Realising Trustworthy and Inclusive Artificial Intelligence for Indonesia

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IBM Center for
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Foreword

In less than two decades, Indonesia will celebrate its centenary, 100 years since its independence in 1945. From an agricultural-based economy to one embracing digital startups, from paying things with cash to using our mobile phones for payment, Indonesia has accelerated its technology adoption and acceptance.

Today, artificial intelligence (AI) is rapidly transforming societies worldwide, and Indonesia is at a pivotal moment to harness AI's potential for economic growth, social progress, and improved quality of life. This new IBM report, *Realising Trustworthy and Inclusive Artificial Intelligence for Indonesia*, captures another step towards ensuring that AI is developed and deployed in a manner that benefits all segments of society.

The report examines the landscape of AI in Indonesia, identifying both the opportunities and challenges that lie ahead. The report's authors underscore the imperative of fostering trust and inclusivity as foundational principles for accountable, ethical, and responsible development of AI. Governance is the key to build trust, not just from government but from all stakeholders in industry.

This report presents insightful and actionable findings. It also provides a clear roadmap for policymakers, industry leaders, researchers, and civil society to collaborate in building a thriving AI ecosystem with a human-centric approach that promotes community well-being and societal values. By working together, government can shape a future where AI, guided by ethical principles, serves as a powerful force for good—driving innovation, creating opportunities, and strengthening the fabric of our society.

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Executive Summary

Indonesia's ambition to become a digital leader is evident through its emerging technology start-up ecosystem and the government's advocacy for digital transformation, exemplified by the National Strategy on Artificial Intelligence and the Digital Indonesia Vision 2045, which are both analysed in this report.

However, the road ahead is not easy. Indonesia faces several challenges in realizing its AI ambitions, including a shortage of skilled workforce, inadequate digital infrastructure, disjointed collaboration between academia and industries, regulatory gaps, and low adoption of AI technologies.

This report seeks to contribute to recognizing the critical importance of digital transformation and artificial intelligence (AI), while pointing up the need for a robust framework and strategy behind it. By outlining key recommendations, we aim to inform policymakers and stakeholders on the essential steps needed to realize Indonesia's AI ambitions effectively and responsibly. These recommendations also provide a model for other governments seeking to advance AI to support their goals.

Based on research and insights from a) an ongoing global project that has examined national AI strategies since 2019,[1] and b) a previous project that led to the design of an AI maturity model for the public sector,[2] we highlight the following recommendations for Indonesia to succeed with AI:

- Immediate and sustained investment to modernise Indonesia's digital infrastructure

- Bolster cybersecurity capabilities

- Setup a general framework to promote responsible innovation with AI

- Build and curate native datasets

- Invest in coordination

- Form strategic international partnerships to accelerate AI capacity and capability building

- Design AI experimentation and innovation platforms

- Design AI public value metrics

AI systems will continue to shape the economic development trajectory of nations. The government of Indonesia has recognised the transformative affordances that can be actualised if AI systems are designed, developed, and deployed at scale in a manner that is trustworthy and inclusive. While there are considerable challenges that must be addressed, focusing on the recommendations outlined in this report will enable Indonesia, and other nations learning from the Indonesia experience, to forge ahead responsibly to ensure that it maximises public value.

1. Denford, J. S., G. S. Dawson, and K.C. Desouza. (2023, April 25). WEIRD AI: Understanding what nations include in their artificial intelligence plans. https://www.brookings.edu/articles/weird-ai-understanding-what-nations-include-in-their-artificial-intelligence-plans/.
2. Desouza, K. C. (2021). *Artificial Intelligence in the Public Sector: A Maturity Model*. IBM Center for The Business of Government. https://www.businessofgovernment.org/report/artificial-intelligence-public-sector-maturity-model.

Introduction

Indonesia has the largest economy in Southeast Asia and several of the vital ingredients needed to become a digital leader. Its technology start-up ecosystem is second only to Singapore within the region. Indonesia has been a vocal champion of digital transformation. Implementation of artificial intelligence is projected to contribute $366 billion to Indonesia's GDP in 2030.[3]

> "Sovereign, Advanced, Just and Prosperous"—Digital Indonesia Vision 2045 revolves around three pillars:
>
> 1. Modern and responsive **digital government**
>
> 2. **Digital economy** to create an innovative economy based on digital technology
>
> 3. Empowered and cultured **digital society**

In his second term, President Joko Widodo—through a visionary leadership in digital transformation which was also reflected in Indonesia's influence at the G20 summit in 2020—pushed for an ambitious nationwide digital transformation program. Led by the Ministry of Communication and Informatics, the 2021-2024 Indonesia Digital Roadmap focuses on four strategic domains: 1) modernising digital infrastructure, 2) accelerating digital government, 3) strengthening the digital economy with a focus on attracting and supporting micro, small, and medium enterprises (MSMEs), and 4) strengthening its digital society to increase uptake of digital innovations with programs focused on uplifting basic (e.g., digital safety) to more advanced (e.g., professional upskilling in areas such as cloud computing, artificial intelligence) capabilities for all Indonesians.

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3. Eloksari, E. A. (2020, October 9). AI to bring in $366b to Indonesia's GDP by 2030. *The Jakarta Post*. https://www.thejakarta-post.com/news/2020/10/09/ai-to-bring-in-366b-to-indonesias-gdp-by-2030.html.

Across the nation, there is a palpable energy on digital transformation efforts at all levels of government. Consider the range of smart city programs such as moving the capital from Jakarta on Java Island to East Kalimantan on Borneo.

> *Twenty years from now, artificial intelligence will be an accepted part of everyday life and other new challenges will be born.*
>
> —Budi Arie Setiadi
> Minister for Communications and Informatics, Indonesia[4]

The National Artificial Intelligence Strategy 2020-2045 (Strategi Nasional Kecerdasan Artifisial) was unveiled on August 10, 2020. The plan outlines five strategic priority areas:

1. Health,
2. Bureaucratic Reform,
3. Education and Research,
4. Food Security,
5. Smart City And Mobility.

The plan includes four focus areas to support the nation's AI aspirations:

1. Ethics and Policies,
2. Data and Infrastructure,
3. Talent Development,
4. Industrial Research and Innovation.

This report outlines a set of recommendations for Indonesia to realise its ambition around trustworthy and inclusive AI.

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4.   Ministry of Communication and Informatics Republic of Indonesia. (2024). *Digital Indonesia Vision 2045* (pg. 1-2). https://digital2045.id/bukuvid2045/.

National AI Strategy

Indonesia's AI plan is focused on four desired outcomes:

1. **Sovereignty**, which gives priority for Indonesia's interests, and a strategy that is not dependent on foreign solutions or companies

2. **Advancement** in AI innovation produced in Indonesia

3. **Equality,** with responsible and ethical use of AI

4. **Prosperity**, with economic growth fuelled by AI

The National Strategy on AI highlights six key challenges that the country faces in the adoption and implementation of AI: human capital, digitization and infrastructure, collaborations between universities and industries, training capacity, regulations, and adoption by industries and the public sector.

1. **Human capital**. The lack of skilled workers proficient in artificial intelligence poses a significant challenge, compounded by a shortage of experts, lecturers, and professors in the field.

2. **Digitization and infrastructure**. The inadequacy of digital infrastructure and unique datasets for research and experimentation, as well as cybersecurity vulnerabilities, hinders progress in AI development.

3. **Collaborations between universities and industries**. The disjointed connection between educational institutions and industries inhibits collaborative innovation.

4. **Training capacity**. The lack of universities that do not meet adequate requirements to support AI and the lack of incentives exacerbate an insufficient training capacity and the absence of AI education in school curricula.

5. **Regulations**. The absence of a legal frameworks for ethical and responsible AI development, monitoring bodies, and national standards.

6. **Adoption by industries and the public sector.** Indonesia's digital market is dominated by imported technology, which runs counter to one of the highlighted goals of data sovereignty not dependent on foreign solutions or foreign entities. These challenges are exacerbated by issues such as the misuse of private data, public distrust of Indonesian products, and problems in retaining national talent.

Indonesia's National Strategy on AI is linked to several major plans and initiatives aimed at shaping the nation's future trajectory. First and foremost is **Indonesia's Vision for 2045**, also known as the "Golden Indonesia Vision." This vision encompasses four pillars: human development, sustainable economic development, equitable development, and strengthening of national resilience and governance. The development and use of AI technologies must be in line with these pillars, with a particular emphasis on priority areas such as food resilience and governance.

Furthermore, Indonesia's national strategy on AI intersects with the **National Priority Programs** outlined in the "National Medium-Term Development Plan (RPJMN) IV Year 2020-2024." These programs cover a wide range of agendas, including economic resilience, regional development, quality of human resources, cultural development, infrastructure improvement, and political stability. Linking AI initiatives to these priority programs ensures coherence and synergy in national development efforts and insures, for example, that AI programs also receive funding from the national budget.

The National Strategy on AI also integrates with **Industry plans and strategies**— "Making Indonesia 4.0" initiative and the "National Industrial Development Master Plan 2015-2035"—both of which serve as a roadmap for the nation's industrial transformation in the context of the fourth industrial revolution. The idea is to develop AI for industrial innovation to support the fourth industrial revolution.

The Strategy on AI is also closely intertwined with two important **presidential decrees on data and e-government**. The first, One-Data Indonesia (Presidential Regulation No. 39/2019), was issued to ensure responsible data sharing and accessibility in adhering to data standards, metadata requirements and data interoperability principles. Similarly, the Electronic Government System (Presidential Regulation No. 95/2018), aims to enhance governance through the integration of information and communication technologies to promote transparency, accountability, and efficient delivery of e-government services. The use of AI technologies in this framework can support decision-making processes and policy formulation and is in line with the vision of creating an efficient bureaucracy and public service sector.

Finally, the AI strategy also considers the capital relocation plan. The decision to relocate Indonesia's capital represents a significant challenge still being studied. As the Indonesian government considers this possibility, four criteria have been determined for this change: The capital should be a symbol of the nation's identity; it should be sustainable, smart, and modern; and it should have an efficient governance. The inclusion of AI and digital technologies is decisive in this regard, as it represents a commitment to national progress by promising greater efficiency and innovation with cloud computing infrastructures and better government's digital datasets.

Digital Infrastructure

Despite Indonesia's stated ambition on AI, the nation's path ahead is fraught with challenges. The existing digital infrastructure is far from robust and in many cases is even barely operational. While mobile broadband penetration is promising—in early 2023, the number of internet users has reached 78.19 percent of the population,[5] and 79.5 percent in 2024,[6] leading Southeast Asia's growth—fixed broadband still lags compared to neighbouring countries as it is hindered by inconsistent and unreliable internet connectivity.[7] Although, 96.2 percent of Indonesia's population is covered by at least 4G connection, only 62.1 percent use the internet in 2023, most in urban areas, according to the International Communication Union (ITU). This is exacerbated by the low rates of access to computers,[8] only 20 percent compared to the Philippines (24 percent) or South Korea (72 percent).[9] Indonesia's digital economy is largely focused on greater Jakarta and Surabaya, which accounts for 50 to 80 percent of the country's digital economy and only 15 percent of the population.

Recent data shows that most users access international websites, with only around 30 percent of the most visited websites being local. Similarly, local applications account for only 16 percent of the most downloaded applications.[10] This problem is made worse by the perception that local content is less attractive compared to international content,[11] low digital literacy and limited access to ICT and computers. Furthermore, regulatory support and investment funding for local content development is insufficient, preventing digital content creators from effectively producing and distributing quality local content. Nevertheless, the Internet of Things (IoT) market value in Indonesia is expected to reach 40 billion USD in 2025 and had over 134.6 million IoT connections recorded in 2022.[12]

5. Kemp, S. (2023). The Changing World of Digital in 2023. Meltwater. https://www.meltwater.com/en/blog/changing-world-of-digital.
6. Antara News. (2024, January 31). Indonesia's internet penetration hits 79.5 percent, trend continues. https://en.antaranews.com/news/304593/indonesias-internet-penetration-hits-795-percent-trend-continues.
7. Digital Indonesia Vision 2045, p.19.
8. The International Communication Union. (2023). Measuring digital development—ICT Development Index 2023. https://www.itu.int/hub/publication/D-IND-ICT_MDD-2023-2/.
9. The International Communication Union. (2023). Measuring digital development—ICT Development Index 2023. https://www.itu.int/hub/publication/D-IND-ICT_MDD-2023-2/.
10. Kearney. (2021, March). Unlocking the next wave of digital growth: beyond metropolitan Indonesia. https://www.kearney.com/service/digital-analytics/digital/article/-/insights/unlocking-the-next-wave-of-digital-growth-beyond-metropolitan-indonesia.
11. Digital Indonesia Vision 2045.
12. Statista (2023, December 21). Internet of Things (IoT) in Indonesia—statistics & facts. https://www.statista.com/topics/11406/internet-of-things-iot-in-indonesia/#topicOverview.

Digital Transformation during COVID-19

According to the Special Advisor to the Minister of ICT, digital transformation helped Indonesia's economy survive the COVID-19 pandemic. He mentioned that during the pandemic, 77 percent of micro and small medium enterprises (MSME) in Indonesia used digital tools for business purposes, and 69 percent said that digital tools were essential to keeping their business running during COVID-19.[13] This continues to increase even after the pandemic, until December 2023 when 27 million Indonesia's MSMEs went digital.[14]

Digital government is improving in Indonesia with advancements in technology offering new pathways for digital public services and transparent governance. For instance, the introduction of an e-government system (SPBE) in 2018, increased Indonesia's United Nation E-Government Development Index (EGDI) from the 88th position and a grade B in 2020 to the 77th position and a grade A in 2022.[15] The SPBE is a comprehensive framework aimed at implementing effective, transparent, and accountable governance through ICT to provide services to government agencies, civil servants, businesses, the public, and other stakeholders. An update to SPBE has been launched in beginning of June 2024 through the INA Digital super portal.[16] Yet, there are still plenty gaps to implement SPBE INA Digital, as trust among executives is low, there is a lack of deliverable back end data to prepare various data centers, and some technology-based public services still need to be implemented.

Despite efforts like this, Indonesia faces significant challenges ahead, such as integrating and linking thousands of scattered government applications and systems work together. This ecosystem is also quite complex, but steps are being taken by the Indonesian government to work on that with the implementation of the One-Data Indonesia. Other obstacles to e-government includes limited technological infrastructure, cybersecurity concerns, and the need for greater transparency in public data. While Indonesia is leveraging digital technology to improve public service delivery, it is behind other countries in government effectiveness and e-government development. According to a survey conducted by the International Communication Union (ITU), in 2020, Indonesia is still ranked 88th out of 193 countries while Malaysia has been ranked 47th, Thailand 57th, and China 45th.[17]

13. DAI. (2022, February). Insights from Emerging—MSMEs and Digital Tool Use Amidst the COVID-19 Pandemic—Indonesia Country Brief. https://www.dai.com/uploads/final-msme-reports/indonesia-country-brief.pdf.

14. Suhayati, M. (2023, December). Digitalisasi Usaha Mikro Kecil dan Menengah. DPR RI. https://berkas.dpr.go.id/pusaka/files/info_singkat/Info%20Singkat-XV-24-II-P3DI-Desember-2023-241.pdf.

15. Cabinet Secretariat of the Republic of Indonesia. (2024). Indonesia Electronic-based Gov't System Continues to Show Positive Record. https://setkab.go.id/en/indonesia-electronic-based-govt-system-continues-to-show-positive-record/.

16. https://inadigital.co.id—further information regarding the launch can be found at: https://en.antaranews.com/news/305214/ministry-seeks-immediate-launch-of-e-government-platform-ina-digital and https://indonesiabusinesspost.com/insider/president-jokowi-launches-ina-digital-accelerates-integration-of-services.

17. The International Communication Union. (2023). Measuring digital development—ICT Development Index 2023. https://www.itu.int/hub/publication/D-IND-ICT_MDD-2023-2/.

Progress on One-Data Indonesia

One-Data Indonesia, which is regulated by the presidential regulation No. 39/2019, aims to establish an integrated data management service to "produce accurate, updated, integrated and accountable data that is easily accessible and shared between central government and regional agencies.[18] This regulation establishes protocols for data collection, management, and sharing, emphasizing data standards, metadata, interoperability principles, and the use of reference codes.

As data is collected by different institutions, the regulation aims to create uniformity and coherence in data management by ensuring the availability of high-quality and standardized data. This is essential to provide a solid foundation for the development of AI applications across sectors. One-Data's importance lies in its role in standardizing data ownership, custody, and quality.

Currently, the government has started the implementation of One-Data Indonesia by committing to integrate data at the regional level into One-Data Indonesia in the Open Government Action Plan.[19] The commitment has been fulfilled in seven pilot regions, although the results have been modest, and implementation has varied from region to region.[20]

Cybersecurity breaches and data leaks is still prevalent in Indonesia, which ranks 85 out of 175 countries according to Kearney report.[21] This underscores the urgency of robust cybersecurity regulations and measures to protect public and government data. In response to this urgency, President Joko Widodo quickly established the National Cyber and Crypto Agency (BSSN) in 2021 to optimize the implementation of duties and functions in the field of cyber and encryption security. Furthermore, he enacted the Presidential Regulation on National Cybersecurity Strategy and Cyber Crisis Management (PR 47/2023) on July 20, 2023, as well as the Personal Data Protection Act (PDP Law). However, effective for both the public and private sectors remains a challenge in light of ongoing incidents, such as data leaks and ransomware attacks.[22]

Effective governance and policy frameworks are essential to drive the intended digital transformation and create an enabling environment for innovation and investments. In this regard, Indonesia is streamlining regulations (e.g., PR 47/2023 and the PDP Law) and creating agencies to fostering public-private-university partnerships/promoting applied research for industries (e.g., KORIKA). Through these networks, the government can encourage open innovation that promotes new approaches to strengthen cybersecurity

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18. Office of Assistant to Deputy Cabinet Secretary for State Documents & Translation. (2019, June 27). President Jokowi Issues Regulation on Satu Data Indonesia. Setkab. https://setkab.go.id/en/president-jokowi-issues-regulation-on-satu-data-indonesia/.
19. Open Government Indonesia. (n.d.). Developing One Data Indonesia Action Plan at Local Government Level. https://ogi.bappenas.go.id/en/Komitmen_III#rencana-aksi-ogi.
20. Open Government Partnership. (n.d.). Implement One Data Indonesia policy (IDO113). https://www.opengovpartnership.org/members/indonesia/commitments/IDO113/.
21. Kearney. (2021, March). Unlocking the next wave of digital growth: beyond metropolitan Indonesia. https://www.kearney.com/service/digital-analytics/digital/article/-/insights/unlocking-the-next-wave-of-digital-growth-beyond-metropolitan-indonesia.
22. Surfshark. (2022, October 19). Data breaches rise globally in Q3 of 2022. https://surfshark.com/blog/data-breach-statistics-2022-q3.

Artificial Intelligence Collaborative Industrial Research and Innovation (KORIKA)

In order to achieve the goals of industrial research and innovation in AI, the AI Collaborative Industrial Research and Innovation (KORIKA) was founded. In recognizing the importance of the quadruple helix collaboration ecosystem within the government—namely collaboration between academia, businesses, and communities—the KORIKA was established as an orchestrator to drive research and innovation efforts in line with Indonesia's Industry 4.0 aspirations.

The Ministry of Research and Technology/BRIN acts as the primary executing institution and is supported by other relevant ministries. Other institutions and business sectors can participate in an advisory capacity. The tasks and functions of KORIKA include governance, execution, and program management for industrial research and innovation in the field of AI, including setting priority programs, coordinating flagship research centres, supporting policy development, and monitoring program implementation. According to the AI Strategy, the idea behind the establishment of KORIKA is to achieve quick wins and promote continuous progress in AI technology. KORIKA was effectively established on August 10, 2021, and participated in the AI Innovation Summit 2021.[23]

23. KORIKA. (2021). Tentang KOKIRA. https://korika.id/tentang-korika/.

Recommendations

Our recommendations are based on our research which included a review of Indonesia's national AI strategy, Digital Indonesia Vision 2045, and other seminal related publications (e.g. Making Indonesia 4.0, Indonesia 2045, etc.). This research was complemented with insights from a) an ongoing global project that has examined national AI strategies since 2019,[24] b) a previous project that led to the design of an AI maturity model for the public sector,[25] and c) an interview and written statement by the Special Advisor to the Minister of ICT in April 2024. These recommendations also may be helpful for other governments to consider and adapt for advancing AI in their national or subnational contexts.

Recommendation 1: Immediate and sustained investment to modernise Indonesia's digital infrastructure

To have any chance of realising Indonesia's ambition with AI and other emerging technologies (e.g., quantum computing), Indonesia must invest immediately to significantly upgrade its digital infrastructure. Upgrading the nation's digital infrastructure will not happen instantaneously and hence it is vital that the funding program be sustainable for the long-haul. Using Abraham Maslow's hierarchy of need framework, one can consider this recommendation akin to addressing physiological needs.[26] Indonesia must fix issues such as poor digital connectivity, uneven access to computing resources, and other digital disparities across the nation.

24. Denford, J. S., Dawson, G. S., & Desouza, K.C. (2023, April 25). WEIRD AI: Understanding what nations include in their artificial intelligence plans. https://www.brookings.edu/articles/weird-ai-understanding-what-nations-include-in-their-artificial-intelligence-plans/.
25. Desouza, K. C. (2021). *Artificial Intelligence in the Public Sector: A Maturity Model*. IBM Center for The Business of Government. https://www.businessofgovernment.org/report/artificial-intelligence-public-sector-maturity-model.
26. Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370–396.

Recommendation 2: Bolster cybersecurity capabilities

Building on the Maslow's hierarchy of need analogy, Indonesia must also ensure safety needs for digital infrastructure are met. From 2004 to 2024, Indonesia had around 156 million data breaches, accounting for almost 1 percent of global breaches, the 13th country in the global rank. The rate of cyberattacks is currently on the rise with an increase of 1.61 percent in the first quarter of 2024 compares to the last quarter of 2023.[27] Before one can design, develop, and deploy AI systems responsibly, one must ensure that its digital infrastructure is secure and robust. More recently, a cybersecurity ransomware incident involved attacking the Surabaya temporary data center.[28] To date, Indonesia has invested heavily to move the public sector to adopt and use digital systems, but such systens can be highly fragile and subject to routine disruption from adversaries. As such, before one adds more stress to an already unstable digital ecosystem, it is vital that a coordinated strategy be put in place to secure existing digital assets. Also helpful would be to rebuild cybersecurity architectures, strengthening BSSN's vision as the executive focal point in driving cybersecurity robustness.

Recommendation 3: Setup a general framework to promote responsible innovation with AI

Indonesia is at the nascent stage when it comes to exploring how AI affordances can modernise the public sector, its economy, and society-at-large. As such, it is too early from strong regulations on AI as the requisite experience base to design them does not exist. It is also not advisable to employ the wild west approach where anything goes. The country is well-placed to design a general framework that preserves the nation's Pancasila values. To foster responsible innovation the general framework should enable for coordination and collaboration across all levels of government, industry sectors, and the public to promote economies of scale, learning, and innovation. The general framework should outline the most significant behaviours and activities that should not be undertaken as well when it comes to AI systems. In addition, the government can strengthen risk-based approaches, responsibility, and ethics, while also supporting open innovation.[29]

Recommendation 4: Build and curate native datasets

Data is vital to design, calibrate, and test AI systems. Curating native datasets is vital for several reasons. First, these datasets are needed to build systems applications across the diverse set of languages spoken across the country. Second, getting residents and businesses, especially those that live in regional areas, to contribute data to digital responsibilities can lead to an increase in awareness and trust in AI systems. Third, native datasets should be representative of the entire population of the country. Finally, native datasets when curated and managed appropriately, will enable the Indonesian government to build on the efforts to date with One Data Indonesia.

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27.   Surfshark. (2024). Data Breach Monitoring. https://surfshark.com/research/data-breach-monitoring.

28.   https://www.reuters.com/technology/cybersecurity/cyber-attack-compromised-indonesia-data-centre-ransom-sought-reports-antara-2024-06-24/.

29.   Some citations to consider: on responsible AI please refer to this link: https://www.ibm.com/topics/responsible-ai on AI ethics please refer to: https://www.ibm.com/impact/ai-ethics on open innovation ecosystem for AI please refer to: https://www.ibm.com/policy/why-we-must-protect-an-open-innovation-ecosystem-for-ai/.

Recommendation 5: Invest in coordination

It is clear that Indonesia has bold ambitions when it comes to leveraging AI. To date, the efforts have covered a wide spectrum of program and initiatives. However, these efforts are loosely, if at all, coordinated. As such they are not sustainable and hold the country back when it comes to realising benefits such as economies of scale. It is vital that the government put in place an organisation that is responsible for coordinating the AI activities, even if just for initiatives within the public sector. Doing so will enable the organisation to conduct a thorough audit of where various agencies stand when it comes to their maturity with AI.[30] Our analysis has public agencies at either the ad-hoc or experimentation level when using the maturity model published by the IBM Center for The Business of Government. A designed agency responsible for AI innovation can ensure that issues such as poor datasets, lack of training, limited ethical guidance, and even raising leadership ambition on AI are addressed effectively and efficiently.

Recommendation 6: Form strategic international partnerships to accelerate AI capacity and capability building

Organic AI capacity building and capability uplift is not a viable strategy. Given the dire shortage of skilled AI capacity both within and beyond the Indonesian public sector, it is vital to leverage international partnerships. International partnerships can accelerate knowledge transfer and even enable Indonesia to be more efficient in moving up its AI maturity. There is evidence showing that transnational collaboration is indeed a powerful tool to overcome capacity challenges related to innovation in developing countries.[31] This does not mean that Indonesia must give up its sovereign strategy and native dataset ambitions. Well-build collaborations support the generation and transmission of useful knowledge, enhances leadership, and support structural arrangements that Indonesia needs to develop its AI capacity and then its own and sovereign AI ecosystem and datasets. In a step in this direction, industry can help by offering opportunities to increase skills.[32] Indonesia could also embrace and foster south-to-south cooperation to strengthen the transfer of knowledge and technologies between emerging economies. Indeed, according to the Advisor to the Minister of ICT, this is already being planned as a way of allowing local actors to compete globally. A global AI alliance that IBM has helped to drive also provide an opportunity to collaborate with other governments, and to strengthen capacity.[33]

30. Desouza, K. C. (2021). *Artificial Intelligence in the Public Sector: A Maturity Model*. IBM Center for The Business of Government. https://www.businessofgovernment.org/report/artificial-intelligence-public-sector-maturity-model.
31. Picavet, M. E. B., L.S. de Macedo, R.A. Bellezoni, and J.S. Puppim de Oliveira (2023). How can Transnational Municipal Networks foster local collaborative governance regimes for environmental management?. Environmental Management, 71(3), 505-522. https://doi.org/10.1007/s00267-022-01685-w.
32. For example, IBM opened in Batam the IBM Academy for Hybrid Cloud and AI to support technical and professional skills and capabilities in this area to accelerate Indonesia's Digital Economy Roadmap.
33. https://newsroom.ibm.com/AI-Alliance-Launches-as-an-International-Community-of-Leading-Technology-Developers,-Researchers,-and-Adopters-Collaborating-Together-to-Advance-Open,-Safe,-Responsible-AI.

Recommendation 7: Design AI experimentation and innovation platforms

To foster coordination and collaboration on AI, the government should take its role as a platform seriously. Setting up forums (physical and virtual) that enable the citizenry to experiment on AI solutions is important. These platforms can be organised around grand challenges facing the nation. Crowdsourcing of expertise, prototypes, and complete solutions via digital platforms will also enable for citizen engagement on AI.[34, 35] The role of government is to setup the platform, create compelling problem statements around grand challenges, and then provide feedback and even scale solutions provided.

Recommendation 8: Design AI public value metrics

In our review of the various strategic plans on AI and digital innovation, there was a conspicuous absence of metrics that account for public value created by AI. To be clear, there were plenty of metrics and indicators in these various published artefacts. However, all of them focus on activity level indicators and in some cases were focused on recording outcomes, such as ICT development index or AI's on Gross Domestic Product growth. What is needed are metrics that also capture how AI is creating and enhancing public value. It is important to note that while the private sector has made significant progress in adopting AI and developing digital transformation strategies, these practices cannot be easily transferred to the public sector. This is because the use of technology in the public sector requires greater attention to how public value is maximized, which is more complex compared to maximizing shareholder value. AI can increase public value if it is used responsibly, but if it does not work as intended, the opposite can occur. For example, if a country fully deploys AI-enabled public services but public trust is damaged due to the government's tech-centric rather than citizen-centric approach, it might generate digital platforms that are not used by citizens. The inclusion of public value metrics can ensure that this does not happen.[36, 37]

34. Mergel, I., and K.C. Desouza. (2013). Implementing open innovation in the public sector: The case of Challenge. gov. *Public administration review*, 73(6), 882-890.

35. Desouza, K. C. (2012). *Challenge.gov Using Competitions and Awards to Spur Innovation*. IBM Center for The Business of Government. https://www.businessofgovernment.org/report/challengegov-using-competitions-and-awards-spur-innovation.

36. Fatima, S., K.C. Desouza, J.S. Denford, and G.S. Dawson (2021). What explains governments interest in artificial intelligence? A signaling theory approach. *Economic analysis and policy*, 71, 238-254.

37. Fatima, S., K.C. Desouza, C. Buck, and E. Fielt (2022). Public AI canvas for AI-enabled public value: A design science approach. *Government Information Quarterly*, 39(4), 101722.

Conclusion

Indonesia finds itself at a significant moment regarding its AI and digital ambitions. Recognizing the potential impact of AI on economic and social development, the government must take immediate action to upgrade the country's digital infrastructure and to enhance cybersecurity measures. Establishing a framework for responsible innovation that enables coordination and collaboration across all levels of government, industry, and the public to promote economies of scale, learning, innovation, and native datasets, and fostering coordination will be crucial steps toward creating an environment conducive to AI development. Strategic international partnerships will further accelerate capacity building, while the creation of AI experimentation platforms and public value metrics will increase citizen engagement and accountability. These considerations provide guideposts that other nations can learn from.

AI systems will continue to shape the economic development trajectory of nations. The government of Indonesia has recognised the transformative affordances that can be actualised if AI systems are designed, developed, and deployed at scale in a manner that is trustworthy and inclusive. While there are considerable challenges that must be addressed, focusing on the recommendations outlined in this report will enable Indonesia to serve as a model in forging ahead responsibly to ensure that it maximises public value.

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Desouza has authored, coauthored, and/or edited nine books. He has published more than 150 articles in journals across a range of disciplines including information systems (*Journal of MIS*), information science (*Journal of the American Society for Information Science and Technology*), public administration (*Public Administration Review*), political science (*Studies in Conflict and Terrorism*), technology management (*Technology Forecasting Social Change*), and urban affairs (*Cities*).Several outlets have featured his work including *Time, Sloan Management Review, Financial Times, Stanford Social Innovation Research, Harvard Business Review, Forbes, Businessweek, Wired, Governing, Slate. com, Wall Street Journal, BBC, USA Today, NPR, PBS*, and *Computerworld.*

Desouza has advised, briefed, and/or consulted for major international corporations, nongovernmental organizations, and public agencies on strategic management issues ranging from management of information systems to knowledge management, innovation programs, digital transformation, and leadership development. Desouza has received over $2.25 USD million in research funding from both private and government organizations.

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He has also international experience having worked several years for a consultancy in Hong Kong, and another consultancy in Brazil specialized in innovation. His research interests are innovation and collaboration in public sector, artificial intelligence, sustainability and cities.

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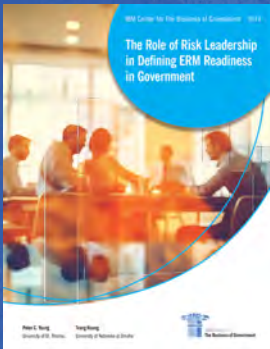
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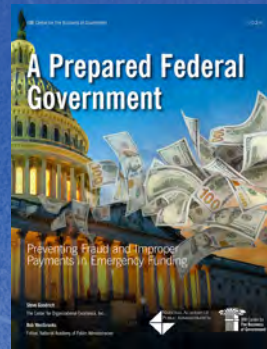
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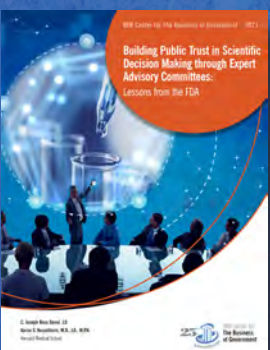
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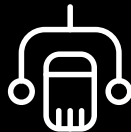# 25 YEARS CONNECTING RESEARCH TO PRACTICE

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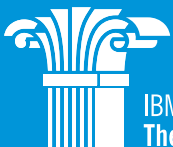
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