospects for Collaboration. With our vision to shape the Asia Pacific region as a dynamic, open, and collaborative AI ecosystem, we analyse the current bilateral, regional and multilateral initiatives each country is party to in order to evaluate potential overlaps as impetus for transnational collaboration. In this report, we handpicked international partnerships where each country has exhibited strong leadership or involvement in crafting or shepherding the agreements. We consider the outlined transnational or international cooperation initiatives as impetuses towards effective harmonisation of regulatory requirements.

Our Key Findings from our analysis of Singapore, Japan, South Korea, Australia and India revealed the following:

Balancing Innovation versus Regulation. Striking the appropriate balance between AI innovation and regulation is a challenge confronting every case study nation. On one hand, governments are bullish on the potential economic and societal benefits of AI, but on the other, they are also concerned about its potential negative implications. Industry is sensitive to the introduction of rules, standards and regulations that may potentially stifle innovation. Governments are enthusiastic about setting boundaries, but they are also faced with the challenge of keeping current laws abreast with the fast-changing AI landscape. The dilemma of practice outpacing policy is highly evident, making the case for governments to adjust and exercise relative flexibility on designing laws and regulations which encourage innovation while addressing the implications of AI.

Emphasizing the Human Factor on Trustworthy AI. Throughout the study, each country has attempted to locate the "human" dimension within AI development. There is an emphasis of the human being's involvement in the AI development cycle, including the distinct roles of users, vendors, and developers. Using the "human" as the referent object orients each country's approach to remain cognizant on the negative impacts that AI can inflict on society if the principles or values of human-centricity, fairness, explainability, transparency, privacy and accountability are compromised. Greater understanding of the shared responsibility of the user and the vendor also provides for a nuanced reflection of how privacy and human rights are considered when data are shared in testbeds or public-private partnerships.

Forging potential consensus on Trustworthy AI through digital economic agreements. We

have seen a growth in digital economic agreements in the region, often addressing some aspects of AI, such as the facilitation of secure and safe data transfers as well as the healthy exchange of talent and technology among relevant businesses and sectors. The general provisions in digital economic agreements or cross border data frameworks espouses AI principles, which when combined or further fine-tuned may help establish a set of minimum standards to harmonise policy deliberations on Trustworthy AI.

Strengthening cybersecurity standards and data regulations as a foundation for

Trustworthy AI. No case study country has yet adopted any legally binding law to expressly regulate AI, although many existing laws might indirectly regulate AI-related activities. The five country case studies have adopted or are in the process of enhancing their data privacy and security governance laws. The establishment of data protection frameworks ensures that although most national AI frameworks are non-legally binding, stringent data privacy and security laws ensure that the sanctity of personal data that are collected, stored, and processed to develop AI models are preserved and protected. As the building blocks of AI, there is a strong commitment across all countries to safeguarding the confidentiality, integrity, and accessibility of data for the purpose of economic, social and research benefits. Conversely, cybersecurity is also integral to safeguarding machine learning models against adversarial AI and other forms of cyberattacks. Through data regulations and cybersecurity standards, governments can exercise regulatory oversight to uphold accountability, privacy, and transparency.

Investing in Soft and Hard Infrastructure. To seize the competitive advantage of AI, governments are investing in soft infrastructure that includes non-binding rules and standards, regulatory frameworks, oversight and accountability bodies and human capacity. Tangent efforts are also underway to further strengthen hard infrastructure such as fast and unparalleled internet connectivity and supercomputers, highly secure data centres, electrical or power resources, and even as far as occupying a critical node in the global supply chain of AI chips or semi-conductors. Although the five case study nations are cognisant of any significant imbalances in their soft and hard infrastructure to sustain or achieve upward mobility in the AI value chain, practical realities such as the lack of human talent or digital infrastructure continue to pose serious drawbacks.

Focusing on a sectoral and targeted approach. Governments have identified priority sectors where AI can have the most significant impact with a relatively short period of implementation. Such trends are dictated mainly by socio-economic challenges unique to each country as well as by the nature of AI which is oriented towards scoping, testing, prototyping and scaling. Japan and South Korea view the contribution of AI to aid their aging population as invaluable, while Singapore, India, and Australia look to AI to jumpstart digital trade and further support economic integration in Southeast and South Asia more broadly. Through a sectoral approach, case study nations can leverage their comparative advantages and niche strengths in specific areas where they have demonstrated relative success in terms of expertise and economic value. In pursuing this route, they can easily extract lessons and feedback which can be applied to other sectors.

Trustworthy AI Operationalisation. There is significant momentum among the five case study nations to make an indelible impact in the AI landscape. One of the challenges in achieving this relates to the distribution of policies and initiatives which have not yet translated into significant breakthroughs in implementation, particularly from startup communities. In Japan and South Korea, for example, most AI developments are still concentrated among multinational companies. There is momentum to jumpstart cross-collaboration between universities and private companies, such as setting up AI labs or sandboxes, cultivating entrepreneurial mindset as well as recruiting local and regional talent.

Startups have valuable contribution to the ongoing debate in Trustworthy AI, highlighting issues that large companies often overlooked or are less prioritised. Ensuring a balanced conversation that emphasizes the salient roles of established firms and up-and-coming startups in fostering Trustworthy AI is essential to its adoption throughout the AI development lifecycle. From seeking venture capital investments, testing ideas in regulatory sandboxes or deliberations in the boardrooms, discussions on Trustworthy AI must be present at the very onset of any endeavour rather than an afterthought.





Chapter 1: Singapore



1.1 Introduction to Singapore's AI Landscape

In 2019, Singapore announced its intention to adopt AI through development and education, with the overarching goal of transforming the nation's social and economic sectors using AI.⁵ This led to the emergence of Singapore's National AI Strategy, and since its launch in 2019, the nation has seen much progress in its development of its AI governance framework. Yet, importantly, while Singapore has a relatively robust set of guidelines in place, its AI framework still exists against the backdrop of pre-existing data and economic policies. These policies frame the emergence and development of Singapore's AI framework.

For data, the Trusted Data Sharing Framework, and Personal Data Protection Act (PDPA), governs and regulates the usage and sharing of data between organisations, and data providers.⁶ It imposes various requirements on an organisation's collection, use, disclosure and custody of personal data in Singapore.⁷ As for economic policies, Singapore hopes to use AI to generate economic gains, acting as a strong driver of growth in key sectors of Singapore's economy.⁸ At the same time, Singapore seeks to develop and structure an inclusive digital economy.⁹

The National AI Office relies upon the National AI Strategy to direct Singapore's AI ecosystem. This document outlines two key works carried out. Firstly, it highlights the national AI projects implemented to solve specific sectoral problems. Secondly, it lays out five key enablers for the development of a broader AI ecosystem.

These Enablers are¹⁰:

- Triple Helix Partnership;
- AI Talent and Education;
- Data Architecture;
- Progressive and Trusted Environment; and
- International Collaboration.

The five Enablers form the foundation of Singapore's AI ecosystem, and are instrumental in guiding the creation and implementation of Singapore's best practices for AI development.

1.2 Best Practices

1.2.1 Self-Regulatory Approach

Singapore has primarily adopted a "self-regulatory" approach when it comes to policies for the development, deployment and usage of AI. The Model Artificial Intelligence Framework,¹¹ the Implementation and Self-Assessment Guide for Organizations (ISAGO) companion document,¹² and the Compendium of Use Cases¹³ work together to produce a pool of self-regulatory resources that industries are encouraged to adopt and rely on. The Model Artificial Intelligence Framework is a voluntary model framework intended to provide guidance for organisations to build AI confidence through the responsible deployment of AI solutions.

The document details the following guiding principles:

- 1. Explainable, transparent and fair decision-making process: Helps to build trust and confidence in Al
- 2. Human-centric AI solutions: Protect the well-being, safety, and interest of humans

Subsequently, it illustrates four actionable areas for implementation of these principles:

- Internal governance structures and measures: Assigns clear roles and responsibilities in AI deployment while developing risk management strategies to address potential risks.
- Determining the level of human involvement in AI-augmented decision-making: A methodology to aid organisations in setting its risk appetite for the usage of AI. It recommends assessing human involvement as human-in, -out, or -over the loop, while assessing risks through a harm matrix of probability against severity.
- 3. Operations management: Covers issues to be considered when developing, selecting, and maintaining AI models, including data management. It recommends proper data preparation and monitoring to ensure that the quality and source of the data remains transparent. It also recommends proper documentation and good governance with regards to algorithms and AI models, so as to ensure transparency, reliability, robustness and repeatability.
- 4. Stakeholder interaction and communication: Lays out strategies for stakeholder communication and management. Generally, the strategies recommend transparent two-way communication between stakeholders and the creation of safeguard policies when interacting with stakeholders.

Singapore's most recent contribution to building a trustworthy AI ecosystem is AI Verify,¹⁴ an AI governance testing framework and toolkit issued by the IMDA. It has been pilot tested by several members of industry, and the results seem positive. Firstly, the initiative reaches beyond the ISAGO checklist for implementation of AI. Secondly, it has a complementary nature to the approach that Singapore has adopted. As it has been pointed out, the IMDA takes a non-binding self-regulatory approach. Therefore, for this approach to be effective, the IMDA needs to reduce the friction on implementation of its guidelines by industry. The easier it is for the industry to adopt the principles and guidelines, the more likely that it will be adopted. Hence, the focus on translating policy and principles into specific actionable steps that industry can implement. By partnering with industry leaders, the implementation guides and toolkits are field tested and more likely to conform with industry norms and standards, compared to going at it alone.

Interestingly, the toolkits and checklists are also geared towards adoption by small and medium-sized enterprises. If they are developing AI, these tools can be used to evaluate and produce more trustworthy AI. If they are procuring AI solutions, these tools could be adapted to evaluating vendors instead.

1.2.2 Industry Outreach

Singapore has been successful in its industry outreach via several programs. Firstly, Al Singapore, its national AI programme, aims toward delivering socio-economic benefit. Secondly, its five National AI Projects formally encourage sector-specific AI development.

Co-creation of Solutions: 100 Experiments Programme

Al Singapore (AISG) is a national Al programme that capitalizes on the nation's capabilities in Al to produce an Al ecosystem that generates social and economic benefits. Its flagship initiative "100 Experiments" (100E) was launched in 2017 with the aim to spur the cocreation of Al solutions with industries. Organisations propose practical problems they are facing where no commercial Al solutions are available, and the 100E programme matches them with AISG's research to build customised and novel solutions to address these problems.

Furthermore, the Model AI Governance Framework and ISAGO are used to ensure responsible development and deployment of the solutions.¹⁵ Essentially, AISG assists organisations in identifying challenges, recruiting AI engineers, designing the AI infrastructure and architecture, and if required, also providing grants of SGD \$180,000 - \$250,000.

On the other side of the collaborative effort, organisations are required to contribute manpower and data, and to also match AISG's grants with cash.¹⁶ As of 2020, more than 260 companies have been enrolled in the programme, with a specific focus on the sectors of healthcare, finance, fast-moving consumer goods (FMCG), manufacturing, and the government sector.¹⁷ Companies that have embarked on this programme include: IBM, RentalTeam, and Sompo Holdings Asia.¹⁸

The 100E programme supports AI development in Singapore by materially encouraging the industry to innovate and develop novel AI solutions for problems which do not have off-the-shelf solutions. It also ensures that development is advanced in a trustworthy manner through the government's oversight and approval of these projects.

National AI Projects

Recognising the immense potential of AI towards innovation and sustained economic growth, Singapore has embarked on a flagship initiative called National AI Projects.¹⁹ The aim of this initiative is to formally mark out sectors where the implementation of AI will result in strong social and/or economic impact throughout the nation. These sectors are:

- 1. Intelligent Freight Planning: Optimization of freight movement and improvement for businesses and traffic efficiency.
- 2. Seamless and Efficient Municipal Services: Increasing the responsiveness, reliability, and timeliness of municipal services.
- 3. Chronic Disease Prediction and Management: Prevention and management of chronic diseases.
- 4. **Personalised Education through Adaptive Learning and Assessment:** Customisation of learning experiences for individual students.
- 5. **Border Clearance Operations:** Strengthening of border security while improving traveller experience.

The National AI Singapore is a representative of the smart nation's AI journey to fulfil its vision in becoming a leader in developing and deploying scalable, impactful AI solutions by 2030. The above-mentioned National AI Projects works to support the journey by essentially breaking down the national AI programme into specific AI projects.

Additionally, Singapore focuses on driving AI development in key sectors with high socioeconomic value for which it can build on existing strengths. A total of nine sectors are identified of which we will examine three: finance, education, and healthcare.

Finance

To better enable Singapore's financial institutions to tap into new opportunities, the national AI programme is developing an AI platform to generate financial risk insights and help these organisations assess their environmental impact and identify emerging environmental risks. Called NovA!, the system will be developed by Aicadium, which is a subsidiary of Temasek Holdings, alongside local fintech companies and Singapore-based banks. More use cases also will be added to the platform in subsequent phases.²⁰ MAS Veritas Program, further analysed below, has been a key initiative for the financial industry in Singapore.²¹

Education

Singapore recognises the importance of investing in its domestic talent in Al-related fields and has continually expanded its efforts in this area. As a few examples, in 2021, the Ministry of Education enhanced baseline digital competencies at the Higher Education level, including deepening digital and AI competencies under its National Digital Literacy Programme.²² Separately, in May 2021, AI Singapore (AISG), a national AI programme, launched LearnAI- a dedicated site for AI and Data Science learning for students, professionals and organisations. The site offers a wide range of free and paid courses for the general population.²³ Additionally, AISG supports the AI Apprenticeship Programme which seeks to develop

Singaporean AI talents and enhance career opportunities in AI-related roles.²⁴ Together, these initiatives aim to foster a digitally literate society and to increase the domestic talent pool for AI-related industries.

Healthcare

AlHGle (pronounced as "agile") document serves as a guide for developers and implementers of Al in healthcare. These guidelines aim to share good practices with the healthcare community to guide the safe development of Al in healthcare.²⁵ The initiative represents the nation's recognition on the importance of Al to advance healthcare, but also acknowledges Al's potential risks and ethical concerns, specific to the sector.

Singapore continually encourages the implementation of AI in the healthcare sector, as an example, under the National AI Projects, AI can be used to prevent and manage chronic diseases by focusing on predictive and preventive measures.²⁶ As part of this, local startup EyRIS was awarded a contract to develop SELENA+, a deep learning system that detects the risk of chronic diseases in advance, which was deployed in 2020.²⁷

Singapore's governmental outreach in the healthcare sector has displayed the ability to develop sector-specific guidelines and the willingness to collaborate with private industry to implement these.

Sectoral outreach on Trustworthy AI

The sectoral outreach approach discussed above can positively influence the advancements towards Trustworthy AI. Firstly, sectoral outreach in general opens an avenue of collaboration between industry stakeholders and policy makers. This is essential in the advancement of trustworthy AI as industrial sector leaders are often well placed to guide these ethical developments. At the same time, policy makers can oversee industry recommendations in their structuring of ethical frameworks. Secondly, the sectoral approach encourages each sector to advance the country's AI strategy and governance while customising it to its own specific needs. Automatically, this can increase trust in AI, by recognising and accounting for the different complex scenarios that AI can represent.

1.2.3 Incentives

Scholarships and grants

Singapore also has several programmes that encourage participation in relevant domains while generating communication between stakeholders. Such incentives take the form of grants, competitions, and other events. An example of a grant is the Artificial Intelligence and Data Analytics (AIDA) Grant. Sponsored by the Monetary Authority of Singapore (MAS), it was launched as part of the Financial Sector Technology and Innovation (FSTI) scheme under the Financial Sector Development Fund (FSDF) to promote AIDA's adoption and strengthen the ecosystem. It is open to Singapore-based Financial Institutions (FI) or Industry Consortiums and is valid until March 2023. It provides up to 50% co-funding of qualifying expenses capped at \$\$1.5 million to support AIDA projects.²⁸

Monetary grants enable the government to stipulate requirements and guidelines in the business proposals by industry stakeholders. For example, the AIDA grant requires each proposal submitted to demonstrate the positive impact it will have for the local workforce. In doing so, this can assist building public trust in AI and encouraging innovation.²⁹

Al Singapore also encourages community interest in Al development through competitions and events. The Al Grand Challenge aims to promote innovative approaches to solve national challenges, making Singapore a leader in advancing novel Al technologies while creating significant socio-economic impact. These challenges reflect practical problems and encourage technological breakthroughs while anchoring capabilities to develop scalable and impactful Al solutions.³⁰

2018's AI in Health Grand Challenge is a competitive research funding initiative aimed at encouraging new ideas that adopt novel AI technologies to enhance healthcare solutions in Singapore and the world.³¹ It has awarded up to S\$35 million in grants to multidisciplinary teams.³² The Trusted Media Challenge, which is open to international participants, aims at crowdsourcing AI solutions to combat fake media.³³ Lastly, AI Singapore hosts events such as the annual AI Summer School which allows for collaborative exploration of the digital domain between students, academics, and industry practitioners.³⁴ It also features competitions such as the 2021 competition on AI for Stock Forecasting.³⁵

The above incentives can contribute to the opening of opportunities which create an avenue for public engagement on Trustworthy AI.

1.3 Opportunities

1.3.1 Trustworthy Ecosystem

Singapore can encourage the organic growth of its domestic AI industry through statesponsored programs like AI Makerspace, a platform offered by AI Singapore aimed at helping SMEs and startups accelerate the adoption of AI in Singapore.³⁶ For example, it provides a suite of AI tools, APIs and pre-built solutions (Makerspace Bricks) for specific use cases which SMEs and startups can quickly deploy and implement in their business. Further, these prebuilt solutions include Open-Source Software and IPs developed by local universities. This creates a virtuous circle where the uptake of locally created solutions encourages further domestic innovations. The benefits are two-fold: firstly, it allows the Singaporean government to curate the trustworthy development of AI solutions built locally, and secondly, it cultivates AI talent by encouraging participation.

Through these government-led AI initiatives, Singapore has demonstrated its leadership when it comes to modelling the balance between innovation and governance of AI. The tripartite relationship between government, industry, and the education sector allows active stakeholder participation in the development of a trustworthy ecosystem that is holistic in its aims.

1.4 Challenges

1.4.1 Trustworthy AI Operationalisation

Singapore's AI strategy has been well-directed and concrete. It provides a wealth of resources for the operationalisation of AI principles, supporting industry compliance with the government's recommended guidelines. However, there is still a challenge in sustaining a national consistent approach and adoption has been particularly difficult to reach smaller companies or startups which have limited resources. As we saw in the case of Singapore's industry outreach policies, each sector of the industry has unique differences and challenges when it comes to implementing AI; it is difficult to have a set of guidelines that reliably accounts for all sectors at once. The recent launched initiative, A.I. Verify,³⁷ can potentially become a strong tool in addressing this challenge and promoting transparency between companies and their stakeholders.

1.4.2 Digital Divide

One of the main challenges for Singapore, as well as other governments around the world, has been to ensure that the benefits of AI are extended to all parts of its population, society and economy. While Singapore is often ranked among the top of global benchmarks for digital inclusion, this challenge is still present.³⁸ Larger companies which can access large amounts of data are automatically placed in an advantageous position when it comes to the AI journey. It is, of course, more challenging to ensure that smaller companies are not excluded from digital participation due to data constraints. Addressing the digital divide is therefore crucial and perceived as a global challenge. To address this challenge, Singapore works collaboratively with various international organisations and institutions such as the Association of Southeast Asian Nations (ASEAN). Domestically, the country has also been investing in avenues to incentivise consumer and professional awareness of AI, as well as its governance. One of these recent developments is the Certificate in AI Ethics and Governance, a joint certification between Nanyang Technological University and the Singapore Computer Society, aiming to recognise and certify professionals in AI Ethics and Governance.³⁹

1.5 Prospects for Collaboration

This section examines both existing and planned prospects for collaboration for Singapore at the domestic, bilateral, and international level.

1.5.1 Domestic

As a technologically advanced city-state with a diverse population, Singapore presents the ideal laboratory to implement its Model AI Governance Framework. Singapore can apply the notion of trustworthy AI given its advantages when it comes to establishing a permissive environment to test and control variables that advances practical use cases within the remit of transparency, accountability, and fairness. To foster trustworthy AI deployment within its shores, Singapore has laid the groundwork for data exchange, safe AI testbeds, and sectoral-level AI implementation guidelines.

Data Exchange: SGTraDex

Singapore Trade Data Exchange (SGTraDex) is a digital infrastructure that facilitates trusted and secure sharing of data between supply chain ecosystem partners by streamlining information flows using a common data highway spanning across a fragmented global supply chain ecosystem. This allows companies to build a stronger and more robust ecosystem for international trade flows. The collaboration of ecosystem partners also anticipates new efficiencies and opportunities due to shared visibility of the end-to-end supply chain.⁴⁰ The infrastructure represents a collaborative effort between policy makers (IMDA), industry leaders (both domestic and international), and banking institutions. Furthermore, given Singapore's position as a trading hub, it intends to extend the use of SGTraDex internationally in the future.

Safe Testbeds: MAS FinTech Regulatory Sandbox

MAS regulatory sandbox creates a safe environment for stakeholders in the Fintech domain by encouraging experimentation while containing the consequences of failure. The relaxing of specific legal and regulatory requirements for the sandbox duration protects innovation in the rapidly evolving FinTech landscape, where there is increasing uncertainty over whether solutions meet regulatory requirements. Regulatory sandboxes encourage innovation despite these circumstances.⁴¹

Sector-specific AI Guidelines: MAS Veritas Program

Veritas is a multi-phased collaborative project between MAS and the financial industry that enables financial institutions to evaluate their Artificial Intelligence and Data Analytics (AIDA) driven solutions against the co-created principles of fairness, ethics, accountability and transparency (FEAT). MAS successfully concluded the first phase of Veritas which saw the development of the fairness assessment methodology in credit risk scoring and customer marketing. Currently, the project is in its second phase, with a focus on the following four use cases: Credit Risk Scoring (banking), Customer Marketing (banking), Predictive Underwriting (insurance), Fraud Detection (insurance).⁴²



Bilateral/ Multilateral/ Regional 1.5.2

Singapore's Role in Trustworthy AI

Within the region, Singapore has been quick to adopt and adapt to the emerging AI landscape. In the last few years, it has developed and released various frameworks and resources to encourage trustworthy AI. As a result, its local industry has greatly benefited from the carefully crafted programs and policies designed by the government. Outside its shores, Singapore is also well-positioned to continue to influence other countries on trustworthy AI development and implementation. To do so, Singapore should retain and improve the key ingredient to its success: its close collaboration with its industry partners in co-creating a conducive AI environment, by means of advisory councils⁴³, roundtable discussions and collaborative projects. Its economic and political stability, coupled with its strategic geographical positioning will continue to help make Singapore a persuasive partner to collaborate with, and learn from.

Digital Economic Agreements

Singapore has several Digital Economy Agreements (DEAs) that are currently already in place or being negotiated. A DEA is a treaty that establishes digital trade rules and digital economy collaborations between two or more economies. Singapore's aim in negotiating DEAs is to develop common international frameworks which foster standards and systems to support businesses (especially SMEs) in their engagement in digital trade and electronic commerce.⁴⁴ More specifically, DEAs also look into supporting cross border data flows, and the cooperation between Singapore and its economic partners in the fields of AI and data innovation, which make these agreements of special interest to this report.

Singapore's DEAs offer opportunities for collaboration between Singapore and other countries in the region. As individual agreements, they allow Singapore to tailor its digital agreements to other economies. Across all DEAs, common points include the creation of shared ecosystems for AI development and usage, and the production of secure and efficient systems of cross-border data transfer, with a specific interest in creating opportunities for relevant businesses and industries. This may also present a solution to one of the challenges that Singapore, as well as other countries in the region, face: the digital divide. One way this may be alleviated is by facilitating small companies' the access of data. Other examples of collaboration exist that have not been classified under the DEAs. One instance of this is through the City of Darwin's "Switching on Darwin" Program, which saw the city adopt Singapore's Model AI Governance Framework and ISAGO in its initiative to enhance its capabilities as a smart city.45

Singapore-Australia Digital Economy Agreement (SADEA)⁴⁶

SADEA, signed on 6 August 2020, focuses on cooperation between Singapore and Australia in the integration of both countries' respective digital economies. It also looks at encouraging businesses, researchers and academics in their respective territories to engage in this cooperation. Specifically, the SADEA considers the practical collaboration within the field of Al by encouraging the sharing of best practices and ethical frameworks. It also covers cooperation within the field of data innovation and protection, aiming to provide access to shared data for the development of new solutions, and looks at compatible and interoperable data transfer mechanisms for personal data.⁴⁷

Digital Economy Partnership Agreement (DEPA)⁴⁸

DEPA is an agreement between Singapore, Chile, and New Zealand, and is also the first DEA concluded by Singapore on 12 June 2020. It aims to facilitate end-to-end digital trade between the countries involved by enabling secure data flows and building trust in digital systems. With regards to secure data flows, it considers data innovation and regulatory sandboxes across borders, and open government data to generate opportunities for businesses. It also covers cybersecurity cooperation, online consumer protection and the adoption of ethical and inclusive AI frameworks. South Korea has recently expressed interest in joining Singapore, New Zealand and Chile in their partnership to cooperate on key emerging issues in the digital economy.⁴⁹

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UK-Singapore Digital Economy Agreement (UKSDEA)⁵⁰

On 28 June 2021, Singapore announced that negotiations between the two countries had been launched regarding the above-mentioned agreement. As the first DEA between an Asian and European country, it also represents a bi-regional relationship. Its main aim is to enable businesses to use Singapore and the UK as digital gateways to access new opportunities in both regions. It will focus on creating rules for cross-border data flows, prohibition of data localization and data protection. It will also explore the emergence of AI while considering opportunities of cooperation in the field of cybersecurity.

Korea-Singapore Digital Partnership Agreement (KSDPA)⁵¹

On 22 June 2020, Singapore announced that negotiations between the two countries had been launched regarding the above-mentioned agreement. The aim of the agreement is to enable greater access, connectivity and opportunities between the two countries and related businesses, which would imply a promotion of trusted data flows. It also seeks to deepen bilateral cooperation with regards to AI governance frameworks, especially in the spheres of fintech and digital identities.

Asia-Pacific Economic Cooperation (APEC)

The APEC was established in 1989, in Australia, with the mission to support sustainable economic growth and prosperity in the Asia-Pacific region. The founding members were Australia; Brunei Darussalam; Canada; Indonesia; Japan; Korea; Malaysia; New Zealand; the Philippines; Singapore; Thailand; and the United States. Other economies joined later and today twenty-one APEC member economies jointly work towards the realization of free and open trade and investment in the region.⁵²

One of APEC's key working groups is the Policy Partnership for Science, Technology and Innovation (PPSTI), which is dedicated to "support the development of science and technology cooperation as well as effective science, technology, and innovation policy recommendations in APEC through collaboration between government, academia, private sector and other APEC fora."⁵³

APEC has been effective on regional economic integration, acting as an incubator for new trade policy approaches.⁵⁴ The forum provides a strong foundation for regional cooperation on AI related issues.

1.5.3 Global

Global Partnership of Artificial Intelligence (GPAI)55

Launched in June 2020, Singapore is one of fifteen founding members. Due to the relatively advanced development of the nation's AI ecosystem, this platform may provide opportunities to collaborate with other countries on a global scale, and to capitalise on the unique strengths of other nations through this collaboration. One such example is a possible Singapore-Canada collaboration, due to the similarities between the former's National AI Strategy and the latter's Pan-Canadian AI Strategy. Canada's comparative advantage when it comes to technological R&D and Singapore's potential as a testing environment go hand in hand to possibly justify a collaboration between the two members of GPAI. Furthermore, it is also possible that the partnership may result in a reduction of adversity on the global stage when it comes to the "AI arms race" by acting as representatives of the "middle powers" on the global level when it comes to AI.⁵⁶

OECD Council Recommendation on AI

The Organisation for Economic Co-operation and Development (OECD) supports governments by measuring and analysing the economic and social impacts of AI technologies and applications and engaging with all stakeholders to identify good practices for public policy. The OECD Principles on Artificial Intelligence promote artificial intelligence (AI) that is innovative and trustworthy and that respects human rights and democratic values. They were adopted in May 2019 by OECD member countries when they approved the OECD Council Recommendation on Artificial Intelligence. Although a non-member of the OECD, Singapore joined the list of adherents in 2021.⁵⁷



Chapter 2: Japan

2.1 Introduction to Japan's AI Landscape

To holistically understand Japan's overall AI approach, it is important to first internalise its aspiration to leapfrog from its current state of Information Society to Society 5.0. The Ministry of Economy, Trade, and Industry (METI) coined the term Society 5.0 as Japan's vision of a "human-centered society" where the boundaries of physical and digital systems have disintegrated to promote economic development while addressing social issues built on the interplay of big data, AI and ML, and 5G.⁵⁸ While there are promising economic opportunities attached to new business models and innovation in Society 5.0, the emergence of new types of risks is also inevitable. With no physical borders, the expansion of digital technologies could result in a winner-takes-all mindset with respect to data accumulation among governments and private companies. This observation raises pertinent questions around data privacy and security as well as bias and misrepresentation underpinning data collection and management. Faced with the twin dilemmas of preserving basic rights such as "security of property, life, and mental and physical safety, privacy, democracy, and fair competition" while reaping the benefits of innovation, Japan proposed Governance Innovation. The concept of Governance Innovation has two dimensions: on one hand, it aims to promote innovation by easing regulations (Governance for Innovation) while on the other, it introduces new regulations to control new risks (Governance of Innovation).

As the application of conventional laws and modes of regulation grapple with the rapid changes caused by technology, a shift from rules-based to goal-based regulation is necessary. Through a goal-based approach, goals are protected by law yet are open-textured, leaving room for interpretation. The fundamental objectives of the goals of law to ensure safety, consumer protection, and fair competition will not change but there must be openness and flexibility to adopt other methods to achieve such goals. A process of "co-regulation" emerges, prompting government and private sector entities to establish trust through regular dialogues to identify principles that facilitate achieving the goals set by law. This entails establishing guidelines and standards that businesses can refer to so they can achieve specific goals set by regulators. Another pathway is the establishment of intermediate norms that aim to bridge evolving interactions between physical space and cyberspace. In this manner, guidelines and standards are frequently and flexibly adjusted to enhance the predictability of business models while keeping abreast with the speed of innovation and disruption. By employing a goals-based approach, the implementation of the law might not hinder the benefits of innovation.

Initial implementation of Governance Innovation includes three stages: (1) Rulemaking; (2) Monitoring and (3) Enforcement. These processes are directed primarily towards the stakeholders, namely the state or government, businesses, and communities or individuals.⁵⁹

- Rulemaking encompasses the development, formulation, evaluation, and updating of mechanisms to regulate human behaviour through various channels or tools like (i) laws; (ii) source codes written in software and systems architecture; (iii) market mechanisms and (iii) social norms.
- 2. Monitoring pertains to the timely collection and analysis of information about the activities of key stakeholders to make an informed assessment of their activities.
- 3. Enforcement is actions or measures undertaken not just by the government but by all concerned stakeholders to resolve issues.

Major steps to chart Japan's national AI strategy were initiated during the premiership of Shinzo Abe. The provision of strategies and policies which have domestic and international dimensions were aimed to boost Japan's competitiveness in the global AI landscape. In 2016, the Artificial Intelligence Technology Strategy Council was established to jumpstart Japan's AI strategy, resulting from the Public-Private Dialogue Investment for the Future. A year after its inception, the AI Technology Strategy Council produced the Artificial Intelligence Technology Strategy.⁶⁰

The document outlined the role of the AI Technology Strategy Council as the central coordinating body to manage three research centres: (1) the Centre for Information and Neural Networks and Universal Communication Research Institute of the National Institute of Information and Communication Technology; (2) RIKEN Centre for Advanced Intelligence Project (AIP) of the Institute of Physical and Chemical Research; (3) Artificial Intelligence Research Centre (AIRC) of the National Institute of Advanced Industrial Science and Technology. Apart from the three centres, projects are also being implemented through the (4) Japan Science and Technology agency and (5) New Energy and Industrial Technology Development Organization.

The strategy also proposed an Industrialization Roadmap which aimed to harmonize the application of AI technologies in three priority domains: (i) productivity; (ii) health, medical care, and welfare and (iii) mobility. The three domains were selected mainly due to the necessity and urgency of addressing related social issues; potential to generate economic benefits and contribute to further improving the mainstreaming of AI applications. Mindful of the possible damage that cyber-attacks can inflict against AI technologies, information security was identified as a cross-sectional domain.⁶¹ The Industrialisation Roadmap will be implemented in three phases: *Phase 1* is the initial application of AI technologies; *Phase 2* involves the public use of AI and data derived from the initial implementation to further improve succeeding applications and *Phase 3* is the establishment of an ecosystem based on the integration of multiple domains.

Projected outcomes from the fusion of AI technologies on the Industrialisation Roadmap encompass the full assembly line from Research and Development (R&D) to social implementation. Phase 1 and Phase 2 outline practical applications like new and innovative services and products, car-sharing, and telemedicine while Phase 3 involves designing one's body and personal robots. Because of possible disruptive effects on existing industries, the strategy mentioned that there were negative concerns about the rapid fielding of AI technologies. Yet the strategy notes that more rigorous testing should be conducted to alleviate such concerns and to increase awareness of AI technologies. The Strategy Council also highlighted the need to conduct regular consultations and reviews to track the progress of the roadmap, take stock of the latest developments in the AI field, and provide and elicit feedback to and from relevant stakeholders and investigative bodies.

In 2018, the Abe government officially included AI as part of its integrated innovation strategy where funding mechanisms for young talents were provided to support research on the identified priority fields. The Japanese government also advanced the standardisation of data formats to enable various industries to share and utilise big data more efficiently. An action plan was launched for the timely implementation of the initiative and the roadmap.

Internationally, the Abe Government introduced the *Draft AI R&D Guidelines for International Discussions* during the Conference toward AI Network Society in 2017.⁶² Building on the previous discussions of the G7 Information and Communication Ministers Meeting, which Japan hosted in April 2016, the draft document focused on the promotion of the multistakeholder approach in R&D and AI applications and the importance of international collaboration to share best practices. It enumerated basic philosophies and non-binding principles to balance the benefits and risks associated with AI development.

The release of Japan's AI Strategy in 2019 showcased a more international outlook set against the backdrop of the ensuing US-China trade-turned-tech war and the impending AI race.⁶³ The 2019 strategy recognised that Japan is falling behind in AI development and thus, the strategy offers an "integrated policy package" with clear strategic objectives that seek to elevate Japan's industrial competitiveness through educational reform, research and development while enhancing its international presence in multilateral frameworks.

The strategy is backed by "Social principles of Human-Centric Al" centred on dignity, diversity and inclusion, and sustainability as well as the emphasis on multi-stakeholder collaboration. With the anticipated risks and negative ramifications associated with AI, Japan's 2019 strategy devoted a chapter on the role of ethics which builds on its Social Principles of AI. Japan's dissemination of the Social Principles of AI is in concert with other similar initiatives at the G20 Trade and Digital Economy Ministers' Meeting and the International Conference of Data Protection and Privacy Commissioners, as well as parallel efforts at the UNESCO and G7. Japan's rulemaking goals on the emerging AI landscape culminated during its hosting of the G20 Summit in 2019. In the months leading up to the multilateral conference, Prime Minister Abe claimed that the G20 Summit would be the "summit that started worldwide data governance." At the World Economic Forum's annual conference in Davos, Abe proposed the Data Free Flow with Trust (DFFT) as the blueprint that will guide the process of laying down the rules and principles in the fast-emerging data-driven economy under the auspices of multilateral platforms such as the World Trade Organization (WTO).⁶⁴

During the G20 Summit, Japan formally unveiled the DFFT also known as the Osaka Track. As a centrepiece to its chairmanship, the Osaka Track aims to jumpstart the process of building consensus in establishing a framework that will guide the anticipated e-commerce and digital economy negotiations in the WTO. Under its proposed DFFT, Japan sets the stage for a deeper interrogation on how the power of data can be harnessed in the Fourth Industrial Revolution where the value of the trust will be the enabler to achieve interoperability to maximize productivity and achieve innovation.⁶⁵

In practice, DFFT attempts to carve out a more nuanced approach in qualifying data.⁶⁶ Data that are classified as personal—intellectual property or national security intelligence—must be restricted, while non-personal data like "medical, industrial, traffic and other most useful non-personal anonymous data" are allowed to cross borders under specific and agreed-upon conditions. As data serves as the building blocks of AI/ML technologies, DFFT will have a profound impact on the overall establishment of the AI ecosystem within and beyond the Asia Pacific.

2.2 Best Practices

Multi-stakeholder collaboration is a centrepiece of Japan's AI strategy from the early stages of conception towards its implementation. Throughout its interaction among all concerned stakeholders, the Japanese government walked the delicate balance between regulation and innovation as exemplified by the updated release of Governance Innovation 2.0.

2.2.1 Goal-based Governance

Like the first iteration, the latest Governance Innovation 2.0 champions a goal-based approach to governance that delineates a distinction between binding and non-binding guidelines.⁶⁷ At the roundtable discussion, METI stated that private companies are more inclined to accept non-binding guidelines which provide flexibility and adaptability in tackling the complex issues related to technology innovation and rules. Through a non-binding approach, a horizontal and goal-based type of governance has emerged where the goals of all concerned stakeholders are sought through public feedback channels.

Feedbacks are then incorporated during the formulation of guidelines and rules. Goal-based governance is largely influenced by the Agile Governance Framework which creates a feedback loop mechanism starting from the analysis of conditions and risks, goal setting, designing governance systems, and the implementation and evaluation of governance systems then cycling back to the re-analysis of conditions and risks.

2.2.2 Co-regulation

METI further stressed that goal-based governance is better equipped to address issues that existing laws cannot address due to the speed and complexity of technological innovation. The non-binding guidelines also allow companies to design solutions to address the gap between innovation and existing regulations. Last January 2021, METI published updated guidelines on how to operationalise AI principles. The guidelines – which include 14 high-level action targets – provide practical examples and recommendations which companies can use as fundamental references to implement AI principles. As the guidelines are not legally binding, companies are given flexibility to implement based on their clear-eyed assessments. Implementation is encouraged through the expectation that companies will establish an internal compliance system responsible for overseeing its AI monitoring.

METI also notes that converting legally non-binding principles into legally non-binding corporate governance guidelines is not an effortless task. Moreover, the lack of guidance on risk assessment also poses additional risks. In this regard, risk-based management must go hand in hand with goal-based governance based on the assumption that large and small companies may have varying responses in developing or employing AI guidelines.⁶⁸

2.2.3 Industry Outreach

Hard Infrastructure

The private sector has taken an active role in supporting the implementation of the country's AI Strategy. Key sectors like the automotive, robotics, and electronics sectors that will gain the most from AI have made significant investments in R&D through public-private partnerships.⁶⁹ High-profile Japanese companies such as Toshiba, Toyota, Fujitsu, Hitachi, and NEC are involved in various collaborations with government. For instance, Fujitsu, NEC, and Toshiba have collectively partnered with the Ministry of Education, Culture, and Sports, Science, and Technology to establish RIKEN Center for Advanced Intelligence Project. In addition, Toshiba, Fujitsu, and NEC are also engaging with other international companies like Microsoft and other governmental organisations.

Key automotive players like Toyota, Honda, and Nissan are investing heavily in the development of self-driving cars. Toyota established the Toyota Research Institute to advance research on facial, behavioural, and speech recognition. Honda is collaborating with the Chinese company SenseTime to develop deep learning and image recognition. while Nissan has struck a partnership with NASA to develop sensors and software for self-driving robot cars. The automotive sector has also established the Alliance Venture, a collaboration between Mitsubishi Motors, Renault, and Nissan that invests in startups that are developing promising technologies and businesses.⁷⁰

Notable developments in the Robotics sector include Mitsubishi Electric's Maisart research program which involves the development of deep learning and reinforcement learning. So far, the practical application includes the predictive capacity to detect signs of machinery failure. Hitachi is using robotics to provide a unique customer experience where customers can navigate, communicate, and interact in virtual reality. FANUC is also active in the robotics industry, specialising in industrial robots and factory automation. Together, Hitachi and FANUC established the Intelligent Edge Systems (IES) where AI is used as an intermediary between cloud and robotics for cyclic real-time control.⁷¹

Soft infrastructure

As mentioned above, multi-stakeholder collaboration is a fundamental pillar of Japan's AI strategy and policy blueprint. A concrete demonstration of this public-private partnership is the ongoing collaboration between METI, private companies, academic institutions, and civil society organizations including the World Economic Forum (WEF) Japan. WEF Japan has been actively convening members from the Japanese public and private sector to maximize the impact of AI through the advancements of rules and regulations that underpin information management to promote economic growth while ensuring data privacy and security. Japan's continued engagement with various stakeholders has made incremental progress in the advancements of rules and regulations management to promote economic growth while ensuring information management to promote economic growth while ensuring information management to promote economic growth while ensuring information management to promote economic growth while ensuring data privacy and security. Staying true to the core elements of its DFFT model—human rights, specific public interests, and considerations for data holders—Japan is striking a balance between openness and trusted mechanisms for the exchange of data control and management.⁷²

Given its ongoing consultation among Japanese stakeholders, WEF Japan has proposed the Authorized Public Purpose Access (APPA) framework to achieve a relatively high degree of trust in data management even without opt-in consent.⁷³ Defined broadly, APPA considers data not as merely shared assets but from the viewpoint of data distribution architecture where trust and the protection of human rights and societal interests are the paramount criteria. Data use is contingent on the importance of the intended purpose, method, or level of anonymisation and the identity of the user. In practical terms, under APPA, consent anonymisation can be waived for certain data, purposes, or users subject to specific conditions.⁷⁴ For instance, if data is important for public safety and protection of human life, and more generally, the handling of data has clear benefits to the entire society. Furthermore, the APPA-based framework only authorises trusted public and private sector companies. The feasibility of the APPA framework remains to be seen given the sensitivity surrounding the consent and strong buy-in from the public. A possible way for APPA's implementation might be contingent on existing data governance regimes such as the GDPR and the APEC-CBPR.

2.2.4 Incentives

In late 2021, the current Japanese government announced funding worth 100 billion Yen (US\$ 779,560,000) to accelerate R&D of several key advanced technologies such as AI, 5G, quantum technology, biotechnology, and robotics.⁷⁵ The funding is allocated to Japanese companies and universities to encourage domestic innovation and attract global talent due to fierce global competition on AI.⁷⁶ The current funding adds to existing incentive mechanisms and programs in Japan that range from national, prefectural, and municipal levels.⁷⁷

At the national level, foreign companies are offered tax deductions, industry assistance, and single contact points across relevant ministries as part of ease of doing business. Incentives to attract highly skilled professionals are also available. For instance, Japan External Trade Organization has set up the Invest Japan Business Support Centre and deployed its international experts to help foreign companies to expand or establish a base. The Government of Japan and the Tokyo Metropolitan Government established the Tokyo One-Stop Business Establishment Centre that offers similar assistance for overseas affiliated or venture companies in Japan. Japan has also launched accelerator programs like the Accelerator Program Fintech Business Camp Tokyo, which acts as a matchmaker to introduce Tokyo companies to foreign companies who are working on advanced technologies like Al, Blockchain, VR/AR, IoT, and robotics,⁷⁸ while the Tech Business Camp Tokyo targets foreign startup companies to come to Tokyo and understand the uniqueness of the Japanese market and the needs of companies.

2.3 **Opportunities**

Guided by the AI strategy's long-term vision of leveraging AI to ease Japan's political, economic, and societal challenges, a whole of society approach to AI development is unfolding. These developments serve as the backbone for Japan's realisation of Society 5.0 which can alleviate its anxieties due to the declining demographic population while positioning itself as a viable player in the practical applications of AI. The road to digitalisation is promising if the Japanese government continues or upgrades its investment in R&D that includes AI while also leveraging the dynamics of bottom-up and top-down policymaking and strategy implementation.

2.3.1 Effective Public-Private Partnerships

Japan's use of soft and hard infrastructure offers a promising model that promotes innovation without undermining basic social principles. The Japanese government harnesses the distinct strengths and weaknesses of the private sector and academia to elevate Japan's Al competitiveness. Japan has achieved strong public-private partnerships which has resulted in the creation of multiple research facilities.⁷⁹As a result of such a tight partnerships, Japan has made progress in key areas of computer vision, machine learning, speech processing, natural language processing, transportation, and communication. Simultaneously, Japan's partnerships with civil society and academic organizations has also contributed to profound exploration of the flexibility and effectiveness of non-binding rules and guidelines to safeguard fundamental laws and social principles to avoid unintended effects of Al development.

2.3.2 Venture Capital Growth

Considered as a "unicorn-free venture backwater", Japan is catching up with its fierce competitors in the region like China as a preferred partner among foreign investors. In 2021, the country attracted major investments from local and international investors including Sequoia, Soros Capital, Founders Fund, and Vision Fund among others.⁸⁰ The prominent SoftBank Group Corporation, for example, is changing its tone, echoing that the increasingly complicated environment in China has forced investors to reconsider Japan. Moreover, the current political climate under the new Kishida administration, which supports digital transformation as one of its key strategies, provides a fertile ground to sustain growth and attract more startup investments.⁸¹

2.3.3 AI Chips

Japan aims to revive its semi-conductor industry which will be essential to its future economic growth. As global competition for the prized chips—which are central to advancing computing power to develop AI technologies—heats up, Japan aims to regain its position in the memory-chip-making landscape, making it a national mission. Japan will invest approximately US\$9 billion to attract overseas foundries like the Taiwan Semiconductor Manufacturing Corporation (TSMC) to boost its domestic chip industry. Under the proposed plan a joint-development project between TSMC and 20 Japanese firms will convene in Tsukuba.⁸² TSMC will also set up a subsidiary near Tokyo to further expand its research in developing energy-efficient and 3D chips.⁸³ If successful, Japan is poised to fortify further its competitiveness in the AI market with the production of a new generation of hardware that can possess significant computational power with greater efficiency.

2.3.4 AI for Social Good

A promising area for Japan that may bridge the commercial and regulatory considerations for AI development is the umbrella framework of "AI for Social Good" that could further advance the goal of transparency, reliability, trustworthiness, and interoperability in AI technologies. AI has the potential to improve natural disaster response and mitigation against earthquakes or typhoons and even prepare or predict future disasters.⁸⁴ For instance, modelling and simulation can improve disaster preparedness that allows local communities to prepare and recover in the aftermath of a Tsunami. The use of the so-called Tsunami-Scenario Bank, a pre-computed database that catalogues tsunami incidents can help project tsunami inundation to predict coastal tsunami heights.⁸⁵ Using sensors, data assimilation can help simulate tsunami wavefield data. While real-time forward simulation is critical to emergency response efforts because it can forecast tsunami inundation and estimate the damage of tsunami.

2.4 Challenges

Although the country has achieved significant progress, outlined below are key areas where Japan continues to encounter challenges in implementing Society 5.0:

2.4.1 Talent shortage

The dearth of AI talent is a critical concern for Japan to sustain its AI momentum. METI predicts that talent shortage in Japan will reach a staggering 120,000 by 2030.⁸⁶ To start filling in such gaps, the government has launched internationalisation of education programs such as foreign exchanges and issuance of special working visas. Instinctively, Japan may only want to forge a partnership with more AI-advanced countries like the US and China, but in undertaking this path, it might be beneficial to explore other countries in the region.

2.4.2 Legal and Ethical Challenges

Japan is still at the nascent stage of crafting a legal framework that could facilitate the establishment of a data-sharing platform. As an initial pilot under the Strategic Innovation Promotion Program (SIP), the Japanese government has introduced the AI Hospital System to circulate data related to health, medical care, and welfare between public and private domains. The system can be used as a model for a high-security data system that ensures access while maintaining confidentiality.

As extensively discussed in this chapter, Japan has designed efforts to ameliorate the challenges of technology and innovation outpacing law and policies. At the centre of this binary between regulation and innovation is the need to promote a human-centric approach to account for legal and ethical principles not just as an afterthought but intrinsic throughout the AI development lifecycle. The DFFT and the Social Principles of Human Centric AI demonstrate Japan's commitment to an ethical and trustworthy approach to AI. But aside from building trust, the human-centric approach should also embody cultural sensitivities that are akin to the local context.

2.4.3 Trustworthy AI Operationalisation

Japan shares similar challenges of sustaining a nationally consistent approach to AI as well as increasing industry adoption with other countries in the region. As previously noted, operationalisation is more difficult when it relates to smaller companies or startups which have limited resources. Furthermore, the regulatory and market culture in Japan which tends to favour traditional routes of initial public offering or merger and acquisition can create a challenging landscape for startups to flourish.⁸⁷ Participation of startups should be encouraged in the unfolding debates in Trustworthy AI frameworks as they bring new perspectives to an evolving industry.

2.5 Prospects for Collaboration

Japan is still the number one supplier of industrial robots and ranks third behind China and the US in AI R&D.⁸⁸ Toshiba has Japan's biggest AI patents, and holds the third spot in the world, trailing behind IBM and Microsoft. Given the strong footing of the Japanese government in diplomatic rulemaking in regional and multilateral avenues, combined with the growing competitiveness of Japanese companies in AI across the globe, it can leverage these strengths to underwrite both the soft and hard infrastructure of the AI ecosystem. During the roundtable discussion, METI shared that Japan is pursuing a layered structure that cuts across its regional and international collaborations marked by common themes:

- 1. Goals/Principles that are aligned with OECD that emphasizes security and privacy protection, fairness, accountability, transparency, etc.
- Horizontal and immediate-type rules and AI governance guidelines are general and not legally binding but align with international standards which are similar to the EU, Singapore, and Japan.
- 3. For more specific rules, Japan adheres to a sectoral approach that resembles those of the US.

These major themes fuel Japan's international rulemaking as exemplified through its initiatives below. But in parallel to the issuance of non-binding guidelines and principles, Japan is also persistent in using economic and trade agreements as tools for stronger enforcement.

2.5.1 Domestic

Japan's three most prominent research institutes concentrating on AI are the Artificial Intelligence Research Center (AIRC), Riken-Advanced Intelligence Project (AIP) and the AI Science and Promotion Center based at the National Institute of Information and Communications Technology (AIS). Each institute specialises in different areas. AIRC focuses on AI applications in the private sector from mobility, healthcare, productivity, and infrastructure. AIP specialises in the general AI technologies and has longstanding collaboration with NEC, Toshiba, and Fujitsu. While the AIS concentrates more on various aspects or subsets of AI like neuro computing, data knowledge integration, natural language processing and multilingual translation, and multilingual speech processing.⁸⁹ Through government funding, the three institutes are seen as the main links between universities, industry as well as international organisations mainly based in Europe and England. At the university level, the Japanese government also sponsors students and staff exchanges through scholarships in key institutions like the University of Tokyo.

2.5.2 Bilateral/Regional/Multilateral

Data Free Flow with Trust (DFFT)

On a more granular level, the launch of the DFFT or Osaka Track in 2019 has also jumpstarted the process of building consensus in establishing a framework on data that will guide ecommerce and digital economy negotiations in the World Trade Organization. Japan views the value of trust as the enabler to achieve interoperability to maximize productivity and achieve innovation that involves the cross-border flow of data.⁹⁰ This means that countries who rely on an open, rules-based global trading system must agree on common principles on electronic commerce and data flow. For Japan to succeed in institutionalising broader reforms on the global digital economy, Japanese policymakers are faced with the arduous task of socialising WTO member states towards creating a framework on data governance using DFFT as a starting reference.

EU-Japan Economic Partnership Agreement

Japan and the European Union entered into a free-trade agreement in 2017 which aimed to remove old non-tariff obstacles across different exports. Through the EU-Japan Centre for Industrial Cooperation, the European Commission and the METI can advance all types of industrial, trade, and investments including technological capacities. The agreement also touches on data protection which allows the free flow of data between. Japan's data protection system is considered "equivalent" to the EU's General Data Protection Regulation.⁹¹ The pact which establishes one of the world's biggest data zones will enable Japan and the EU to explore the full extent of their AI R&D collaboration through their Moonshot program and Horizon 2020 respectively.⁹²

Comprehensive and Progressive Agreement on the Transpacific Partnership (CPTPP)

Aside from the WTO, Japan is also determined to concretely demonstrate the specific principles of DFFT using the e-commerce and digital trade provisions embedded in the CPTPP. In essence, the DFFT principles are iterations of the CPTPP aimed at raising the regulatory governance on data management to protect intellectual property and strengthen cybersecurity. CPTPP provides Japan with the leverage to shape the preferences of participating economies in the Asia Pacific by adopting the high standards on e-commerce and digital trade while promoting cross-border data flow and mitigating the advent of data sovereignty.

The CPTPP serves as a neutral venue to devise compatibility mechanisms to implement a more stratified approach to personal and non-personal data that may persuade CPTPP members to enact data policies that prefer a more open and interoperable model rather than adhering to rigid data localization policies.

Japan can leverage its convening power across these international initiatives to employ its rule-making strategy on AI principles. Trade agreements like the CPTPP have stronger enforcement capacity where human-centric AI can be socialized among its signatories. With Japan's rule-making diplomatic bandwidth plugged in across these regional and multilateral frameworks, it can co-create as well as test rules and guidelines while learning from the experiences of other countries. Through constant and sustained interaction, Japan's AI strategy and approach becomes enmeshed into the social fabric of regional and international AI policymaking which can be adapted eventually into legal frameworks and international standards.

Asia-Pacific Economic Cooperation (APEC)

Japan is a founding member of the APEC which was established in 1989. Today, twenty-one APEC member economies jointly work towards the realization of free and open trade and investment in the region.⁹³

One of APEC's key working groups is the Policy Partnership for Science, Technology and Innovation (PPSTI), which is dedicated to "support the development of science and technology cooperation as well as effective science, technology, and innovation policy recommendations in APEC through collaboration between government, academia, private sector and other APEC fora."⁹⁴

APEC has been effective on regional economic integration, acting as an incubator for new trade policy approaches.⁹⁵ The forum provides a strong foundation for regional cooperation on AI related issues.

2.5.3 Global

Global Partnership on AI (GPAI)

Japan is a founding member of the GPAI, an international initiative that fosters "humancentric" development and use of AI under the auspices of the OECD AI Principles.⁹⁶ Japan joins the US, Australia, South Korea, Singapore, India, European Union, Slovenia, Italy, Mexico, the United Kingdom, and the European Union in bridging the theory and practice on AI through leveraging research and partnership across a wide range of stakeholders. Upon its inception, GPAI aimed to establish a working group focused on (1) Responsible AI; (2) Data Governance; (3) Future of Work and (4) Innovation and Commercialisation.⁹⁷ GPAI dovetails with Japan's ongoing efforts to support the implementation of the G20 AI principles which were conceived during the G20 Ibaraki-Tsukuba Ministerial Meeting on Trade and Digital Economy.

In 2019, Japan also chaired the Council for Social Principles of Human-centric AI which closely aligns with the OECD AI Principles. The meeting discussed the Social Principles of Human-centric AI, Draft AI R&D guidelines for international discussions, and the Draft AI Utilization Principles.⁹⁸



Chapter 3: South Korea



3.1 Introduction to South Korea's AI Landscape

In 2019, South Korea published its National Strategy for AI with the vision 'AI for everyone, AI for everything' focusing on three major areas: a. the establishment of a global-leading AI ecosystem; b. full-scale implementation of AI; and c. creating harmony and coexistence with AI. Since then, it has made significant strides towards accomplishing these goals. This section gives an overview of the digital landscape that exists as a backdrop for South Korea's AI development. Specifically, it will cover the Korean New Deal, alongside the digital, economic, and human rights policies that are relevant to Korea's development of its AI framework.

Announced in July 2020, the Korean New Deal plans to transform the Korean economy in three ways, making it: greener, digitalised, and having a stronger safety net. As part of the Korean New Deal, the Digital New Deal will see 58.2 trillion won (USD\$49 million) invested to accelerate the transition towards a digital economy. The investments will focus on the integration of data, network, and AI throughout the economy.⁹⁹ Relevant to the development of AI in the country, the Data Dam project will focus on maximising data utilisation in order to create innovative AI services by encouraging big data sharing on a public scale.¹⁰⁰ More recently, in August 2021, the Korean government released a refreshed Digital New Deal 2.0, increasing the scope of the deal to include frontier technologies that are helping to usher in a "hyperconnected" digital era. It identifies specific target areas such as the metaverse and blockchain.¹⁰¹

The Personal Information Protection Act (PIPA) and its independent body, the Personal Information Protection Commission (PIPC), regulate the use of personal data and coordinate the different approaches of processing personal data across other governmental agencies. Regarding fintech, the Financial Services Commission (FSC) regulates credit information and has put in place policies related to the usage of data. Examples include the K-New Deal Fund, which applies to the aforementioned Korean New Deal,¹⁰² and policies regarding fintech. Finally, Korea's digital landscape is also influenced by the National Human Rights Commission and its cooperation with the United Nations and other international bodies, such as the Asia Pacific Forum (APF) and the International Criminal Court (ICC).¹⁰³

In 2020, South Korea revealed its first set of guidelines for ethical AI standards: "AI for Humanity".¹⁰⁴ While the guidelines are non-legally binding, they apply to all AI sectors such as government institutions, private companies, and individuals. The guidelines are built on the three main principles of human dignity, public benefit, and the rightful purpose of technology. Additionally, 10 essential factors are meant to be considered to realise the three principles: human rights, privacy, diversity, infringement, pursuit of greater good, solidarity, data management, responsibility, safeness, and transparency.

Korea has adopted a non-binding framework under its National Strategy for Artificial Intelligence. While the document details nine strategies to fulfil the national strategy, for the purposes of this report we will analyse below two strategies which specifically relate to AI governance.¹⁰⁵ They are: Drastic Regulatory Innovation and Revision of Laws and Preventing Dysfunction and Establishing AI Ethics.



3.2 Best Practices

3.2.1 Drastic Regulatory Innovation and Revision of Laws

This strategy focuses on enabling an environment where companies and developers can innovate without limitations. To do this, the government acknowledges the need to revise its existing regulatory system. This requires adapting existing regulations which can apply to new technologies as well as implementing new regulations where necessary. The strategy involves two tasks: a) shifting the regulatory paradigm in the AI field; and b) establishing a future-oriented legal system which is conducive to the era of AI.

Shifting the regulatory paradigm in the AI field

The main aim of this task is to transition from explicatory to principles-based models of regulation. It supports the transition from a system which authorises some options to the prima facie prohibition of others, to a model which permits generally, but prohibits specific technologies on an exceptional basis, establishing a comprehensive negative list roadmap. An "approve first and regulate later" approach is encouraged which is adaptable to the technological fast pace. This is implemented through flexible regulation and a regulatory sandbox. The former adds to the negative list, and the latter provides an environment for items to be implemented, albeit with close monitoring and follow-ups, thus supporting the market launch of solutions despite the existing laws and regulations, where the lives and safety of people are not at high risk.

The items within the sandbox are also further separated into the categories of special cases and temporary permission, with the prompt checking of regulations. Some examples include: Kakao Pay, a mobile e-notice for public institutions (temporary permission); and Huinno, a monitoring device used in the healthcare sector, (special permission). Furthermore, industry outreach is provided through close support by the governing body. This includes commercialisation consulting and the prioritisation of patent applications through programmes designed for startups and SMEs.

Establishment of a future-oriented legal system in the era of AI

This task aims to prepare a framework for legislation that presents a national strategic direction, including basic values and principles of the AI era, and measures to prevent dysfunction. The main contents of the framework, which is still being drafted, consist of:

- Basic principles of pursuing national and social development, sharing benefits and opportunities of economic growth in a comprehensive manner, etc.
- The Establishment of the basis for intelligent informatisation by fostering related industries through:
 - technological development support,
 - the nurturing of human talent,
 - the support for industrialisation and commercialisation, and
 - data policy regulations
- Countermeasures against environmental change in the job and labour environment.
- Ethical standards: Preparing grounds for new ethical standards, preventing infringement on privacy and personal information.
- Minimal protection measures: Establishing minimum protection measures (kill switches) for securing safety and reliability for each new technology and service.

Task	Regulation System	Best Practices	Challenges
Task 1: Shifting the regulatory paradigm in Al field	Flexible legislation	Operates under the basic principle "approval first and regulate later". Technologies are generally permitted, unless they are classified under a "negative list".	Implementing the right safeguards to ensure trust in Al. New legal issues by sector present themselves while industries innovate and produce
	Regulatory sandbox	Allows for innovation and the launch of technological solutions if these do not harm the lives and safety of the people.	technologies within the regulatory sandbox.
Task 2: Establishment of future-oriented legal system in the era of AI	Framework legislation	Potential implementation of a new legislation to address the new Al era. Adopting a sectorial approach.	The new regulatory system can impose new legal issues such as whether to grant legal status to Al. These legal issues may vary from sector to sector.

Table 1. Evaluation of the Drastic Regulatory Innovation and Revision of Laws¹⁰⁶

3.2.2 Preventing Dysfunction and Establishing AI Ethics

The South Korean government recognises that the nascent field of AI presents specific challenges and risks requiring new ways of tackling them. This strategy proposes an AI code of ethics creating a safer environment for dysfunction and security threats. The strategy involves three tasks: a) innovation of intelligent information protection; b) prevention of AI dysfunction; and c) establishment of AI ethics.

Innovation of intelligent information protection

To prepare for the potential risks arising from the increasing adoption of AI, South Korea has been focusing on advancing its cyber threat response systems based on intelligent technologies like AI. Some of the commissioned works to innovate intelligent information protection technologies utilising AI include: developing AI-based information protection technology and intelligent video security technology.¹⁰⁷

In addition to improving its AI capabilities, South Korea will also establish a government-wide collaboration system to tackle AI dysfunction. In 2020, it started building the 'Information Protection AI Learning Support Center' to provide comprehensive consulting services for the private sector.

Prevention of AI dysfunction

As a prevention against potential AI dysfunction, establishing an inter-ministerial cooperative system is encouraged. This involves an ongoing process of developing innovative technologies to respond to new challenges, such as identifying and detecting deepfakes.

Establishment of AI ethics

This task focuses on encouraging more cooperation on the global level to work on challenges involving AI ethics, as well as establishing standards that are consistent with the global norms. To create an AI code of ethics, based on social debate and consensus, the government established the Policy Center within the Korea Information Society Development Institute (KISDI) in 2019. This mid- to long-term policy-making system serves to protect the interests of AI users. South Korea has also recently implemented more initiatives focusing on the education of AI ethics.

3.3 **Opportunities**

3.3.1 Metaverse

The Seoul Metropolitan Government (SMG) announced in November 2021 that it will be the first major city to enter the metaverse. Initially called 'Metaverse Seoul', it intends to create a virtual communication ecosystem for all areas of its municipal administration. The city has invested KRW3.9 billion into the project. The SMG will consecutively provide various opportunities for businesses to join its metaverse platform, including the Virtual Mayor's Office, Seoul FinTech Lab, Invest Seoul and Seoul Campus Town.¹⁰⁸ As the metaverse progresses as a reality, new opportunities for collaboration between the government and industry is likely to arise.

As one of the first cities to actively invest in this space, there is an opportunity for the Metaverse Seoul to model its developments to other cities and countries in the region, as well as globally. Most importantly, the metaverse brings new ethical, legal and social considerations which will need to be carefully considered. Seoul, being one of the pioneering cities in this area, would be in a good position to initiate discussions on what policies and principles underpin the metaverse.

3.3.2 Strong Foothold in Tech-Related Industries

The country's strong foothold in the semiconductor, automotive, electronics, and robotics industries helps in strengthening its AI industry as well. The presence of international technology companies like Samsung, LG, and Hyundai contribute to South Korea's increasingly visible AI potential.¹⁰⁹ It is important to highlight that there is a local tendency to invest in AI for 'incremental innovation' rather than 'disruptive innovation', which can be detrimental, especially considering the nature of AI as a new disruptive technology. To address this issue, leaders are encouraged to place efforts - strategically, financially, organisationally – to adopt and implement AI. It also remains a priority to continue supporting industry through collaborative initiatives. Potential strategic partnerships between government and the private sector can continue to strengthen their domestic trustworthy AI ecosystem.

3.3.3 Compendium of Use Cases

In establishing guidelines for trustworthy AI, in December 2019, South Korea released a practical guide for industry based on international recommendations from the OECD of inclusivity, human-centricity, transparency, security, and accountability.¹¹⁰ The paper guides AI development based on these principles, acknowledging different roles in the AI ecosystem which contribute to implementation and assigning accountability accordingly. Ensuring accountability, one of the main guiding principles of trustworthy AI, remains a challenge for most governments around the world. The practical guide is a starting point for South Korea in finding the right approach in respect of accountability.

3.3.4 Investment in education

South Korea has been significantly investing to strengthen its AI research capabilities in the last few years. The Kim Jaechul Graduate School of AI at Korea Advanced Institute of Science and Technology, a.k.a., "KAIST AI" is a recipient of many recent investments. Established in 2019, it is the first university in South Korea to offer postgraduate degrees in Artificial Intelligence.¹¹¹ As we have discussed throughout the report, education plays a major role not only in encouraging innovation, but in shaping the development of AI in a trustworthy manner.

3.3.5 AI semiconductor industry

The government has increased the support for next-generation chip companies like Samsung Electrics and SK Hynix in a bid to compete globally in the semiconductor industry. It plans to significantly invest in this industry over the next decade, viewing it as crucial in automating factories and improving the competitiveness of the country's exports.¹¹² By supporting the semiconductor industry, the government is actively strengthening an essential part of South Korea's digital private sector, and therefore this support is also an investment in the AI ecosystem.

3.4 Challenges

3.4.1 Trustworthy AI Operationalisation

Although conversations and developments on Trustworthy AI have matured in South Korea in the last two years, industry implementation remains a challenge. In July 2021, Korea FSC (Financial Services Committee) and FSS (Financial Supervisory Service) together announced 'AI Guidelines in Financial Services'¹¹³ which guides industry on the responsibility, accuracy and safety, transparency and fairness, and consumer rights relating to AI systems. The initiative resembles Singapore's project in the financial services "Veritas" and it shows a tendency to adopt a similar sector-specific approach to AI, although in very early stages. ¹¹⁴ In Singapore, the Veritas project is in its second phase, with a focus on use cases, a helpful approach which could also be encouraged in South Korea to address the challenge of operationalisation.

There are many issues which might impact Trustworthy AI implementation such as the political landscape, the relatively early stage of AI adoption and the cultural context relating to ethics in each country. It is important to highlight the importance of collaboration for the South Korean context. On this note, in addition to the need to increase collaboration between academia and industry, it needs to be an investment to widen the collaboration with other countries in the region and globally.

3.4.2 Insufficient safeguards to ensure trust

South Korea's initiatives on flexible regulation and regulatory sandbox places the country in an advantageous position to best respond to ethical and legal challenges involving AI. However, like most other countries that have started early on their AI journey, the government will need to maintain a balance while implementing the right safeguards to ensure trust in the AI era. As the nation experiences this shift relating to their regulatory system, new legal challenges are also likely to arise, and it will remain crucial to adopt a flexible approach. Beyond these legal challenges, it is important that adequate education on this paradigm shift is provided to stakeholders at the same pace as which these changes are occurring.

3.4.3 Digital divide

Similarly, to other countries in the report, one of the challenges for South Korea is to ensure that the benefits of AI are extended to all parts of its population, society and economy. Despite South Korea's strong sectorial foothold and its investment in AI, the long-term growth of its AI ecosystem could be hamstrung by the lack of support for startups and smaller companies. Similarly, to Japan, South Korea's initiatives and funding are still significantly concentrated in the activities of the major technology incumbents already in the industry.¹¹⁵ One way to address this challenge is by increasing the support of startups in the regulatory sandbox. For instance, apprenticeship programs could be implemented, where potential startups and talents partner with leaders in the relevant established sectors (as seen in Singapore's AIAP¹¹⁶ and 100 Experiments¹¹⁷ programmes).

3.5 Prospects for Collaboration

3.5.1 Domestic

Improving Trustworthy Data Flow

South Korea's AI Open Innovation Hub provides SMEs, venture companies, individual developers and researchers with crucial resources which allows them to innovate with AI.¹¹⁸ It aims to stimulate an open and cooperative AI development environment by supporting the development and implementation of the technology.¹¹⁹ The hub discloses public data applicable to various sectors and provides a repository of use cases for users to explore and learn from. Furthermore, it also provides a set of contests to incentivise participation. The hub illustrates South Korea's efforts in promoting a viable environment for AI and tech-related SMEs to flourish.¹²⁰ Through this hub, the government ensures that the data collected and shared is based on trustworthy foundations. This promotes the use of a reliable stream of data, that is legal and safe, for the development of AI solutions.

This hub forms part of the Data Dam Project announced in September 2021 by the Ministry of Science and ICT (MSIT). The Data Dam collects data generated through public and private networks and standardises, processes, and utilises the data for consumption from AI-related industries. It aims to create jobs through innovation in existing industries and innovative services. The five-year project consists of seven sub-projects: building data for AI training, AI voucher, AI data processing voucher, AI convergence (AI+X), cloud flagship, cloud use voucher, and establishment of big data platforms and centres.

Public-Private Roundtable Meetings

The Ministry of Science and ICT (MSIT) recently held the first series of CEO-level AI strategy talks with chief executives from Naver, Kakao, Samsung, and Telcos. It plans to hold its AI strategy roundtable meetings regularly every six months. Topics to be covered include AI semiconductor and cloud development, public-private collaboration in fostering AI talents, digital healthcare, and AI robot-driven services. The government acknowledges its limited resources when compared to the United States and China and believes that under a strategic public-private alliance, it will be able to concentrate its resources and compete through a coordinated effort.¹²¹ As we have seen in various examples, the public-private collaborative structure is essential in formulating trustworthy AI frameworks. While policy makers have regulatory interests in mind, the private industry is at the forefront of the AI landscape, and thus appropriately able to contribute feedback on the strengths and weaknesses of guidelines.

3.5.2 Bilateral/ Regional/Multilateral

Korea-Singapore Digital Partnership Agreement (KSDPA)¹²²

On 22 June 2020, Singapore and South Korea began negotiations on the KSDPA. The agreement aims to deepen bilateral cooperation in emerging digital areas. This enables greater access, connectivity, and opportunities between the two countries and related businesses, which rely on trusted data flows. It also seeks to deepen bilateral cooperation with regards to AI governance frameworks, especially in the spheres of fintech and digital identities.

South Korea to join Digital Economy Partnership Agreement (DEPA)¹²³

On 6 September 2021, South Korea and Singapore entered negotiations regarding South Korea's accession to the DEPA, a digital trade agreement among Singapore, New Zealand, and Chile. South Korea intends to establish rules on digital trade and strengthen cooperation between Korea and the countries involved. Such rules will cover end-to-end digital trade, secure data flows, and build trust in digital systems in order to facilitate opportunities for participation in the digital economy. In a press conference related to this agreement, South Korea's Trade Minister Yeo Han-koo suggested that prospects for collaboration will include discussions with Australia, United States, Singapore, and New Zealand.¹²⁴

Certain prospects of collaboration also exist outside of these agreements. On 13 September 2021, South Korea proposed a new pact on digital trade with ASEAN counterparts to strengthen economic ties.¹²⁵ It was also stated that this agreement could be built on a structure similar to that of the already existing DEPA.

Asia-Pacific Economic Cooperation (APEC)

South Korea is a founding member of the APEC which was established in 1989. Today, twenty-one APEC member economies jointly work towards the realization of free and open trade and investment in the region.¹²⁶

One of APEC's key working groups is the Policy Partnership for Science, Technology and Innovation (PPSTI), which is dedicated to "support the development of science and technology cooperation as well as effective science, technology, and innovation policy recommendations in APEC through collaboration between government, academia, private sector and other APEC fora."¹²⁷

APEC has been effective on regional economic integration, acting as an incubator for new trade policy approaches.¹²⁸ The forum provides a strong foundation for regional cooperation on AI related issues.

3.5.3 Global

Global Partnership on AI (GPAI)

In June 2020, South Korea joined the GPAI that aims to seek human-centric development and use of artificial intelligence, grounded in human rights, inclusion, diversity, innovation, and economic growth. It has dispatched scientists and engineers from Korea Advanced Institute of Science and Technology, the Korea Information Society Development Institute and SK Telecom to take part in the working group discussions, playing an active role in the global development of AI guidelines.¹²⁹

OECD Council Recommendation on AI

The Organisation for Economic Co-operation and Development (OECD) supports governments by measuring and analysing the economic and social impact of AI technologies and applications and engaging with stakeholders to identify good practices for public policy. The OECD Principles on Artificial Intelligence promotes AI that is innovative and trustworthy while respecting human rights and democratic values. They were adopted in May 2019 by OECD member countries when they approved the OECD Council Recommendation on Artificial Intelligence. As part of OECD's 36 member countries, South Korea joined the OECD Principles on Artificial Intelligence.¹³⁰



Chapter 4: Australia

4.1 Introduction to Australia's AI Landscape

Australia's AI landscape is largely dependent on and being developed according to three key reports: the Artificial Intelligence Roadmap (Roadmap), the Ethical Framework Discussion Paper (Discussion Paper) and Australia's Digital Economic Strategy (Digital Strategy). This is supported by government plans and related reports detailing AI developments in the country. Recently, there have also been developments in data management and data privacy, including the enactment of legislation and introduction of data-centered bills into parliament relevant to AI policy and development.

The Federal Government's AI policy documents established the improving of quality of life and productivity as a focus for Australia. Three key factors in the Discussion Paper highlight this:¹³¹ (a) the economic benefits of development; (b) the regulation of AI inclusive of ethical considerations and (c) the upskilling and strong technology infrastructure recommendations. The analysis of these three factors culminated into establishing specific objectives in Australia.

One of the most significant contributions of the Discussion Paper in Australia is the enactment of eight ethical principles identified as:

Principle	Meaning
Human, societal, and environmental wellbeing	AI systems should beneficial, this is linked to UN's SDG's
Human-centred values	Al systems should respect human rights, diversity, and the autonomy of individuals. This corresponds to adhering to the values of Australia's representative democracy as the Al in being applied in a democratic society.
Fairness	Al systems should be inclusive and accessible and should not involve or result in unfair discrimination against individuals, communities or groups.
Privacy protection and security	Al systems should respect and uphold privacy rights and data protection and ensure the security of data.
Reliability and safety	AI systems should reliably operate in accordance with their intended purpose
Transparency and explainability	There should be transparency and responsible disclosure so people can understand when they are being significantly impacted by AI and can find out when an AI system is engaging with them. The relevant stakeholders are identified in the ethics document.
Contestability	When an AI system significantly impacts a person, community, group or environment, there should be a timely process to allow people to challenge the use or outcomes of the AI system.
Accountability	People responsible for the different phases of the AI system lifecycle should be identifiable and accountable for the outcomes of the AI systems, and human oversight of AI systems should be enabled.

As part of the 2021 Report,¹³² Australia, similarly to Singapore, fully considers the Unified Principles¹³³ in the region:

Table 2. Comparison of AI principles in APAC

- Fully Considered
- O Partially Considered
- Not Presently Considered or in Development

Principles	China	Australia	Singapore	New Zealand
Human-Centricity	0	•	•	•
Fairness	0	•	•	٠
Explainability	0	•	•	٠
Transparency	0	•	•	•
Privacy	0	•	•	•
Accountability	0	•	•	٠

To support the Discussion Paper, the government also published case studies¹³⁴ where the ethical principles were applied in large companies. The development highlights the importance of due diligence from the outset, encouraging organisations to adopt ongoing assessments and monitoring to address potential risks.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) was commissioned by the Australian Government to develop Australia's AI technology roadmap.¹³⁵ This roadmap looks at how Australia can build on its strengths to solve national challenges, grow the economy, and export AI-driven solutions. The roadmap, published in 2019, explores ways economic progress can be made by addressing specialisation areas to increase jobs and productivity, provide better quality of life, and drive a stronger economy. It also lays out strategies that can be employed in conjunction with the Discussion Paper to achieve strong outcomes, such as the upskilling of the workforce and increasing cybersecurity. The roadmap identifies three high potential areas for AI in Australia:¹³⁶

Area	Details
Natural Resources and Environment	Develop AI for enhanced natural resource management to reduce the costs and improve the productivity of agriculture, mining, fisheries, forestry, and environmental management.
Health, Ageing and Disability	Develop AI for health, ageing and disability support to reduce costs, improve wellbeing and make quality care accessible for all Australians.
Cities, Towns and Infrastructure	Develop AI for better towns, cities and infrastructure to improve the safety, efficiency, cost-effectiveness and quality of the built environment

More recently, as part of Australia's Artificial Intelligence Action Plan (Action Plan), the Australian government published an implementation plan related to the 2021-22 Al budget.¹³⁷ The plan comprehensively addresses the four growth areas targeted within the 2021-2022 financial year. With the allocation of \$124.1 million towards strengthening Trustworthy Al in Australia, the strategy supports Australia's goal in becoming a leader in the digital economy by 2030.

The first goal seeks to establish National Artificial Intelligence Centres as well as smaller Capability Centres to aid with the adoption of AI in business. This would ensure the competitiveness of businesses, increase investment in the industry and the commercialisation of AI. A similar hub, which focuses on supporting local AI innovators, has already been established in Brisbane, Queensland, as a Queensland state government initiative. The second goal prioritises regional collaboration and engagement revolving around AI technologies. Thirdly, a scholarship programme directed to educate both undergraduate and post-graduate students in AI specialised skills will be implemented with the overall goal of retaining graduates onshore. Finally, government and industry partnerships are encouraged as a targeted strategy. This set of objectives lays out a proactive plan to propel Australia and its businesses safely and successfully into the digital economy; equip the nation with strengthened AI capabilities; and support the development of integrated AI technologies.

It is also important to note that the Action Plan aligns with and is incorporated within the Digital Strategy.¹³⁸ The Digital Strategy aims to position Australia as a leader in the digital economy by 2030 by focusing on ensuring the right foundations are present allowing for positive digital economic growth, enhancing digital infrastructure, bettering skills and inclusion, increasing collaboration and improving cybersecurity. There will also be a heightened focus on building on the capabilities surrounding emerging technologies such as AI.

Australia has recently completed drafting an Intergovernmental Data Sharing Agreement (Data Agreement) facilitating data sharing between State and Territory, and Commonwealth government agencies.¹³⁹ This agreement is important and relevant to AI due to the fundamental importance of use and access to data to AI. Such agreements are relevant to the trustworthiness of AI, as they promote openness and transparency about how data is shared and protected across and between government agencies. The Data Agreement considers fundamental data sharing principles and limits depending on the context, as well as trust ideals which include: accountability, security, transparency and respect. The table below details the data sharing principles.¹⁴⁰

Data Sharing Principles	Interpretation
Project	data is shared for an appropriate purpose that delivers a public benefit
People	the user has the appropriate authority to access the data.
Settings	the environment in which the data is shared minimises the risk of unauthorised use or disclosure
Data	appropriate and proportionate protections are applied to the data
Outputs	the output from the data sharing arrangement is appropriately safeguarded before further sharing or release

A significant alignment exists among the above principles, the National Privacy Principles (or NPPs) and Australian Privacy Principles (or APPs) underpinning the Privacy Act (Cth) 1988.¹⁴¹

On 1 April 2022, the *Data Availability and Transparency Act 2022* (Cth) commenced, creating a new scheme for sharing Commonwealth Government data.¹⁴² The recent Act allows data to be shared, except for national security data and other recognised sensitive information such as health data relating to The Australian Digital Health Agency.

4.2 Best Practices

4.2.1 Industry outreach

While establishing the Digital Strategy and Discussion Paper, the Department of Industry, Science, Energy and Resources has engaged in a continuing consultation partnership with a variety of industries and stakeholders. Collaborators included: Commonwealth Bank, Telstra, Microsoft, National Bank of Australia (NAB), Insurance Australia Group and Flamingo Al.¹⁴³ While the implementation of the ethical principles is voluntary, they can guide industry to achieve better outcomes, while upholding higher ethical standards and good governance.

The federal government has also involved educational institutions in the development of these AI related governance materials. It has additionally increased support and scholarships to educate graduates in AI skills, encouraging upskilling.¹⁴⁴ Other initiatives, such as the recently published Australian Human Rights Commission's Human Rights and Technology Report¹⁴⁵ and the work of Standards Australia¹⁴⁶ encourage collaboration with industry in the process of developing a governance of AI in Australia.

4.2.2 Incentives

Scholarships and grants

As previously discussed, the Australian government has made financial grants, scholarships, and various funding opportunities available in the field of AI. Many of these scholarships are university based. In addition, the emerging scholarship programmes entitled the Next Generation AI Graduates, and the Next Generation Emerging Technologies Graduate Programme, are a result of a collaboration between the government, academy and industry partners.¹⁴⁷ The government anticipates funding around 480 scholarships through these programmes.¹⁴⁸ There are also other initiatives, including identifying AI as a research priority for the Australian Research Council (or ARC), operating more broadly than the PhD level.

The Australian Council of Learned Academies 2019 report on effective and ethical AI development¹⁴⁹ takes a well-rounded multi-disciplinary approach considering everything from the development of AI technology to its potential in Australia. The report studies the relationship between AI and employment, highlighting the need to upskill the workforce, offsetting potential job shifts as AI continues to impact the working environment. This was coupled with the acknowledgement of Australia's aging population, and the need for education to incorporate more transferable skills and science, technology, engineering, and mathematics disciplines. The report also acknowledged gender disparity as women are less represented in these sectors, giving rise to more gender inequality as technology advances. Undoubtedly, education has a significant role in how Australia can increase its strategies on encouraging employment equality, as well as preparing the workforce for AI disruption.

Enhanced online protection

Like most countries, Australia has no legislation specifically designed to regulate the use of AI. Yet, there are existing regulations that have the potential to intersect with the AI ecosystem outlining fundamental requirements for AI. These include the Corporations Act 2001 (Cth), financial and banking regulations and laws, and anti-discrimination acts (both enacted and upheld by the federal and state governments). But most importantly, the Privacy Act 1988 (Cth) details protections for individuals as it relates to collection, use, disclosure and right to access personal information, through regulating government and large organisations (those with greater than \$3 million AUD p.a turnover). The Act comprises 13 privacy principles, covering a variety of dealings with personal information such as crossborder disclosure of personal information, and disclosure of personal information.¹⁵⁰ In 2021, the Act was amended to enhance online privacy protection. These developments target social media corporations and their use of digital data, improving transparency when handling online data, and international data flow.¹⁵¹

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In the leadup to the amendment's introduction into parliament, discussion papers published by the government suggested that most changes and amendments are technology, digital and data focused. This amendment, and the Privacy Act generally, are separate from state/territory privacy laws and regulation. This results in state-to-state variations, often indicating contrasting nuances in privacy regulations between them.

4.3 **Opportunities**

4.3.1 Regulatory Sandboxes

Australia is relatively early in its AI development in comparison to other countries in the region. This creates an opportunity for the country to learn from other countries' successes and mistakes. One of these successes is Singapore's implementation of regulatory sandboxes in the fintech industry.¹⁵² Regulatory sandboxes allow for safe experimentation of innovations under specialised conditions such as less time on the market and smaller scale. This allows for appropriate testing so that any arising challenges in the real environment can be mitigated safely and timely. Australia has introduced the sandbox model through the Australian Securities and Investment Commission (ASIC) under the Enhanced Regulatory Sandbox Regulations.¹⁵³ Under the model, innovations in the financial and credit sectors may be tested for 24 months within the market whilst receiving greater support, observation, and flexible regulatory requirements. The current structure has prompted some recommendations on increasing the simplicity and clarity of the framework, promoting legal certainty, and aligning with ASIC's competition promotion mandate.¹⁵⁴

The sandbox approach as a regulatory safe space for testing in the AI sector is an idea already embraced by European Union regulators, where AI products and services can be tested within safeguards.¹⁵⁵ A compelling example of an AI-based organisation using this model is Carbon Investment Group Pty Ltd which is using ASIC's regulatory sandbox to test potential subscription stock-picking services from the ASX listings using an AI algorithm.¹⁵⁶ Carbon Investment Group might be one of the first AI-based organisations joining the regulatory sandbox, and it opens the opportunity for Australia to further implement this avenue where AI companies can interact directly with regulators earlier in the development cycle. It is a positive step noting that ASIC has vowed, in its 2020- 2024 Corporate plan, that it will have a strong technological focus, inclusive of the use of AI.¹⁵⁷

4.4 Challenges

4.4.1 Trustworthy AI Operationalisation

The Roadmap, the Discussion Paper and Digital Strategy have provided a significant foundation for Australia's early journey in Al governance. The government is working to encourage the broader industry to develop and adopt AI in accordance with existing frameworks and ethical guidelines, voluntarily, rather than having norms imposed from top down. In reality, there is significant reluctance from industry in adopting this soft approach, resulting in new use cases representing a scenario where AI has failed.¹⁵⁸ Australia is not alone in facing this challenge, as most governments around the world are studying how to better balance new strategies to govern AI, encouraging innovation while also minimising risks. With global demand regarding the regulation of Artificial Intelligence (AI) currently underway, and with international developments such as the release of a proposal from the European Commission on the topic, it is timely that Australia starts to proactively prepare its industry for this possibility. Singapore's model of sectoral outreach could positively influence Australia's next steps in this process. Sector-specific AI programmes such the MAS Veritas could serve as a good example of engagement with specific industries.¹⁵⁹ As previously stated, sectoral outreach can play an important role in fostering collaboration between industry stakeholders and policy makers, a crucial factor in the advancement of trustworthy Al. Furthermore, the implications of Al can significantly vary from sector to sector and it's important to create a flexible governance, which reflects this reality.

4.4.2 Urban versus Rural divide

As seen in previous chapters, the digital divide is a global challenge, and most governments are currently grappling with how to ensure that the benefits of AI are extended to all parts of its population, society and economy. In the Australian context, a further challenge exists in preparing regional and rural Australia for AI. Tasks such as supporting rural and regional small businesses, professionals and improving the infrastructure to successfully implement AI will continue to play a large role in how the country addresses this challenge. It is relevant to note the importance of 5G, the latest generation in mobile technology to AI development and Australia's significant issues with inequitable distribution of access between urban and regional areas.¹⁶⁰

The Australian government recognises and is attempting to address this challenge through the Action Plan which dedicates a large part of investments to the 'AI opportunity in our Regions programme'.¹⁶¹ The programme seeks to engage with regional businesses to develop AI solutions for regional problems, providing opportunities to build greater regional awareness of the benefits of AI.¹⁶² While the programme is a significant investment addressing the digital divide, more resources will need to be devoted to mitigate the regional complexities such as limited infrastructure and lack of long-term expertise in the field. Key 5G policy priorities should also be considered, especially for regional areas

4.5 **Prospects for Collaboration**

4.5.1 Domestic

The National AI Centre was launched in December 2021 to coordinate Australia's AI expertise and capabilities, and address barriers that small- to medium-sized enterprises face in adopting and developing AI and emerging technology.¹⁶³ The centre is part of the government's Action Plan and will play a pivotal role to strengthen Australia's AI capabilities.

On the state level, the Victorian All-Party Parliamentary Group on Artificial Intelligence was established by the Victorian Government in 2018 to ensure constructive discussions on Al. ¹⁶⁴ The group engages with legislators in shaping policy and regulations in the state from a non-partisan viewpoint, preparing Victoria for Al and its developments into the future.

Similarly, in 2020, the New South Wales (NSW) government debuted the nation's first statelead AI strategy which combines ethics, policy, and user guide.¹⁶⁵ In creating the initiative, there was extensive consultation with industry stakeholders which culminated on a list of key target areas where the use of AI by the government is a priority, such as safety and education.¹⁶⁶ The AI Ethics Policy provides a set of key principles for NSW government agencies, setting out five overarching principles: trust, transparency, customer benefit, fairness, privacy and accountability.¹⁶⁷ The list of principles is well aligned with the previously cited Unified Principles which form part of the 2021 Trustworthy Artificial Intelligence in the Asia-Pacific Region report.

4.5.2 Bilateral/ Regional/Multilateral

Singapore-Australia Digital Economy Agreement (SADEA)

The Singapore-Australia Digital Economy Agreement signed in 2020 furthers the nations' free-trade agreements into the digital space.¹⁶⁸ The Agreement is inclusive of seven bilateral memoranda of understanding (MoUs) signed, setting the foundations for future collaborative projects and agreements. One of the MoUs is specific to AI and aims to develop and encourage sharing of best practices and adoption of ethical governance frameworks for AI. The Agreement also includes a set of modules regarding consumer protection, data sharing, data governance and localisation, e-payments and privacy to establish a stronger set of trade rules between the nations in digital trade. This Agreement is the first of its kind for Australia and the second for Singapore, who already have a similar agreement entitled the 'Digital Economy Partnership Agreement' with Chile and New Zealand.

Australia-Hong Kong Free Trade Agreement

The Australia-Hong Kong Free Trade Agreement¹⁶⁹ signed in 2020 contains elements of data protection and provisions relevant to e-commerce and the digital economy. The agreement strengthens Australia's relations with one of its most significant trade and investment partners. It might be a natural progression that such agreement can open opportunities for more discussions on the digital level, specially relating to AI.

Australia-Vietnam (Aus4Innovation)

In 2017, Australia engaged in a partnership with Vietnam in the so called 'Aus4Innovation program' to support Vietnam's development of its innovation systems in technology and digital infrastructure.¹⁷⁰ The initiative addresses AI through preparation and planning in Vietnam's Science and Technology sectors by shaping an agenda and creating innovation policy while ensuring engagement in future commercial opportunities. An example is the Vietnam Today report¹⁷¹ which examines the state of Vietnam's economy and digital economy at the beginning of 2018, and the trends that will affect its development over the next 20 years. The initiative also demonstrates Australia's commitment to address the global digital divide, by supporting other countries in their digital journey.

US-Australia AI Workshops

Australia has worked with the US during AI workshop sessions¹⁷² to promote collaboration in the Indo-Pacific on topics related to the ethical use of AI. This online workshop discussed responsible use of AI and included inter-disciplinary representatives from 20 countries in the region. This workshop stemmed from a 2020 US-Australia Joint Commission Meeting on Science and Technology outcome, where policy, regulation, ethics, and AI development importance was highlighted.

Quad Tech Partnership

A recently published article from the Centre for a New American Security discussed the Australian Department of Foreign Affairs and Trade pursuit to advance the technological future by establishing the Quad Tech Network, aiming to foster technological collaboration among Australia, India, Japan and the United States.¹⁷³ The article considered policy principles and looked at Al development with a more international perspective, placing a stronger emphasis on cybersecurity. With improved digital capacity and infrastructure, Australia is positioning itself to potentially become a technological leader in the Quad group.

Comprehensive and Progressive Agreement for Trans-Pacific Partnership 174

The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)¹⁷⁵ is a significant trade agreement signed in 2018 by twelve countries, including Australia, Singapore, Vietnam, New Zealand, Malaysia and Brunei. The countries' objectives were to create a fully integrated economic area and establish consistent rules for global investment. As part of the intellectual property protections, the agreement includes technology and trade secrets, as well as strict regulations about cross-border data flow. The agreement also covers a commitment among members to improve labour and environment standards. As these countries navigate the challenges of the Fourth Industrial Revolution, these areas of technology and labour might be expanded to specifically initiate cooperation on AI and its related issues such as automation.



Asia-Pacific Economic Cooperation (APEC)

The APEC was established in 1989, in Australia, with the mission to support sustainable economic growth and prosperity in the Asia-Pacific region. The founding members were Australia; Brunei Darussalam; Canada; Indonesia; Japan; Korea; Malaysia; New Zealand; the Philippines; Singapore; Thailand; and the United States. Other economies joined later and today twenty-one APEC member economies jointly work towards the realization of free and open trade and investment in the region.¹⁷⁶

One of APEC's key working groups is the Policy Partnership for Science, Technology and Innovation (PPSTI), which is dedicated to "support the development of science and technology cooperation as well as effective science, technology, and innovation policy recommendations in APEC through collaboration between government, academia, private sector and other APEC fora."¹⁷⁷

APEC has been effective on regional economic integration, acting as an incubator for new trade policy approaches.¹⁷⁸ The forum provides a strong foundation for regional cooperation on AI related issues.

4.5.3 Global

Global Partnership on Artificial Intelligence (GPAI)

Australia is also a founding member of the GPAI, a forum established in 2015, with 15 founding members, including South Korea, Japan, and Singapore.¹⁷⁹ GPAI aims to "bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities" with guidance from the OECD's AI recommendations. The partnership works with a multi-stakeholder approach to allow for international collaboration on AI related topics, such as data governance and the future of work.



Chapter 5: India



5.1 Introduction to India's AI Landscape

The combination of technology, data and talent contribute to India's growing advancements in AI. With great potential due to its large population of young people, India has access to one of the largest working and skilled populations in the world. These factors combined with a rapidly growing economy and its interest in technology place India at stake in the AI journey. With these considerations in mind, Indian AI policy developments and international relationships are critical to ensuring trustworthy AI. These developments, on a federal and state level, are advancing with the involvement of international organisations such as the World Economic Forum (WEF) and industry stakeholders.

With the publication of a discussion paper entitled National Strategy for Artificial Intelligence (National Strategy) in 2018, India started to debate some critical questions including how to manage data ethically, and how to address the digital divide. ¹⁸⁰ The National Strategy was a significant first step in establishing many of the foundations the country is now pursuing. It emphasised Al's potential, outlining the government's key target areas:¹⁸¹

- 1. Education improved access and quality
- 2. Agriculture to increase productivity, decrease waste, increase profits for farmers
- 3. Smart-city development and infrastructure
- 4. Transport and mobility smarter and safer
- 5. Healthcare better access and improved affordability

Also in 2018, a committee under the Department of Telecommunications was formed for the standardisation of Artificial Intelligence technology.¹⁸² This initiative was part of discussions on the necessity to ensure the development of an AI infrastructure which is aligned with accessibility, inclusion, equality, and safety.

Since the publication of the National Strategy, the National Institution for Transforming India (NITI Aayog) has been working on creating roadmaps with key AI recommendations. NITI Aayog is the primary public body think-tank of the Government of India and plays a large role in developing policies, analysing implementation of projects, and identifying areas of capacity building. It is tasked to democratize the AI infrastructure, increasing AI access as well as ensuring the availability of viable datasets. These efforts are expected to promote engagement with AI and strengthen the Indian AI ecosystem.

NITI Aayog has established an AI cloud-based computer infrastructure known as Arawait. It aims to contribute to the research and development of technologies, consequently affecting issues surrounding AI, innovation in the fields of business, and uses in social governance causes.

The 2018 National Strategy on AI also initiated the formation of the National AI Programme which has implemented the Responsible AI for Youth Programme to provide AI skills to secondary school-aged young people in state and central schools to improve future and job readiness.

Recently, India released Operationalising Principles for Responsible AI - Part 2 of the Responsible AI for All approach document which builds on Part 1 of Responsible AI Paper series. The document is the result of a collaboration between the WEF and NITI Aayog and has been drafted in two parts:

5.1.1 Part I of the Responsible AI Paper¹⁸³

Part I focuses on acknowledging the risks and considerations of AI. The document identified seven principles derived from the tenets of the Indian Constitution which provide a guiding framework for various stakeholders in leveraging AI.

Further exploration of the case studies show that the principles were taken from analysing both societal and systematic considerations in India. Systemic considerations may refer to privacy issues or inherent biases, and societal considerations may refer to stakeholder impacts like loss of employment or cost of reskilling. The analysis of such considerations resulted in the creation of seven fundamental principles for responsible AI (Responsible AI Principles):¹⁸⁴

- 1. Principle of Safety and Reliability
- 2. Principle of Equality
- 3. Principle of Inclusivity and Non-Discrimination
- 4. Principle of Privacy and Security
- 5. Principle of Transparency
- 6. Principle of Accountability
- 7. Principle of Protection and Reinforcement of Positive Human Values

The Supreme Court of India, in cases such as the Naz Foundation¹⁸⁵ and Navtej Johar¹⁸⁶ has implied constitutional morality and values should be valued over societal ones. Thus, going forward, principles related to AI will firstly pertain to constitutional values and morality, followed by societal or systemic principles. Naturally, for India as for other constitutional countries, constitutionally protected rights are prioritised over others and therefore its AI policy development is aligned with the constitution before societal values.

5.1.2 Part II of the Responsible AI Paper¹⁸⁷

Part II focuses on the operationalisation of the principles identified in Part I suggests a riskbased mechanism for regulating AI. The Responsible AI Paper supports the idea that as India is rapidly establishing itself as a hub for AI, the implementation of these Responsible AI Principles is crucial to unlock AI's potential safely.

Published in 2021 after consultation with a variety of stakeholders, the Responsible AI Paper details action steps needed from the government and private sector in the areas of policy, regulation, and ethics. It emphasises the place of a multidisciplinary approach where government bodies outline AI recommendations for researchers, industry, and other private sector stakeholders, preventing large risks and ensuring responsible AI in areas of development and deployment.¹⁸⁸

5.2 Best practices

5.2.1 Data privacy and security developments

While India also has no specific legislation or agreements designed to regulate the use of AI, there are other existing laws which regulate some aspects of the technology, therefore contributing to India's general AI governance. Similarly, to other countries in the present report, most of these laws relate to how data is protected.¹⁸⁹ Recognising the importance of a robust system to manage new privacy and cybersecurity challenges, a recent proposal has been made to strengthen India's data and privacy regulations.¹⁹⁰

The Indian constitution does not state that privacy is an explicit right. This led the courts to clarify what specific rights citizens hold. For instance, with guidance from the Puttaswamy case, the right to privacy is now considered a fundamental right, however this is not absolute and may be infringed in some circumstances.¹⁹¹

Therefore, without strict regulation or statute regarding privacy, including regarding use of data, AI policies should address privacy issues to allow for responsible use of AI. There are attempts to address this legislative gap as the Indian government is working towards passing the 2019 Data Protection Bill aimed at creating a data protection framework for both personal and non-personal data.

As India's Lok Sabha (lower house of Indian central parliament) continues to amend the draft legislation after discussions, the Bill is set to regulate the data flow loopholes in the Indian landscape,¹⁹² and will include requirements to obtain consent before distributing and using personal data, limitations on how companies can ask for, use and gather data.¹⁹³ The Bill seeks to strengthen the responsible-nature of AI innovations by establishing more stringent regulation for data usage.¹⁹⁴

5.2.2 Growing international collaboration

As an emerging economy, India has its own unique challenges in the AI journey. It's a distinct country in the region when it comes to culture, politics and history. Compared to the other countries in this report, it is unrealistic to attempt to compare India's AI journey and AI governance with other countries in the region. Despite this consideration, there are still potential synergies with other regional nations. India must continue to work towards more engagement with other countries in the region to benefit from AI's potential and design an effective AI governance, without ignoring its own socio-political reality. The Indian government's ongoing engagement with international organisations such as the WEF to design its AI governance, as well as other stakeholders, domestically and overseas, is a positive step for further regional and international engagement collaboration.

The growing frameworks and oversight that encompass India's AI journey, including standardisation developments have been effective tools to address its grey areas of AI implementations. These processes combined with a needed collaborative engagement are good foundations to sustain India's AI strategy and success in this journey.

5.3 **Opportunities**

5.3.1 Vibrant startups and tech ecosystem

India's Hyderabad and Bangalore are recognised as the Republic's startups and technology hubs with the private sector flourishing in the southern capital cities, particularly with successful technology startups.¹⁹⁵ The ecosystem allows for an opportunity to promote Trustworthy AI, encouraging AI projects with targeted-funding and grants to particular areas of interest. A similar approach seen in Singapore, where specific grants can work by supporting AI driven initiatives relating to social mobility and inclusiveness for example. Such initiatives can also automatically increase collaboration between government and industry.

India is currently leveraging on this advantage through initiatives such as the INDIAai, the National AI Portal of India, a joint venture by the Ministry of Electronics and IT, National eGovernance Division, and the National Association of Software and Service Companies (NASSCOM). INDIAai has been established to prepare the nation for an AI future. The portal focuses on creating and nurturing a unified AI ecosystem for driving excellence and leadership in India's AI journey, fostering economic growth.

5.3.2 Multi-stakeholder partnership

As previously discussed, India has partnered with the World Economic Forum (WEF) to create an AI ethics framework. In 2020, a toolkit was designed to guide board of directors on the importance of trustworthy AI.¹⁹⁶ This toolkit emphasizes a variety of resources and provides guidance on how to create internal policies which are aligned with AI governance developments, increasing knowledge and awareness of AI for private sector leaders. An important aspect of this work is the consultation-based approach, where industry stakeholders were able to contribute their expertise. Such cooperation is vital for the design and implementation of trustworthy AI. The central state of Maharashtra has also partnered with the World Economic Forum (WEF), through a 2018 Memorandum of Understanding (MoU) agreement, on the creation of the Centre for the Fourth Industrial Revolution. The centre, based in Mumbai, aims to promote and facilitate further developments in AI, drones and blockchain technology.¹⁹⁷ The first actions of the centre include prioritising inclusive growth solutions in the areas of smart cities, agriculture, and health.¹⁹⁸ Through this partnership, state-based initiatives will be formed that will be able to be scale-up nation-wide, as needed in the long-term. The cumulative effect of these key collaborations can positively shape India's future policy, initiatives and further innovation developments in the field of AI.

5.4 Challenges

The National Strategy identified major key challenges, further discussed below:¹⁹⁹

5.4.1 Limited research expertise

To address this challenge, catalysts like international collaborations and research hubs have been submitted as potential alternatives. This was suggested to be implemented in a two-tier framework which targets augmenting Al-driven research through developments and initiatives with a stricter organizational system. The first tier is the creation of an Al hub focused on current and future technologies research, a Centre of Research Excellence. The second tier is a transformational Al hub, called the International Centre of Transformational AI, which aims to promote industry collaboration, both domestically and internationally, by applying and developing AI research. At both venues, ethics councils will be established to ensure fairness and equality in the creation, deployment and application of AI developments and research.

5.4.2 Minimal privacy hard regulations

As discussed above, India is working to address this challenge with a recent proposal to strengthen India's data and privacy regulations.²⁰⁰

5.4.3 Minimal use of collaboration in policy

In 2018, the government recognised the absence of collaborative efforts between stakeholders in specific sectors, such as healthcare. India had adopted the electronic health record (EHR) policy then, encouraging the share of data between hospital chains, but implementation was still a challenge with different adopted interpretations of 'digitising records'.

As stated previously, much has been accomplished by the country in this area. There is an increase of collaboration in respect of policy developments and AI innovation, domestically and internationally. Therefore, much progress has been accomplished since its National Strategy was implemented.

5.4.4 Building an inclusive AI ecosystem

Building an inclusive AI ecosystem, as well as addressing some of the largest AI issues such as the digital divide are major tasks for India. The country's vast size, unique diversity and language barriers contribute to the challenge of operationalising trustworthy AI. To address this challenge, collaboration will again play a critical role. There must be cooperation internally, between different government agencies and stakeholders, ensuring consistency across AI governance, as well as continuing international engagement.



AI Asia Pacific Institute

5.5 Prospects for collaboration

5.5.1 Domestic

Indian States and Union Territories have also been active in developing and publishing AI policy encouraging the development of trustworthy AI within their jurisdiction. In 2020, the Southern state of Tamil Nadu released its AI policy entitled Safe and Ethical Artificial Intelligence Policy.²⁰¹ This policy document will be followed by a data policy²⁰² which will complete the state's approach to emerging technologies, AI, and big data. The policy provides guidance on how AI should be deployed by the state, state partners, and state agents through suggesting a variety of strategies.

5.5.2 Bilateral/Regional/Multilateral

US-India Artificial Intelligence Initiative

The US and India entered the Indo-US Science and Technology Forum to promote bilateral cooperation on Science, Technology, Engineering, and Innovation involving government, academia and industry.²⁰³ The program portfolio encompasses a broad-range of initiatives from scientific networks, innovation and entrepreneurship, research and development, and fellowships. Of particular interest to AI is the US-India Artificial Intelligence that seeks to understand and harness the disruptive and transformative impact of AI tools and technologies. Through the Strategic plans jointly developed by the US and India, USIAI will focus on convening key stakeholders for bilateral AI research and development, develop ideas for AI workforce, and recommend modes and mechanisms in establishing partnerships.²⁰⁴ Key deliverables of USIAI include white papers, final synthesis report, and an online-repository which aim to foster better understanding on the specific challenges and opportunities related to the technical, policy, infrastructure and workforce opportunities of AI applications in healthcare, smart cities, materials, agriculture, energy and manufacturing.²⁰⁵

India and Germany

Through the Indo-German Science and Technology Centre, India and Germany have set up a joint AI initiative focused on healthcare and sustainability. Both countries signed a Memorandum of Understanding allowing India's Department of Science and Technology and Germany's Federal Ministry of Education and Research to forge partnerships in research and development programs. The agreement will facilitate the establishment of the International Research Training Groups Programs to encourage student exchange programs among Indian and German doctoral programs.²⁰⁶ Additionally, setting up collaborative research centres between the two countries are also in the pipeline to focus on high-end science topics like quantum computing, and cyber-physical systems. But first, India and Germany must first harmonize data protection regulations to ensure integrity and safety of scientific research particularly on funding and intellectual property.

India-China Technology corridor

India and China's collaborative AI and big data efforts were cemented in 2018 through the creation of technology corridors in Dalian²⁰⁷ and Guiyang, China as well as a data-based IT platform. These projects, supported by the Chinese government and India's NASSCOM, were founded on the nations' mutual aims to improve relationships and engagement between Chinese firms and Indian software companies. However, due to the ongoing Sino-Indian border dispute, collaboration between the two countries has forestalled, prompting the Indian government to ban Chinese apps due to the current geopolitical friction between New Delhi and Beijing.

Quad Tech Partnership

Regionally, India's involvement with the Quad group (India, Australia, Japan and US) provides a strong prospect for collaboration particularly in AI and big-data. This follows agreements from the group's 2021 discussion highlighting Science, Technology, Engineering Mathematics as pertinent disciplines, seen through the establishment of a scholar programme²⁰⁸ known as the Quad Fellow, and the upcoming publishing technology principles as relevant to emerging technologies endorsed and followed by the group. In 2020, India and Japan came to an agreement regarding increasing bilateral involvement in the areas of technology, IT and telecommunications. This signals changes and new opportunities for collaboration in areas of AI and big-data, particularly after the successful 5G agreements as a result of this agreement.²⁰⁹

India-ASEAN

Due to its location regionally, India has an opportunity to partner with ASEAN on AI. Through India and ASEAN's stable relations as seen through the annual India-ASEAN summit meeting, collaboration over AI could act as a next step in this relationship.²¹⁰ India and ASEAN member nations have the opportunity to discuss and share AI policy and frameworks. If it eventuates, this collaboration could assist in establishing mutually responsible AI standards for the region and allow for continuing policy development in AI. Furthermore, this potential engagement on AI development can provide mutual economic benefits, setting-up strong prospects in preparation for the future.

5.5.3 Global

Global Partnership on AI

Like Singapore, Japan, South Korea, and Australia, India is a member of the GPAI. India is part of such rooster of multi-stakeholder partners that aims to promote the opportunities surrounding AI while addressing its many challenges as it relates to inclusivity, diversity, creativity, and economic prosperity.²¹¹ India's participation in GPAI intersects with its existing partnerships and on-going collaborations with other countries within and beyond the Asia Pacific especially in the post-COVID 19 era. India can reflect and integrate the GPAI principles as it implements policies and programs as part of its National AI Strategy and National AI portal across various sectors from education, agriculture, and healthcare.

Table Summary

	COUNTRY	BEST PRACTICES	OPPORTUNITIES	CHALLENGES	COLLABORATION
	Singapore	 Pioneering a self-regulatory approach in the region Exemplary industry outreach Promoting incentives on Trustworthy Al 	Encouraging a trustworthy ecosystem	 Trustworthy Al operationalisation Digital divide 	 Data Exchange: SGTraDex Safe Testbeds: MAS Fintech Regulatory Sandbox Sector-Specific AI Guidelines: MAS Veritas Program Singapore-Australia Digital Economy Agreement (SADEA) Digital Economy Partnership Agreement (DEPA) Korea Singapore Digital Partnership Agreement (KSDPA) UK-Singapore Digital Economic Agreement (UKSDEA) Asia-Pacific Economic Cooperation (APEC) Global Partnership on Al (GPAI) OECD Council Recommendation on Al
	Japan	 Encouraging a goal-based governance Promoting co-regulation Investing in soft and hard infrastructure Industry outreach 	 Effective public-private partnerships Venture capital growth Al chips Al for social good 	 Legal and ethical challenges Talent shortage Trustworthy Al operationalisation 	 Data Free Flow with Trust (DFFT) EU-Japan Economic Partnership Agreement Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) Asia-Pacific Economic Cooperation (APEC) Global Partnership on Al (GPAI)
-	South Korea	 Investing on regulatory innovation and revision of laws to adapt its legal system to the era of Al Proposing an Al code of ethics creating a safer environment for dysfunction and security threats. 	 Metaverse Seoul Strong foothold in tech- related industries Compendium of use cases Investment in education Al semi-conductor industry 	 Trustworthy Al operationalisation Insufficient safeguards to ensure trust Digital divide 	 Korea-Singapore Digital Partnership Agreement (KSDPA) Digital Economy Partnership Agreement (DEPA) Asia-Pacific Economic Cooperation (APEC) Global Partnership on Al (GPAI) OECD Council Recommendation on Al
X	Australia	 Consultative partnership with industry and stakeholders Incentives in education 	Deployment of regulatory sandboxes	 Trustworthy Al operationalisation Urban versus rural divide 	 Singapore-Australia Digital Economy Agreement (SADEA) Australia-Hong Kong Free Trade Agreement Australia-Vietnam (Aus4Innovation) Quad Tech Partnership US-Australia Al Workshops Asia Pacific Economic Cooperation (APEC) Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) Global Partnership on Al (GPAI)
X	India	 Increasing developments in data privacy and security Investing in international collaboration 	 Vibrant startup and tech ecosystem Adoption of multi- stakeholder partnership 	 Limited research expertise Privacy regulations Adopting a collaborative approach in policy Building an inclusive Al ecosystem 	 India-China Technology corridor Quad Tech Partnership India-ASEAN US-India Al initiative Indo-German Science and technology Centre Global Partnership on Al (GPAI)



Chapter 7: Recommendations and Conclusion



Recommendations

Using the outcomes from the Roundtable discussion and desktop research, the AI Asia Pacific Institute used qualitative analysis to asses case study countries against three discrete factors *---best practices, opportunities and challenges, and prospects for collaboration---*this report presents the **Tiered AI framework for International Collaboration (TAFIC)**, outlining how Singapore, Japan, South Korea, Australia, and India can establish common ground for collaboration to manifest and achieve a vibrant, dynamic, and cross-cutting trustworthy AI ecosystem. TAFIC organises current policies, initiatives, and frameworks among each country into a rubric to guide government policymakers, industry practitioners, academic researchers, and members of civil society obtain a macro and micro level understanding on the approach of the five countries on AI development from political, social, economic, and ethical perspectives.



Tiered AI framework for International Collaboration

Moving forward, insights drawn from TAFIC can inform high potential areas of collaboration and how they can be pursued either from a top-down or bottom-up approach. Using TAFIC as an organising framework, countries can pursue collaboration based on existing and similar mechanisms or even cross-pollinate best practices and ideas. A few initial recommendations include:

Exploring City to City Cooperation. An emerging trend of applying AI tools to develop smart cities is on the rise. Scaling down the level of collaboration from country to city level can provide use-cases for AI application which may yield more practical insights and have tangible social and economic benefits. This can complement existing sectoral approaches where city officials are involved in the process of supporting innovation while implementing regulatory oversight. Under this scheme, cities with comparable urban development characteristics and priorities within and outside the country may participate in exchange partnerships. If executed with utmost care, the lessons learned, and insights drawn from this city-to-city level of cooperation can generate support from local communities and mitigate the scepticism and negative impression surrounding AI.

Integrating trustworthy AI in digital and multilateral trade agreements. As detailed throughout this paper, Singapore, Japan, South Korea, Australia and India are signatories to a variety of existing agreements in the region, demonstrating a propensity for growing collaboration. These countries have also been shown a certain degree of alignment relating to trustworthy AI ideals and AI's agenda. Due to AI's nature of being transnational, there is momentum for international collaboration. It is in every nation's benefit to work cooperatively to support its own national goals, especially with the long-term aim of achieving interoperability. To ensure that the regional development of trustworthy AI is advanced, discussions on the governance of AI must be initiated at the onset of trade negotiations with an ample allowance for flexibility.

Amplifying comprehensive Information, Education and Communications campaigns to promote Trustworthy AI. A glaring weakness among the country's case studies is an absence of solid and comprehensive Information, Education and Communications (IEC) campaigns to rally more public support for AI policies and strategies. With AI's traditional association with negative media depiction, the stakes for promoting and maintaining the public's positive perception of AI for good are very high. Ensuring that AI technologies are shaped to complement and not replace human beings must be central in any government's IEC campaigns. In addition to conducting public consultation on AI guidelines or framework to encourage feedback, governments must be more creative and innovative in order to reach a wider audience. A holistic IEC engagement strategy which fosters community engagement will be pivotal to promote principles and values that support or promote the development of trustworthy AI. It can boost public confidence and allay fears or misconceptions on the implications of AI.

Advancing an AI Asia Pacific Working Group. Based on the key analysis of our report, there are common denominators across our five case studies on the growing convergence for international collaboration. We put forward the proposition that a study or working group oriented on the TAFIC framework can spur further synergy and collaboration. As an organising framework, TAFIC can facilitate in harmonizing a minimum set of standards or principles to advance policy discussions on Trustworthy AI in the Asia Pacific.

The proposed AI Asia Pacific Working Group can further investigate the salient points discussed in this publication with a long-term view of establishing a conducive environment that supports the practical implementation of principles embedded in existing digital economic agreements. TAFIC can facilitate the interdisciplinary approach advocated by government officials and policymakers, industry practitioners, academics, and civil society to further refine and fine-tune approaches to truly develop a dynamic, open, collaborative, and interoperable AI ecosystem across the region.



Conclusion

This study has attempted to map out the evolving AI landscape and governance in the Asia-Pacific. It offers an analysis of the initiatives and mechanisms that countries in the region are adopting to advance Trustworthy AI amid overtures of deglobalization and technological nationalism. With its modest aims of analysing the convergence and divergence among Singapore, South Korea, Japan, Australia, and India in AI development, the report highlighted the distinct overlaps driven by regional and global trend of capitalizing on AI as an engine for socio-economic growth. The quest to encourage Trustworthy AI competitiveness in the international stage is very much tied to the existing and impending socio-economic challenges that each country faces or foresees in the medium-to-long term.

Recognising the need to transcend the national and local, the regional and the global, TAFIC serves as the connector for these external and internal challenges and opportunities. We hope the implementation of the abovementioned recommendations can foster collaboration, enabling the exchange of data, talent, and technology with the broad vision of advancing an ecosystem that fosters trust in AI.



Tiered AI framework for International Collaboration (TAFIC)

TIERED- APPROACH	Singapore	Japan	South Korea	Australia	India
HUMAN/SOCIETY	• Model Al Governance Framework	Social Principles of Human-Centric AI	Al For Humanity	Ethical Framework Discussion Paper	 Responsible AI; Part 1: Principles for Responsible AI Responsible AI; Part 2 Operationalizing principles for Responsible AI
CITY-TO-CITY LEVEL	N/A	Tokyo One-Stop Business Establishment Centre	Seoul Metropolitan Government Metaverse Initiative	 New South Wales AI Strategy Victorian All-Party Parliamentary Group on Artificial Intelligence 	Centre for the Fourth Industrial Revolution - Mumbai
NATIONAL	National Al Strategy	Al Technology Strategy	 National Strategy for Al Korean New Deal and the Digital New Deal 	 Artificial Intelligence Roadmap Digital Economic Strategy 	National Strategy for Artificial Intelligence
BILATERAL	 Singapore-Australia Digital economy Agreement (SADEA) Korea-Singapore Digital Partnership Agreement (KSDPA) UK-Singapore Digital Economy Agreement (UKSDEA) 	EU-Japan Economic Partnership Agreement	 Korea-Singapore Digital Partnership Agreement (KSDPA) 	 Singapore-Australia Digital economy Agreement (SADEA) US-AUS Joint Commission on Science and Technology (created regional seminars on ethical AI) Aus41 innovation (AUS-Vietnam) Australia-Hong Kong Free Trade Agreement 	 US-India Artificial Intelligence Initiative India and Germany joint Al initiative India-China Technology Corridor
REGIONAL	 Digital Economy Partnership Agreement (DEPA) Asia-Pacific Economic Cooperation (APEC) 	Comprehensive and Progressive Partnership on the Transpacific Partnership (CPTPP) Asia-Pacific Economic Cooperation (APEC)	 Digital Economy Partnership Agreement (negotiating) Asia-Pacific Economic Cooperation (APEC) 	Comprehensive and Progressive Partnership on the Transpacific Partnership (CPTPP) Asia-Pacific Economic Cooperation (APEC) Quad Tech Partnership	Quad Tech Partnership
INTERNATIONAL	 Global Partnership on Artificial Intelligence (GPAI) OECD Council Recommendation Al 	 Data Free Flow with Trust (DFFT) Global Partnership on Artificial Intelligence (GPAI) OECD Council Recommendation on Al 	 Global Partnership on Artificial Intelligence – GPAI OEED Council Recommendation on AI 	OECD-Global Partnership on Artificial Intelligence - GPAI	Global Partnership on Al

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contact@aiasiapacific.org aiasiapacific.org