KEMENTERIAN SAINS,
TEKNOLOGI DAN INOVASI
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

MALAYSIA NATIONAL ARTIFICIAL INTELLIGENCE ROADMAP 2021-2025 (AI-RMAP)

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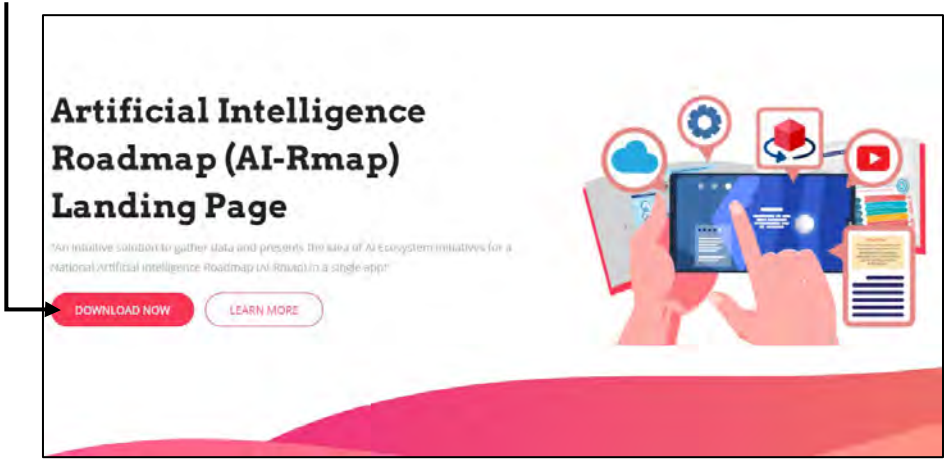

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The National Artificial Intelligence Roadmap (AI-Rmap) signifies the government's commitment and significant step forward in the field of AI. As Artificial Intelligence (AI) is one of the foundation technologies of the 4th Industrial Revolution, the AI-Rmap is a game-changer in Malaysia's quest to leapfrog and become a high-tech nation by 2030. AI-Rmap is aligned with the aims of the National Policy on Science, Technology and Innovation (DSTIN) 2021-2030, the 10-10 Malaysia Science, Technology, Innovation, and Economy Framework (10-10 MySTIE) and other national policies and programmes that support AI development and implementation, such as the Malaysia Digital Economy Blueprint and the National 4IR Policy.

The unprecedented disruption caused by the COVID-19 pandemic has unwittingly driven the innovation engine, which is often not the foremost priority for most organizations. Whilst the outbreak has caused significant disruptions to commercial operations and business relationships around the world, it has also unveiled hidden talents and innate capacity to learn and adapt ideas to local needs. AI has become more critical than ever when society has become increasingly reliant on technology. AI will play an essential role in bolstering Malaysia's economic resiliency and ensuring stability and competitiveness for all Malaysians.

In strengthening the nation's innovation ecosystem, we must increase AI growth and adoption. Most importantly, the government, industry, academia and society must come together and collaborate to deploy the AI solutions in addressing key national priorities. This quadruple helix will need to participate in cross-sectoral collaboration to secure world-class AI competitiveness. I hope this National AI Roadmap will provide a reference to boost Malaysians' quality of life by application of AI technology while also speeding up the country's transformation into a high-tech nation.

YANG BERHORMAT DATO' SRI DR. ADHAM BIN BABA
MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

The National Artificial Intelligence Roadmap (AI-Rmap) is a document that explains the development of artificial intelligence (AI) and demonstrates how the Malaysian government reacts to technological and environmental changes. At the Ministry of Science, Technology and Innovation, we recognise the role of AI in boosting our economy and showcasing Malaysia's true capabilities. We do not want to be a country that only uses and adopts technology; we want to be innovators in new fields.

AI-Rmap's vision is to increase employment opportunities and national competitiveness by expanding productivity and economic growth and making Malaysia more globally competitive. By leveraging AI as a significant technology engine, AI-Rmap will build a thriving and sustainable AI innovation ecosystem that will help Malaysia become a high-tech and high-income country.

The strategic quadruple helix partnership of government, academia, industry, and society (GAIS) is essential to the success of the AI-Rmap. It emphasises how AI can help Malaysia become a high-tech nation by bringing together relevant AI stakeholders. These parties should take a constructive stance in this new paradigm by actively co-designing the required environment and ecosystem to promote responsible AI design, AI growth, and emerging AI technologies in Malaysia.

The implementation and application of AI in our society are increasing and changing, and we are only at the beginning of a long journey. AI-RMap aims to address the complexities of enabling change, given the scope and importance of future AI applications.

YANG BERBAHAGIA DATUK IR. TS. DR. SITI HAMISAH TAPSIR
SECRETARY GENERAL
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

EXECUTIVE SUMMARY

The National Artificial Intelligence Roadmap (hereafter AI-Rmap) describes how Malaysia's AI capabilities will be harnessed, catalysed and propelled within the next 5 years, from 2021 until 2025. The COVID-19 pandemic has created an extraordinary crisis for countries all around the world. It has also been a catalyst for accelerating digital transformation and technology adoption in Malaysia. This roadmap urges all AI stakeholders to take a proactive stance in this new paradigm, actively co-designing the appropriate environment and ecosystem to support responsible AI design, development, and use in Malaysia.

AI-Rmap has three distinctive features in its development:

1. Strategic alignment with global and national strategy documents relevant to science, technology and innovation focus,
2. Strategic collaboration amongst Government, Academia, Industry and Society (GAIS, or Quadruple Helix), and
3. Fully 100% virtual and online meetings and presentations, from project inception to project completion, culminating into a living document placed in the cloud and an augmented reality based physical document.

Central to the AI-Rmap is the AI Innovation Ecosystem (AI-IE) Framework, with the AI Innovation Hub, also known as the AI-Catalyst, leveraging quadruple helix collaboration to expedite the implementation of national AI use cases (or projects) that would place Malaysia on the global AI map.

The main goal of AI-Rmap is to create a thriving and sustainable AI innovation ecosystem that will make Malaysia a high-technology and high-income nation by exploiting AI. Malaysia can be considered a high technology nation when the degree of which cutting edge technologies like AI become a critical driver of productivity and competitiveness for the whole economy, not only in the tech sector. The success of AI-Rmap lies in the strategic quadruple helix collaboration of government, academia, industry and society (GAIS), which is reflected in the collaboration of UTM, PIKOM and MOSTI to develop the AI-Rmap document.

Malaysia's development and use of AI is growing and evolving, and we need to accelerate this important journey. Given the breadth and significance of potential AI applications, AI-RMap seeks to overcome the challenges of enabling change. AI-Rmap is a living document that will continuously be revised along with changes occurring in the environment, to ensure the roadmap remains relevant and consistent with any new developments.

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1 Contextualizing AI in Malaysia

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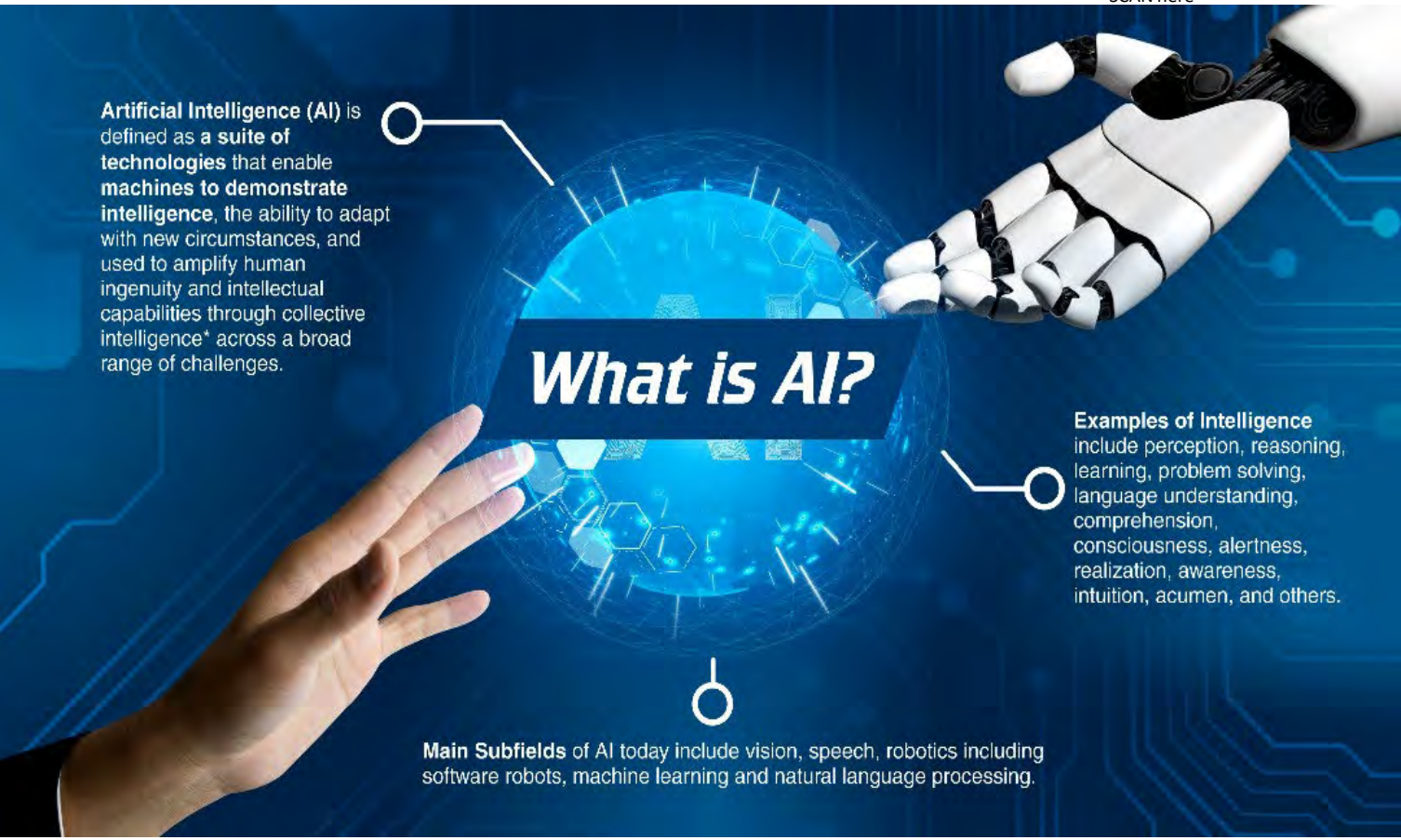
Artificial Intelligence (AI) is defined as a suite of technologies that enable machines to demonstrate intelligence, the ability to adapt with new circumstances, and used to amplify human ingenuity and intellectual capabilities through collective intelligence* across a broad range of challenges.
What is AI?
Examples of Intelligence include perception, reasoning, learning, problem solving, language understanding, comprehension, consciousness, alertness, realization, awareness, intuition, acumen, and others.
Main Subfields of AI today include vision, speech, robotics including software robots, machine learning and natural language processing.

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AI-Rmap Vision, Mission, Goals

VISION

"Make Malaysia a nation where Artificial Intelligence augments JOBS, drives NATIONAL COMPETITIVENESS, encourages INNOVATION & ENTREPRENEURSHIP to bring economic prosperity, social good and improves PEOPLE'S WELL BEING"

MISSION

"To create a THRIVING NATIONAL AI ECOSYSTEM that allows EVERYONE (government, business, and people) to capitalise on the BENEFITS OF AI in a SECURED AND SAFE manner for economic prosperity and social well-being"

5-YEAR GOAL

"To create a self-sustaining AI Innovation Ecosystem for AI development, leveraging quadruple helix collaboration guided by Responsible AI Principles"

By 2025, the future Malaysia envisioned by AI-Rmap will achieve the following:

STRATEGIES	SUB-GOALS
01 Establishing AI Governance	AI Coordination and Implementation Unit (AI-CIU)
02 Advancing AI R&D	A Robust AI R&D Ecosystem
03 Escalating Digital Infrastructure to Enable AI	Digital Infrastructure for AI
04 Fostering AI Talents	AI Talents and AI Skilled Workforce
05 Acculturating AI	Increased AI Awareness and AI Adoption
06 Kick-Starting a National AI Innovation Ecosystem	AI Innovation Hub

Strategies

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STRATEGY 1:
ESTABLISHING AI GOVERNANCE

- 1.1 Establishing AI Coordination and Implementation Unit (AI-CIU) responsible for successful implementation of the AI Roadmap
- 1.2 Establishing digital platform for multidirectional committee interaction and horizon scanning
- 1.3 Institutionalizing current cybersecurity policies and best practices for AI incorporation
- 1.4 Institutionalizing AI principles for AI implementation
- 1.5 Establishing clear guidelines for data sharing in government to enable AI implementation

STRATEGY 2:
ADVANCING AI R&D

- 2.1 Embarking on fundamental and applied R&D in the relevant entities within the AI Innovation Ecosystem
- 2.2 Encouraging AI Adoption in R&D for all fields (S&T and Non-S&T)
- 2.3 Institutionalizing AI within AI National Research Institutes
- 2.4 Leveraging AI within all National Research Institutes
- 2.5 Establishing clear guidelines for data sharing in government to enable AI implementation

STRATEGY 3:
ESCALATING DIGITAL INFRASTRUCTURE TO ENABLE AI

- 3.1 Enabling adoption of cloud computing and storage for AI
- 3.2 Enabling data sharing in AI Catalyst Consortium
- 3.3 Improving network and connectivity for wider access to digital infrastructure for AI

STRATEGY 4:
FOSTERING AI TALENTS

- 4.1 Offering comprehensive and inclusive AI Education
- 4.2 Reskilling and upskilling existing workforce
- 4.3 Attracting and retaining AI Talents

STRATEGY 5:
ACCULTURATING AI

- 5.1 Cultivating AI Awareness
- 5.2 Accelerating AI Adoption

STRATEGY 6:
KICK-STARTING A NATIONAL AI INNOVATION ECOSYSTEM

- 6.1 Establishing AI-Catalyst as the Innovation Hub to implement the Quadruple Helix AI Innovation Ecosystem Model
- 6.2 Implementing Proposed National AI Use-Cases focusing on AI-Driven Supply Chain
- 6.3 Establishing a Quadruple Helix Collaborative Platform for AI R&D&I
- 6.4 Engaging with Global Knowledge and Innovation Networks for AI

The Economic Impact of AI

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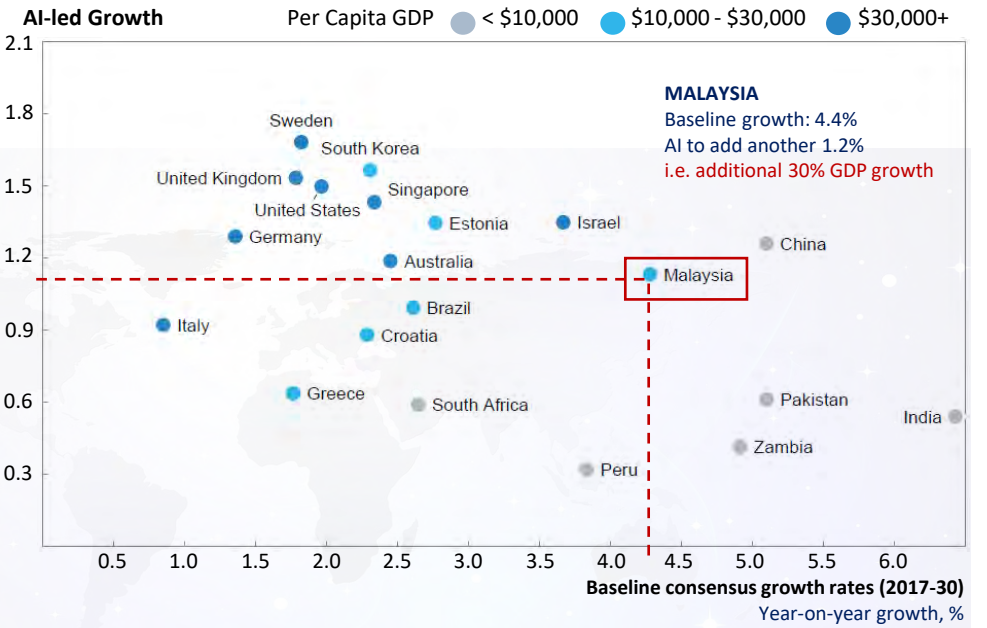
AI can transform the productivity and GDP potential of the global economy. Industry analysts and government believe that AI can be a great transformer for both developed and developing nations. Accenture research on the impact of AI in 12 developed economies concluded that AI has the potential to double annual economic growth in 2035 of gross value added by changing the nature of jobs and creating new relationships between human and machines. United Nations agencies have embraced AI as an accelerator for realizing the 2030 Agenda for Sustainable Development for all countries - poor, rich and middle income - to promote prosperity while protecting the planet. Nations ignoring these trends may miss out on economic opportunity and stay relevant as well as competitive in this fast-transforming digital world.



Using McKinsey data, simulation in 2018 reported that Malaysia's baseline growth is about 4.4%, and with AI-led growth, there is an additional 1.2% growth impact as shown in the figure. The additional 1.2 GDP percentage points on GDP growth leads to an increment of 30% GDP growth based on the 2018 baseline growth for Malaysia. With current events of Covid19 and other related factors, Malaysia GDP is not quite even at 4.0% and this framework (McKinsey) enables the AI-Rmap to evaluate and to calculate what is the expected GDP growth. In view of this, AI-Rmap is targeting towards at least an AI-led growth that aims for 30% increase in the GDP growth at the very least.

Due to the importance of AI for Malaysia, AI-Rmap proposes that an annual economic impact assessment should be carried out over during the RMK12 period. This will not only help Malaysian validate existing reports, but also becomes a measure of progress in the implementation of the National AI Roadmap.

2 AI Landscape

Government AI Readiness Index 2020

COUNTRY	GLOBAL RANK	REGIONAL RANK	SCORE
NORTH AMERICA			
USA	1	1	85.48
WESTERN EUROPE			
UK	2	1	81.12
EAST ASIA			
SINGAPORE	6	1	78.70
SOUTH KOREA	7	2	77.69
JAPAN	13	3	73.30
CHINA	19	4	69.08
MALAYSIA	28	5	63.66
ASEAN			
MALAYSIA	28	1	63.66
THAILAND	60	2	48.16
INDONESIA	62	3	47.53
PHILIPPINES	74	4	38.73
VIETNAM	76	5	34.00

Source: Oxford Insights

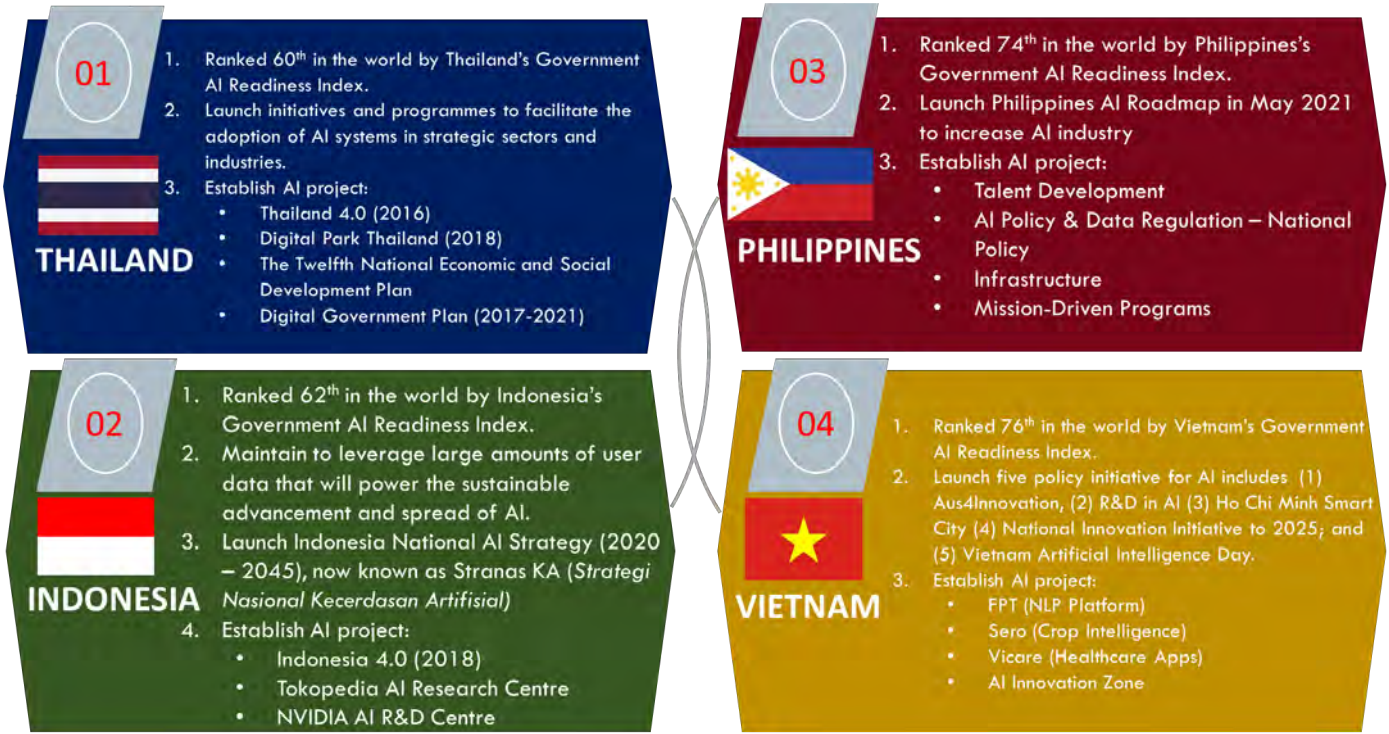
Global AI Leaders

US BENCHMARK	UK BENCHMARK
1. First ranked in the Government Readiness Index for **strong AI innovation ecosystems** across government, academia and industry, consistent with AI leadership standing criteria.	1. UK universities have produced w**orld-leading AI research centres**.
2. USA is one of the leading AI nations and focuses its efforts on **fostering AI innovations** in the private sector and encouraging AI adoption in government.	2. UK **AI strategy focus on the growth of the economy through widespread use of AI** technologies; ethical, safe and trustworthy development; and resilience in the face of change through an emphasis on skills, talents and R&D.
3. One of the key pillars AI Policy plan is focusing on **investments in R&D** to support AI innovations.	3. Boasts some of the **finest AI scientists** in the world.
4. Launch initiative to set out a strategy for maintaining the **USA's global leadership** in AI.	**4.** **Boosting AI** initial in business adoption, startup & scale-up support, public sector adoption, health and social care, climate change, and defense.
5. Improve commitment to **doubling the R&D spending** over the next 2 years.	5. Plan to be as the **global centre** for development, commercialization and adoption of responsible AI.
6. It has a solid foundation on which to build to **improve its human capital score**.	6. First ranked as performs well on the **data and infrastructure pillar**.

East Asia AI Leaders

COUNTRY	BENCHMARK
 CHINA	01 New Generation Artificial Intelligence Development Plan (2017) 02 AI Strategy Advisory Committee was also established in November 2017 to conduct research on strategic issues related to AI and to make recommendations. 03 Center for Security and Emerging Technology (CSET) in 2019.
 SINGAPORE	01 First ranked as the world's most prepared city for the age of AI and the global leader in terms of smart city effort, according to a new report by global consultancy Oliver Wyman (2019). 02 Launched AI Singapore, an integrated, impact-driven, research and innovation program in AI for the entire country which focuses on 4 key pillars – AI Research, AI Technology, AI Innovations and AI Makespace. 03 More than S$500 million to fund AI activities under the Research, Innovation and Enterprise 2020 (RIE2020) plan (2019).
 KOREA	01 National Strategy for AI (2019) to bolster the economy and improve living standards by 2030. 02 Invest KRW 2.2T (approximately US$1.9 billion) for R&D in AI and expansion of AI-related infrastructure as part of the nation's bid to transform the country into an AI heavyweight by 2022.
 JAPAN	01 Japan formulated Artificial Intelligence Technology Strategy (2017) which focuses on promoting AI development and developing phases and priorities for industrialization. 02 The execution of their AI policies is divided over three ministries: the Internal Affairs and Communication, Economy, Trade and Industry and Education, Culture, Sports, Science and Technology. 03 AI Core technology in Japan and has made its way into several policies and policy proposals, such as the Society 5.0, Japanese Moonshot program, and the cross-ministerial Strategic Innovation Promotion Program. 04 Has 200 to 300 AI-related companies, and it aims to stay a prominent player in the high-tech sector with AI as one of its vital components.

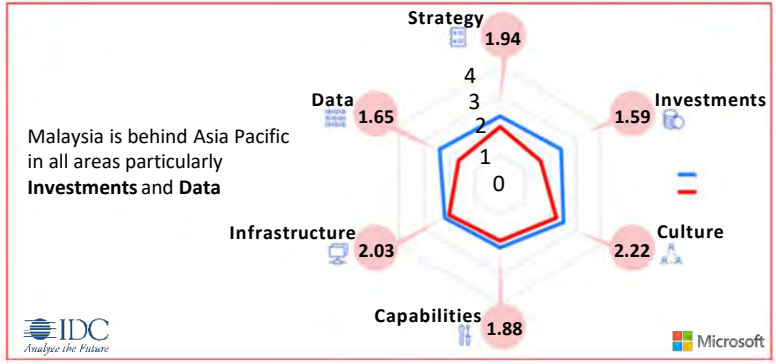
AI in ASEAN


01
THAILAND
1. Ranked 60th in the world by Thailand's Government AI Readiness Index.
2. Launch initiatives and programmes to facilitate the adoption of AI systems in strategic sectors and industries.
3. Establish AI project:
• Thailand 4.0 (2016)
• Digital Park Thailand (2018)
• The Twelfth National Economic and Social Development Plan
• Digital Government Plan (2017-2021)
02
INDONESIA
1. Ranked 62th in the world by Indonesia's Government AI Readiness Index.
2. Maintain to leverage large amounts of user data that will power the sustainable advancement and spread of AI.
3. Launch Indonesia National AI Strategy (2020 – 2045), now known as Stranas KA (*Strategi Nasional Kecerdasan Artifisial*)
4. Establish AI project:
• Indonesia 4.0 (2018)
• Tokopedia AI Research Centre
• NVIDIA AI R&D Centre
03
PHILIPPINES
1. Ranked 74th in the world by Philippines's Government AI Readiness Index.
2. Launch Philippines AI Roadmap in May 2021 to increase AI industry
3. Establish AI project:
• Talent Development
• AI Policy & Data Regulation – National Policy
• Infrastructure
• Mission-Driven Programs
04
VIETNAM
1. Ranked 76th in the world by Vietnam's Government AI Readiness Index.
2. Launch five policy initiative for AI includes (1) Aus4Innovation, (2) R&D in AI (3) Ho Chi Minh Smart City (4) National Innovation Initiative to 2025; and (5) Vietnam Artificial Intelligence Day.
3. Establish AI project:
• FPT (NLP Platform)
• Sero (Crop Intelligence)
• Vicare (Healthcare Apps)
• AI Innovation Zone

IDC Study on AI Adoption in Malaysia

In 2018, Microsoft commissioned a study by the International Data Corporation (IDC) involving 100 business leaders and 100 workers in Malaysia to better understand how they are embracing AI, harnessing its capabilities, and understanding the key barriers to greater and faster adoption. This was part of a wider study involving 15 geographies across Asia Pacific that provides a useful benchmark when studying a country. The IDC study on adoption is based on an organization's readiness to adopt AI using a Readiness Model that involve 6 dimensions including strategy, investments, culture, capabilities, infrastructure and data.

The result of the study is illustrated in the top figure which shows that Malaysia will have to catch up with APAC on her readiness to adopt AI. The key areas of opportunity for Malaysian organization to improve are data and investments in digital platforms. In other words, Malaysian organizations will need to improve their data governance to leverage on the potential of their data and invest in digital platforms such as hyper-scale intelligent cloud rather expansion of their traditional IT infrastructure



International Data Corporation Study: Asia Pacific and Malaysia AI Readiness

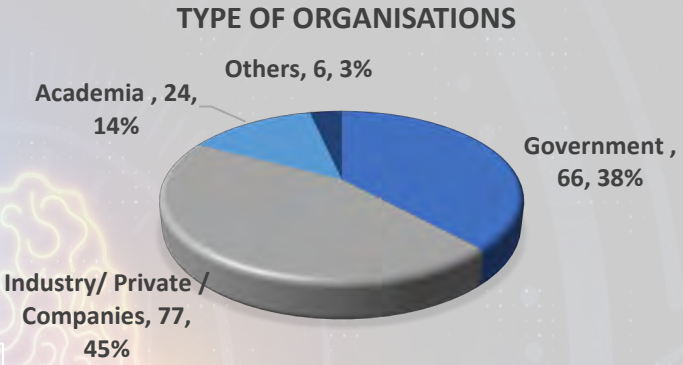
Deeper analysis of the survey shows that most business leaders and workers believed that cultural traits that support AI journeys namely risk-taking, proactive innovation, cross-function partnerships among teams are not pervasive today. This in turn leads to the lack of leadership commitment which will likely lead to lack of investments in the digital skills as well as tools and infrastructure to drive AI-enabled digital transformation. The study discovered that Malaysia's business leaders and workers held positive viewpoints about the AI's impact on the future of jobs. Specifically, more than half (67% of business leaders and 64% of workers) believed that AI will either help to do their existing jobs better or reduce repetitive tasks.

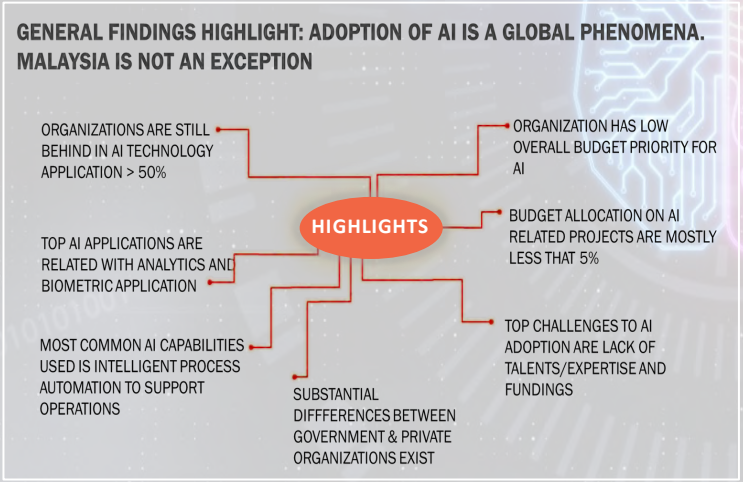
Clearly business leaders in Malaysia require a mindset change to embrace a new culture where innovation and continuous learning are core components of the organizational culture. It sets the stage for agility, adaptability, and growth. The study also showed that those who were brave enough to embrace a growth mindset and to implement digital transformation leveraging on AI saw tangible business benefits from AI. This is not only from a cost leadership point of view through improved efficiency and higher employee productivity, but also from strategic business advantage through accelerated innovation, higher competitiveness, and better customer engagement as shown in bottom figure.

Benefits from AI implementation today (2018) and after 3 years

Malaysian Artificial Intelligence (AI) Roadmap Survey: OVERVIEW

The Malaysian Artificial Intelligence (AI) Roadmap Survey was performed in 2021 in order to better understand the state of AI use and development in various economic sectors across the country, as well as to aid the government in developing an AI roadmap. The survey was conducted with the goal of assessing the state of AI development in the quadruple helix (government, business, academia, and society) in terms of governance, infrastructure and data, talent and technology, research and development, and innovation. The survey received 173 valid answers from Quadruple Helix organizations.





Malaysia (AI) Roadmap Survey Content

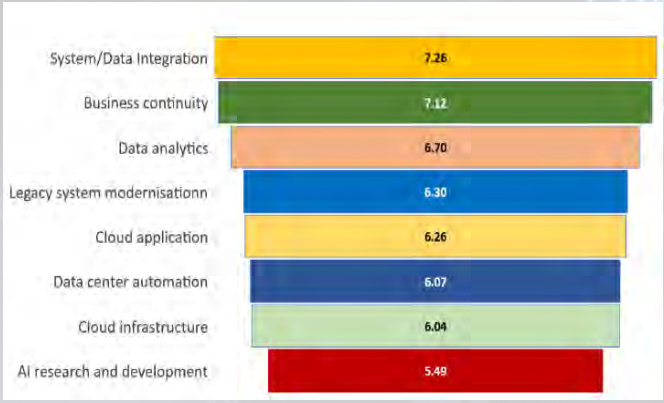
- BUDGET PRIORITIES
- AI ADOPTION
- AI CAPABILTIES & FUNCTIONS
- GOVERNANCE
- INFRASTRUCTURE & DATA
- AI TALENT
- TECHNOLOGY, R & D, & INNOVATION
- CHALLENGES

Malaysian Artificial Intelligence (AI) Roadmap Survey : AI GOVERNANCE

Current status of data security policy/program

More than half of the organizations have a security policy in place. However, just half of those surveyed feel their programme is either well established or established.

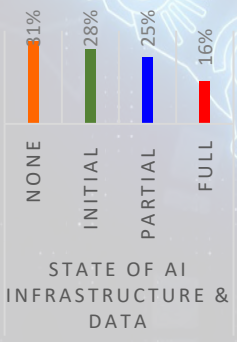
Organization's operational expenditure priority



AI Governance initiatives: Perceived stage of implementation

Initiatives	Initial (%)	Partial (%)	Full (%)	None (%)
Ensured that AI application/system is secured	27.7	18.4	16.3	37.6
Ensured inter-departmental integration throughout the organization	28.4	19.9	12.1	39.7
Safeguarded the transparency in protecting privacy to the users	24.8	18.4	16.3	40.4
Studied, reviewed and update on related AI policies and regulations to accelerate AI development	30.5	14.2	7.8	47.5
Established dedicated task force/committee for planning, implementing and managing AI initiatives.	28.4	11.3	12.8	47.5
Established a policy making support system to protect users	25.5	13.5	12.8	48.2
Developed risk management and cyber security policy for AI	27.7	12.1	10.6	49.6
Updated the legal system to promote AI development	21.3	13.5	7.1	58.2
Established the right regulations and ethical frameworks to implement AI	19.9	12.1	9.9	58.2

Malaysian Artificial Intelligence (AI) Roadmap Survey : INFRASTRUCTURE AND DATA THAT SUPPORT AI



For Infrastructure and data that support AI, the survey comprises information about

- Data sharing activities
- Storage capabilities
- Policy and mechanism
- Infrastructure
- Networks
- Computing resources
- Security

Overall findings indicate good overall computing infrastructure. But majority of the organizations are at the initial stage of capabilities to support AI.

Infrastructure and data capacity for continuous use, development and implementation

CAPACITY	HIGH (%)	MEDIUM (%)	LOW (%)
Storage capacity	***	**	*
Bandwidth	***	**	*
Network Latency	**	***	*
Secured data	***	**	*
Performance computing resources	***	**	*
Cost effective AI solutions	*	**	***

AI-related activities &implementation

AI activities and implementation	None (%)	Initial (%)	Partial (%)	Full (%)
Infrastructure for data storage and sharing	18.8	30.8	27.8	22.6
Data storage in cloud	22.6	30.8	27.1	19.5
Data for inter-department resource sharing (eg. Cloud sharing)	23.3	29.3	27.8	19.5
Security measures against threat to organisational data	25.6	27.8	24.8	21.8
Descriptive and diagnostic analytics	33.1	30.1	21.1	15.8
Techniques and processes facilitate data sharing across functional lines	33.8	24.1	23.3	18.8
Inter-departmental integration throughout the organisation	35.3	26.3	30.8	7.5
Policy and mechanism for sharing data with other organizations	36.8	27.1	21.8	14.3
Predictive and prescriptive analytics	40.6	27.8	20.3	11.3
External data used for business intelligence and analytics	41.4	27.1	22.6	9

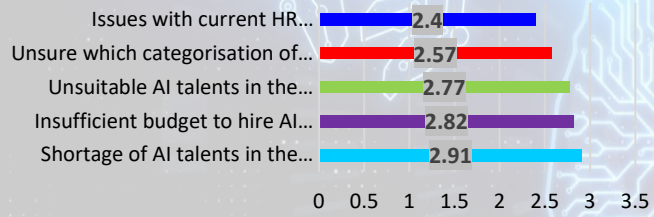
Malaysian Artificial Intelligence (AI) Roadmap Survey: AI TALENTS

The survey related to talents includes

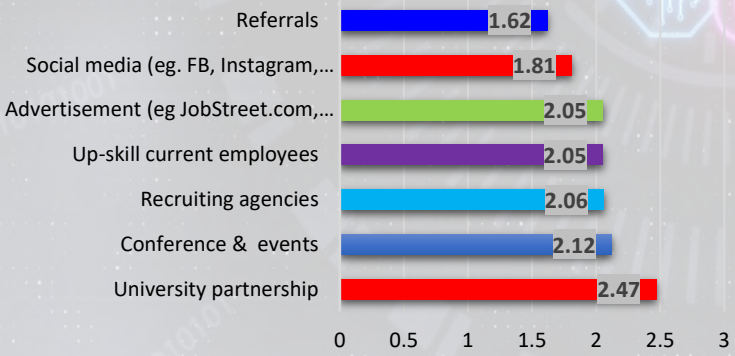
*Talent headcount and projection
*Activities that promote talent
*Hiring channels/ resources
*Challenges

The challenges in sourcing AI talents are mainly **shortage of talents** in the market and **insufficient hiring budget.**

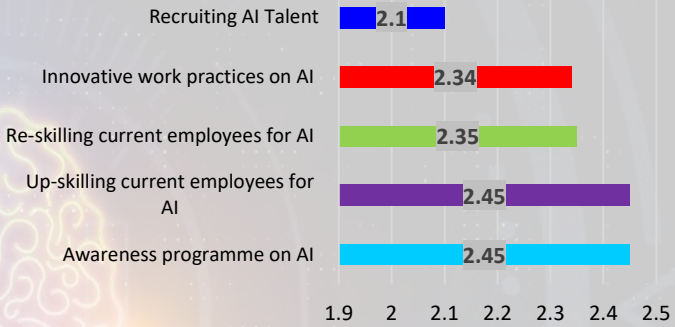
Issues in AI Talent Sourcing



Source or channels to hire AI talents



Activities to accelerate the AI talents

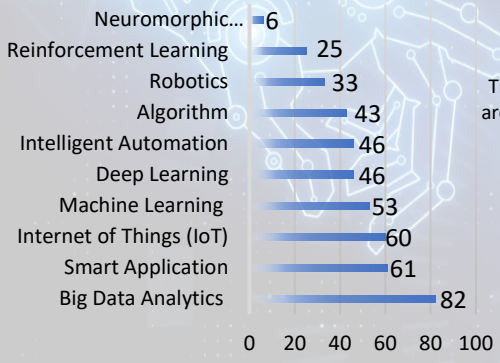


Current and future AI talent needs

Professionals	Current Total Headcount	Target Total Headcount (by 2025)	Percent change
Data Analyst	149	339	128%
Data Engineer	94	263	180%*
Software Engineer (for AI-related activities)	114	259	127%
Data Scientists (including Jr. and Sr.)	201	432	115%
Product Engineering (focus on AI applications)	70	205	193%**
AI Architect	40	171	328%***

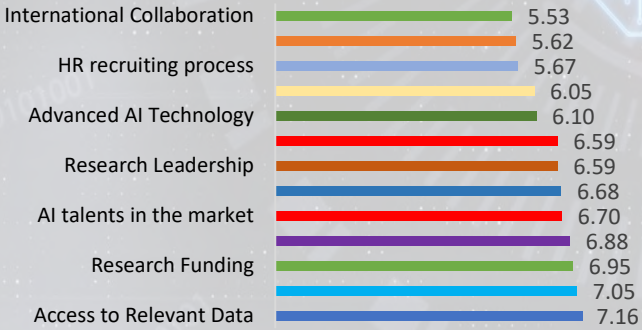
Malaysian Artificial Intelligence (AI) Roadmap Survey : TECHNOLOGY, RESEARCH & DEVELOPMENT, & INNOVATION

Areas of AI R&D

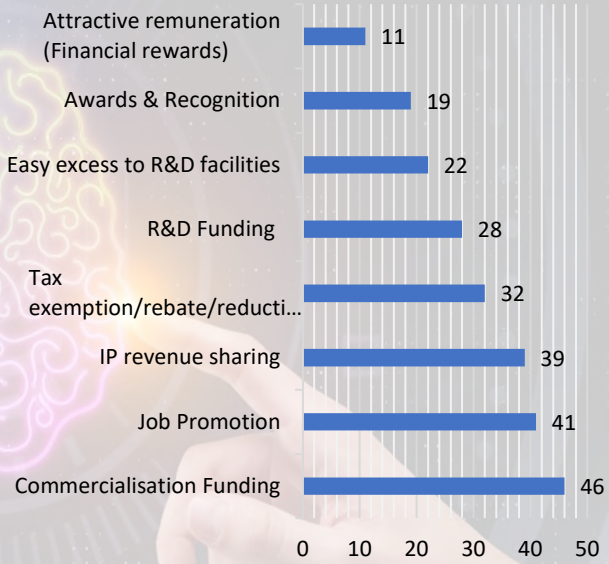


The most common areas of the AI R&D are big data analytics, smart applications and IOTs.

Important elements that promote AI R&D, &I



Incentives available in promoting AI R&D, &I



Malaysian Artificial Intelligence (AI) Roadmap Survey :
STATUS OF AI IN MALAYSIA

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While the survey has its own limitations, the knowledge gained from the analysis can provide useful insights into the AI adoption and implementation in Malaysia within relevant Quadruple Helix quadrants. Investigation on the differences between organizations was made only for the private and the public sectors as there was sufficient unit of analysis acquired in the data. Some of the conclusions provided below are supported by the statistical analysis of the survey, which are detailed out in the full survey report.

Budget and governance

Budget priority is reasonably high on technologies and infrastructure that can support AI

Organizations are allocating less budget for AI related projects and development

AI governance initiatives are mostly at the initial stage

The public sector is significantly behind in some aspects of governance and monetary support.

Infrastructure and data

AI Infrastructure and Data activities are mostly at the initial stage

Majority of the organizations have high capacity in storage, bandwith, computing performance, secured data, and network latency, hence indicating a good readiness for AI

Talents

High growth needs for AI related expertise for the next five years.

Organizations engaged less in activities that accelerate the AI talents.

Talent issues - shortage and insufficient budget top the list.

The private sectors lead in most aspects of promoting and acquiring AI talents

AI Innovation and R&D

Important elements that promote AI R&D - Access to relevant data, budget, funding, network and linkages, and availability of AI talent in the market top the list.

Majority of organizations have no incentives to promote AI R&D.

The private sectors lead in most aspects of AI R&D

Examples of AI Adoption in Malaysia

The level of AI adoption is in nascent stage, and many organizations in Malaysia have begun several AI initiatives. The following quadruple helix sectors (ie Government, Academia, Industry, Society) provides evidences of the AI adoption in Malaysia.

1. Government

Both Federal Government and the State Governments have embarked on numerous AI initiatives. With the wider push for AI, many federal and state agencies are accelerating their adoption of AI. Several agencies of note are the Malaysian Investment Development Authority (MIDA) and the Malaysia Automotive Robotics and IOT Institute.

Federal	State
High-Tech Nation Council provides strategic direction for emerging technologies	Many states included AI Adoption in their strategic plans. Examples: ▪ Johor 4.0 ▪ Pelan Strategik Melakaku Maju Jaya 2035 ▪ Penang2030 ▪ SUK Perak 2021-2025 ▪ Sarawak Digital Economy Strategy 2018-2022 ▪ Smart Selangor 2025
MIDA promotes AI among SMEs	
MARii developed DEVhub Prime online platform that adopts AI and big data in matching algorithm	
Chatbots introduced in KWSP and MOSTI portals.	

Examples of AI Adoption in Malaysia

2. Academia

AI is offered as an academic programme in 17 Malaysian public and private universities, at both undergraduate and postgraduate levels. However, very few of these programmes explicitly state Artificial Intelligence in the degree conferred as AI is usually offered as a course rather than as a programme. Other courses which are related to AI include Machine Learning and Data. There are also three AI Centre of Excellence in public universities and collaborations with industry to cultivate AI talents was implemented.

AI Academic Programmes in Malaysian Universities	Center of Excellence for AI in Malaysian Universities	University-Industry to Cultivate Industry Ready AI Talents
AI Specialization in Undergraduate programmes in: |UM|UTeM|APU|Monash (Sunway)|MMU|UCSI |Nottingham Malaysia|Southampton Malaysia|UOW Malaysia KDU U College|	▪ Center for Artificial Intelligence Technology (CAIT) UKM ▪ Centre for Artificial Intelligence and Robotics (CAIRO) UTM, ▪ Institute of AI and Big Data (AIBIG) UMK	Skymind Holdings Berhad joined forces with Universiti Teknologi Malaysia (UTM) and Universiti Sains Malaysia (USM) with a collaboration to cultivate industry-ready AI talents.
AI Master programme in: IIUM|UKM|UniMAP|UMS|UPM|UTEM|IIUM|Taylor's |UTAR		
AI Doctoral program in: IIUM|UM|UniMAP|UMS|UPM|UTEM|AeU| Monash (Sunway)|		

Examples of AI Adoption in Malaysia

3. Industry

Many industry players in Malaysia have either initiated or are actively involved in various forms of AI projects and programs. Amongst these are Petronas, Telekom Malaysia, Huawei Malaysia, and Seeloz.

- PETRONAS: uses AI to manage platform data - New technology to the Oil and Gas industry is introduced by moving away from condition-based monitoring and conventional analytics and toward predictive maintenance driven by predictive analytics. In the Dulang platform, VROC AI validated the failure root causes 2000 times faster and saved RM 15 million in cost avoidance.
- Microsoft (Malaysia) Sdn. Bhd: supports researchers, nonprofits and organizations globally covering multiple disciplines such as environment, accessibility, human issues, cultural heritage and health through their AI for Good initiatives. Further, ethical AI practices are enforced throughout the organization via their Responsible AI program.
- Seeloz Inc: an AI company based in Silicon Valley, California but with deep roots in Malaysia, is an emerging global leader in Supply Chain Automation. Leveraging Artificial Intelligence (AI), Seeloz introduced Supply Chain Automation Suite (SCAS), the world's first Autonomous Requirements Planning (ARP), that redefines supply chain planning across the distinct types of supply chains.
- Telekom Malaysia Berhad ™: signed a Memorandum of Agreement (MoA) with Huawei Technologies (M) Sdn Bhd (Huawei), sealing a collaboration that expands its cloud infrastructure offered through TM ONE
- Huawei: a leading global provider of information and communications technology (ICT) infrastructure and smart devices, employing 197,000 employees in 170 countries, and serving more than 3 billion people. The company serves more than 80% of Malaysians through fixed and mobile telecommunications solutions and is proud to be a part of the nation's digital transformation journey.

Examples of AI Adoption in Malaysia

Many international companies and digital startups companies in Malaysia are already leveraging on AI to stay relevant and be competitive in this new world. PIKOM, MAGIC, TPM and MDEC have reported a total of more than 100 companies associated with AI. Data from MDEC shows that AI in Malaysia is mainly used in the areas associated with analytics, while having the opportunity to grow other areas of applied AI.

List of AI Companies and Startups in Malaysia

List of AI and Big Data Analytics related companies which are members of PIKOM members		
1.ADF Technologies Sdn Bhd	13.Lenovo Technology Sdn Bhd	25.Strateq Sdn Bhd
2.Adv Fusionex Sdn Bhd	14.Macrovention Sdn Bhd	26.Sunway Quantum Sdn Bhd
3.Avenga Malaysia Sdn Bhd	15.Matrix Connexion Sdn Bhd	27.Synergy Log-In System Sdn Bhd
4.Axiata Digital Labs (Pvt) Limited	16.Mesiniaga Berhad	28.TERAS Teknologi Sdn Bhd
5.Crayon Software Experts Sdn Bhd	17.NEC Corporation of Malaysia Sdn Bhd	29.TOMTOM Navigation Malaysia Sdn Bhd
6.Eighth Intuition Sdn Bhd	18.Orangefin Asia Sdn Bhd	30.Top Click Sdn Bhd
7.FPT Software Malaysia Sdn Bhd	19.PanPages Labs Sdn Bhd	31.Trisilco IT Sdn Bhd
8.Hewlett Packard (M) Sdn Bhd	20.Promeritus Sdn Bhd	32.VADS Berhad
9.Hitachi Vantara Sdn Bhd	21.RAMS Solutions Sdn Bhd	33.Xperanti IOT (M) Sdn Bhd
10.Huawei Technologies (M) Sdn Bhd	22.Saltyskins Sdn Bhd	34.Zadara Storage Inc.
11.IBM Malaysia Sdn Bhd	23.SAP Malaysia Sdn Bhd	35.Microsoft (Malaysia) Sdn Bhd
12.Knight Information Solutions Sdn Bhd	24.Softline Solutions International Sdn Bhd	

MAGIC and TPM list of AI and Big Data Analytics related companies that develop AI products and/or rely on AI in their business				
1.Glueck Technologies	9.DF Automation	17.Robopreneur	25.Braintree Technologies	32.Precision Agriculture Robotics
2.Otomate.me	10.Biztory	18.Food Market Hub	26.Cloudbreakr	33.OFO Tech
3.Tapway	11.Fairwiz by EasyUni	19.Kravve	27.Alfie Tech	34.Geoprecision Tech
4.Poladrone	12.Billplz	20.BoomGrow	28.Naluri	35.Core Expert
5.Dropee	13.MoneyMatch	21.Blinkware	29.Runcloid.io	36.Commaxion
6.Cedar Technologies	14.Retailetics	22.Soft Space	30.Oxygen Resources	37.Y Us
7.Favoriot	15.ServisHero	23.Firegent iASP	31.Inference Tech	38.BNetwork
8.DataMicron	16.EasyParcel	24.Kommu		

Other companies known to leverage AI in their business in Malaysia					
1.Luno, Malaysia	3.Axiata	5.Air Asia	7.Google	9.Grab	11.Shopee
2.Skymind Holdings	4.Telekom Malaysia	6.NVDIA Corporation	8.Amazon	10.Lazada	12.Seeloz Malaysia Sdn. Bhd

Type of Companies identified by MDEC involved in areas related to AI, Machine Learning and Advanced Analytics

Areas in AI, Machine Learning and Advanced Analytics	Number of companies
Automation	4
Data Analysis	14
Data Ingestion	9
Data Management	12
Data Preparation	8
Data Visualization	3
Descriptive analytics	20
IR 4.0	5
NLP	11
Platform enabler	17
Predictive analytics	12
Prescriptive analytics	10
Robotics	9
System integration	7
Total	**141**

Examples of AI Adoption in Malaysia

4. Society

There are several AI interest groups that have been in existence in Malaysia. Communities like AI Malaysia (Facebook) exist to discuss AI-related issues. They may be online communities or registered NGOs in Malaysia. They serve as an important source of views from the grassroots.

AI Society	Owner	URL
Artificial Intelligence Society UiTM Malaysia	UiTM	https://web.facebook.com/aisocietyuitm
Artificial Intelligence Society (ARTIS) Malaysia	NPO	http://www.sigtech.com.my/AI/
Malaysia Robotics & Automation Society (MYRAS)	NPO	https://myras.org/
Woman in AI	NPO	https://web.facebook.com/womenaimalaysia
Tensor Flow & Deep Learning Malaysia	NPO	https://web.facebook.com/groups/TensorFlowMY
R User Group Malaysia	NPO	https://web.facebook.com/rusergroupmalaysia
Artificial Intelligence Malaysia	NPO	https://www.facebook.com/groups/artificialintelligencemalaysia/

3 AI Innovation Ecosystem

Defining the AI Innovation Ecosystem

The AI innovation ecosystem (AI-IE) is an evolving, dynamic, inter-relational, and interactional network of quadruple helix actors, institutions, activities and digital capabilities that coevolve to form trusted, reliable and conducive environment wherein AI innovation could thrive supported by robust investment and policy frameworks. These crucial elements contribute to the quadruple helix actors' innovative performance, allowing AI adoption and implementation to thrive to address the right set of challenges that are aligned to national interests. Within the context of the National AI Roadmap, the ecosystem is virtual whose existence is not bounded by any physical boundaries or structures to ensure its resilience and agility. AI Innovation Ecosystem consists of six main actors:

AI-Catalyst	AI-Catalyst is the nucleus of the AI Innovation Ecosystem virtually hosting consortia established to address specific industry or public sector challenges with AI.
AI Coordination and Implementation Unit (AI-CIU)	It is responsible for the successful creation of a vibrant and dynamic AI Innovation Ecosystem, operationalization, and sustainability through strategic investments, supportive interventions and good governance that will eventually be self-sustainable.
AI Industry	From a business perspective, the AI Industry may include Multinational corporations (MNCs), Malaysian Companies, Startups (typically Agile small companies with breakthrough AI innovation), and National Research Institutes with internal AI practices who can contribute their domain expertise.
AI Socio-Economic Sectors	These include public and private organizations that have the desire to leverage AI-based solutions in their respective sectors to drive the required digital transformation needed to stay relevant and competitive in this Fourth Industrial Revolution.
AI and Data Science Professionals	These professionals are individuals with digital skills in AI and Data Science. These data professionals need to be managed as a virtual community where the industry can source expertise from. These professionals will need to be catalogued, nurtured through skilling (including re-skilling) and made visible to the AI Industry.
Education and Skilling	Tertiary institutions, schools and training centres will create a continuous supply of AI and Data Science Professionals with the relevant digital skills, knowledge as well as hands on experience in developing AI solutions. They will conduct both applied and fundamental research and development activities and offer professional programs relevant to AI.

AI Innovation Ecosystem

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AI-CIU (AI Governance)

- Issues
- Updates

- Enablers
- Guidelines
- Facilitation
- Incentives
- Expert communities
- Funding./funding management
- Monitoring
- Affordable trusted infrastructure
- Awareness

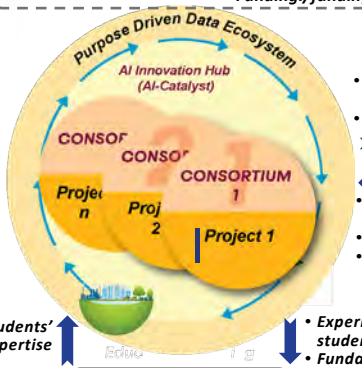
AI Industry

- MNC
- Malaysian Companies
- Startups
- AI-COE — Domain Specific National Research Institutes

Consultancy, Testing, Certification, Advisory, Data, Skilled AI Talents

- Platform/ products
- Expertise

- Revenue/ funding
- Strategic
- Double tax deduction



- Real applied problems
- Data

- Revenue/ funding
- Strategic
- Double tax deduction

Research students' expertise

- Experienced students
- Fundamental research funding

Research students

Experienced students' expertise

Education & Skilling

- Professional Program
- Applied Research
- Fundamental Research
- Postgraduate
- Undergraduate
- Schools
- Training Centres

Skilled AI Talents

Candidates

Skilled AI Talents

AI Socio Economic Drivers

- Energy
- Business & Financial Services
- Culture, Arts & Tourism
- Medical & Healthcare
- Smart Cities & Transformation
- Smart Technology & System
- Water & Food
- Agriculture & Forestry
- Education
- Environmental & Biodiversity
- Government
- IOT

Skilled AI Talents

AI and Data Science Professionals

GOVERNMENT G ACADEMIA A INDUSTRIES I SOCIETY S

Quadruple Helix Stakeholders

Key Actors in AI Innovation Ecosystem

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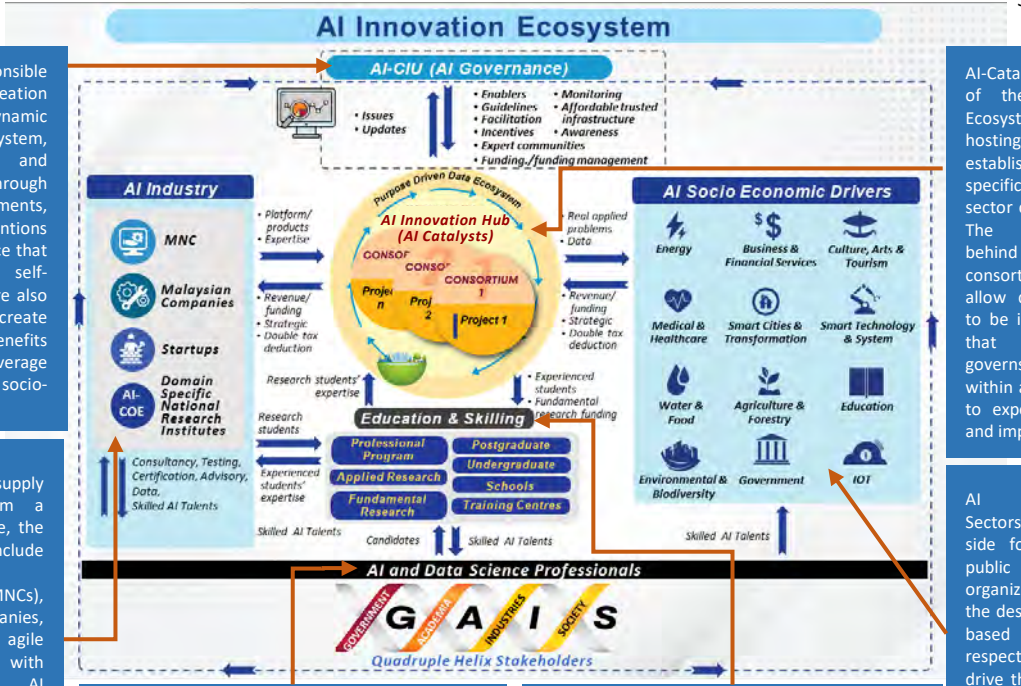
The AI-CIU is responsible for the successful creation of a vibrant and dynamic AI Innovation Ecosystem, operationalization, and sustainability through strategic investments, supportive interventions and good governance that will eventually be self-sustainable. They are also responsible to create awareness on the benefits of AI, and how to leverage this across all socio-economic sectors.

AI Industry is the supply side of AI. From a business perspective, the AI Industry may include Multinational corporations (MNCs), Malaysian Companies, Startups (typically agile small companies with breakthrough AI innovation), and National Research Institutes with internal AI practices who can contribute their domain expertise.



AI-Catalyst is the nucleus of the AI Innovation Ecosystem virtually hosting consortia established to address specific industry or public sector challenges with AI. The critical premise behind the industry-led consortium idea is to allow quad-helix players to be in an environment that facilitates and governs collaboration within a micro-ecosystem to expedite AI adoption and implementation.

AI Socio-Economic Sectors is the demand side for AI. These are public and private organizations that have the desire to leverage AI-based solutions in their respective sectors to drive the required digital transformation needed to stay relevant and competitive in this Fourth Industrial Revolution.

AI and Data Science Professionals are individuals with digital skills in AI and Data Science. They are in great demand. both at local and global levels. These data professionals need to be managed as a virtual community where the industry can source expertise from. These professionals will need to be catalogued, nurtured through skilling (including re-skilling) and made visible to the AI Industry.

Creates a continuous supply of AI and Data Science Professionals with the relevant digital skills, knowledge as well as hands on experience in developing AI solutions. This is achieved through the roles played by schools and tertiary institutions in conducting research and development activities and offering professional programs. Practical experience is derived from solving real world problems.

AI Innovation Hub (AI-Catalyst)

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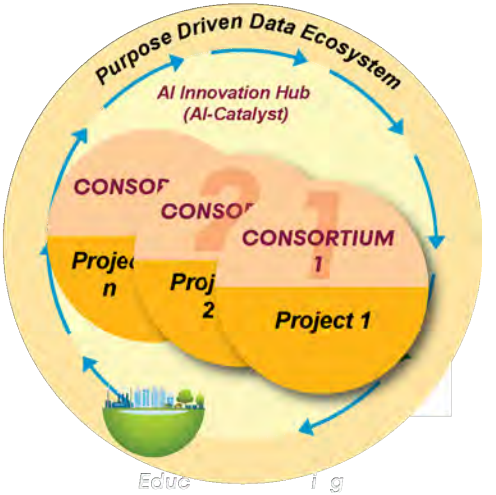
Central to this new conceptualization of the AI innovation ecosystem is a nimble, agile and resilient micro-ecosystem called the AI Innovation Hub (or in short, AI-Catalyst)). This is the nucleus of the ecosystem, that functions as an "AI factory". It hosts select consortia that bring together players from four key sectors - the quadruple helix - to address specific national challenges to create vertical-specific solutions.

AI-Catalyst is the nucleus of the AI Innovation Ecosystem. It virtually hosts consortia, each of which addresses specific industry or public sector challenges. The critical premise behind the consortia idea is to allow quad-helix players to be in an environment that facilitates (particularly data governance), and therefore allows AI solutions to be developed without hindrance, or at the very least, less hindrance to expedite AI adoption and implementation.



A consortium is an apt avenue for:

- Focusing efforts and critical mass in overcoming local and global shortage of AI talents
- Breaking traditional silos to monitor progress of AI-related activities while creating impacts
- Pooling various resources that include expertise, facilities, funding and networking
- Attracting international investments and partnership, beyond the conventional R&I scopes
- Increasing visibility of local AI talents, solutions and industries in the global arena
- Creating better access to networks and opportunities beneficial for all stakeholders
- Effectively pursuing large scale projects

AI Coordination and Implementation Unit (AI-CIU)

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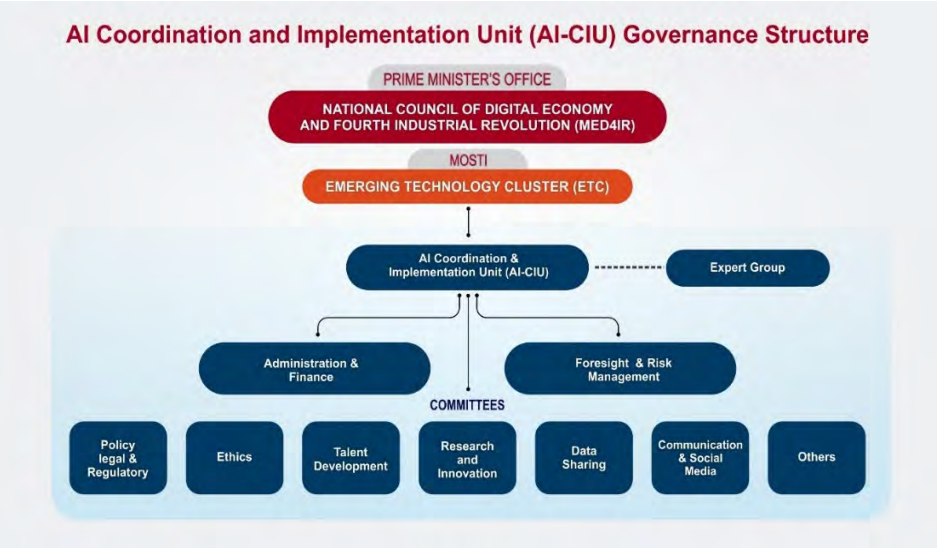
Role and Function: The AI-CIU will act as the apex government body on all matters related to AI. It will arbitrate all issues related to AI within the nation and will be directly answerable to the Minister for Science, Technology and Innovation. It will be a lean, independent organization in line with the latest systems thinking approach i.e., being adaptive and responsive (DSTIN 2030).

Modus Operandi: The first task of the AI-CIU would be to establish a Foresight Committee which will undertake horizon scanning, foresight and policy advocacy. The Foresight Committee will also inform the AI-CIU of relevant issues regarding emerging technologies that will inevitably incorporate Artificial Intelligence. (It will also serve the needs of Initiative B1 of DSTIN 2021-2030).



The Foresight Committee should include representatives from MIGHT (Malaysian Foresight Institute), MOSTI's Technology Foresight division and individual experts drawn from other ministries, academia, industries or the public. Representations from these entities can be rotated according to the agenda of the day.

Upon the recommendations of the Foresight Committee, the AI-CIU will establish ad hoc committees based on anticipated priorities. The committees will focus on HSE; R&D; AI and Digital Ethics and Laws etc.

For effective implementation of AI-Rmap, AI needs to be the engine of next-generation techno-social gamechangers such the Internet of Things (IoT); Fourth Industrial Revolution (4IR); 5th and 6th Gen Telecommunications (5G & 6G); Machine Learning; Robotics; Big Data Analytics (BDA); Security and Surveillance; and Quantum Computing.

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Principles for Responsible AI

1 Fairness

The use or deployment of AI must be designed to avoid biasness to the target audience that the AI solution is to be deployed to.

2 Reliability, Safety and Control

Any AI systems or solutions must be robustly tested to be reliable, safe and controlled to fall back to a safe state by default so that we can trust and depend on the AI solution.

3 Privacy & Security

AI systems should be safe, secure and performing as intended, and resistant to being compromised by unauthorised parties.

4 Inclusiveness

AI must be inclusive for all Quadruple Helix stakeholders including the need to avoid social clefts like "Digital Haves" and "Digital Have-Nots".

5 Transparency

AI algorithms should be transparent to ensure that any capabilities can be explained. This will allow organizations to evaluate the risks of AI and address issues that may arise.

6 Accountability

The implementers or entities deploying AI should be accountable for the success or failure of the AI solutions.

7 Pursuit of human benefit and happiness

AI is to promote the well-being of humanity, elevate human happiness and quality of life.

Principles of Responsible AI

Fairness	It is essential that AI does not limit opportunities for anyone – fairness is the foundation for treating people with dignity and respect. If AI systems provide guidance on medical treatment, loan applications or employment, for example, they should make the same recommendations to everyone with similar symptoms, financial circumstances, or professional qualifications.
Reliability, Safety and Control	AI systems should perform reliably and safely. The complexity of AI technologies has fueled fears that AI systems may cause harm in the face of unforeseen circumstances, or that they can be manipulated to act in harmful ways. Trust in AI systems will depend on whether they can be operated reliably, safely, and consistently even under unexpected conditions, especially for applications in fields affecting both lives and livelihoods such as transportation, healthcare, and financial services – where consequential decisions are involved.
Privacy and Security	People will not want to share their data if they do not believe it will be stored securely, used safely, and to a good end. It is essential that AI systems comply with applicable privacy laws, on the collection, use, and storage of data. The systems must be designed to protect personal data from bad actors who may steal private information or inflict harm otherwise.
Inclusiveness	AI systems should benefit everyone and address a broad range of human needs and experience, inclusively. For example, these technologies can become tools of empowerment for people who are physically or cognitively disabled (or any other minority groups), enabling them to gain access to opportunities that they may not have had before, in education, employment, and citizen services, thereby improving their overall health, socioeconomic situation, quality of life, and participation in society.
Pursuit of Human Benefits and Happiness	AI is first and foremost a tool; the purpose and objective of this tool should be to promote the well-being of humanity. By enshrining the goal of elevating human happiness and quality of life in our own national AI Ethics charter, we can start to address one of the five goals for AI in Malaysia as articulated in MDEC's proposed National AI Framework (NAIF): that is the intention to "solve people's problems to improve quality of life96
Accountability	Transparency is crucial because a lack of it tends to lead to suspicion and reluctance. The Malaysian public places significant value in organisations being transparent about what they do with people's data. Compared to the global average, Malaysians are more receptive to their data being used by organisations - both private and government - but one of the main conditions for allowing this is that they want to understand the risks involved.
Transparency	People who design and deploy AI systems must be accountable for how their systems operate. To establish norms and best practices, we can draw upon experience in other sectors such as healthcare. Internal review boards can provide oversight and guidance on which practices should be adopted during development and deployment of AI systems.

4 Strategies and Strategic Initiatives

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HORIZON 3 2025 onwards

Horizon 3 contains ideas for further growth down the road for the Nation and expansion to other related areas.

HORIZON 2 2023-2024

Horizon 2 focuses on emerging opportunities that require considerable investment by the Nation utilizing ***new annual operating expenditure (OPEX) and capital expenditure (CAPEX) budget***

HORIZON 1 2021-2022

Horizon 1 represents the activities most readily identified by the Nation. The focus is on improving the nation's usage of Artificial Intelligence, and ***maximize existing resources*** including budget by utilizing the existing operational expenditure allocated to the proposed lead agencies. In addition, during Horizon 1 the lead agencies need to plan and acquire resources for Horizon 2.

Strategies

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STRATEGY 1:
ESTABLISHING AI GOVERNANCE

- 1.1 Establishing AI Coordination and Implementation Unit (AI-CIU) responsible for successful implementation of the AI Roadmap
- 1.2 Establishing digital platform for multidirectional committee interaction and horizon scanning
- 1.3 Institutionalizing current cybersecurity policies and best practices for AI incorporation
- 1.4 Institutionalizing AI principles for AI implementation
- 1.5 Establishing clear guidelines for data sharing in government to enable AI implementation

STRATEGY 2:
ADVANCING AI R&D

- 2.1 Embarking on fundamental and applied R&D in the relevant entities within the AI Innovation Ecosystem
- 2.2 Encouraging AI Adoption in R&D for all fields (S&T and Non-S&T)
- 2.3 Institutionalizing AI within AI National Research Institutes
- 2.4 Leveraging AI within all National Research Institutes
- 2.5 Establishing clear guidelines for data sharing in government to enable AI implementation

STRATEGY 3:
ESCALATING DIGITAL INFRASTRUCTURE TO ENABLE AI

- 3.1 Enabling adoption of cloud computing and storage for AI
- 3.2 Enabling data sharing in AI Catalyst Consortium
- 3.3 Improving network and connectivity for wider access to digital infrastructure for AI

STRATEGY 4:
FOSTERING AI TALENTS

- 4.1 Offering comprehensive and inclusive AI Education
- 4.2 Reskilling and upskilling existing workforce
- 4.3 Attracting and retaining AI Talents

STRATEGY 5:
ACCULTURATING AI

- 5.1 Cultivating AI Awareness
- 5.2 Accelerating AI Adoption

STRATEGY 6:
KICK-STARTING A NATIONAL AI INNOVATION ECOSYSTEM

- 6.1 Establishing AI-Catalyst as the Innovation Hub to implement the Quadruple Helix AI Innovation Ecosystem Model
- 6.2 Implementing Proposed National AI Use-Cases focusing on AI-Driven Supply Chain
- 6.3 Establishing a Quadruple Helix Collaborative Platform for AI R&D&I
- 6.4 Engaging with Global Knowledge and Innovation Networks for AI

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STRATEGY 1: ESTABLISHING AI GOVERNANCE

With Artificial Intelligence being developed and deployed across all facets of human undertakings worldwide -- particularly in Developed Nations – there is an urgent need for Malaysia to prioritize the incorporation of AI intelligence into all four national helixes i.e. in the government, academia, private sector and civil society. This is a *sine quo non* for Malaysia to attain a Developed Nation status by 2030 or *even earlier.* The development of the national AI ecosystem would be led by a robust governance structure that will eventually subsume all aspects of civil administration. It will also oversee the development of AI sub-sectors (or industries impacted by AI) in the nation. The Ministry of Science Technology and Innovation (MOSTI) will play a centralizing role in this regard.

Currently Malaysia does not have a central AI governance coordination structure. Most AI activities are planned and implemented in silo. This siloed approach will vitiate industrial and societal competitiveness as well as efficiency in the area of public service delivery. As a result, many agencies incur needless financial, personnel and operational expenses. A clear and smooth communications platform, high level of information exchange, de-fragmentation of management as well as cross ministerial and cross-functional approaches are needed to reduce or control siloes effectively. The “un-siloed” paradigm necessitate the adoption of AI.

Additionally, AI governance will be aligned to, and simultaneously support the realization of the Shared Prosperity Vision 2030 and the Sustainable Development Agenda 2030. The Malaysian government had also established the Digital Economy and Fourth Industrial Revolution (4IR) Council in November 2020 to ratchet up the country's 4IR technological capabilities and ensure the overall growth of its digital economy.

As such, the country requires a clear AI policy, collective actions as well as a whole-of-nation approach instead the usual compartmentalized approach to governance. This new approach must be mainstreamed throughout all levels of the government through the adoption of AI-powered digital technologies.

Strategic Initiative 1.1 Establishing AI Coordination and Implementation Unit (AI-CIU) responsible for successful implementation of the AI Roadmap

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Establish AI-CIU and operationalize AI-CIU through appointment of permanent staff, establish committees and expert groups across the Economic, Environmental, Political Societal and Technological (EEGST).	Conduct a study on the Annual Economic Impact Assessment of AI.	Continue the Economic Impact Assessment of AI.	▪ Staffing for AI CIU ▪ 6 Committess –Policy & Regulation –Ethics –Talent, –R&D&I, –Data Sharing & –Communication & social media) ▪ 20 Expert Groups (EEGST)	MOSTI MITI KKMM MDEC
Develop clear roles and responsibilities (TOR) for all (AI Committee Members Expert Groups, and various committee including foresight committee).			▪ TORs	MOSTI MITI KKMM MDEC
Develop AI Digital Governance Model, reporting mechanism and measurement Index.	Develop and operationalize AI Governance Decision Making Model. Promote and implement Digital Governance Model across ministries and sectorial.	Determine effectiveness of Decision-making Model. This includes a working monitoring, evaluation and implementation mechanism for all AI undertakings. Monitor and evaluate the effectiveness of an AI-powered Digital Governance Model.	▪ AI Governance Digital Model ▪ Reporting mechanism ▪ Measurement Index ▪ Decision Making Model	MOSTI MAMPU MCMC

Strategic Initiative 1.1 Establishing AI Coordination and Implementation Unit (AI-CIU) responsible for successful implementation of the AI Roadmap (continued)

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Prioritize foundational aspects of AI-driven digital governance structure and measures (policy, regulation, standard, guidelines.	Review existing laws, policies, regulations and guidelines. Develop standards to support AI development. Develop AI Investment Fund Policy to nurture AI industries. Review existing incentives. Introduce AI Innovative Incentives.	Promote AI investment policy to the natural AI industry.	▪ Number of policy, regulation, guideline reviewed ▪ Number of standards developed ▪ Investment Fund Policy formulated ▪ Number of promotional programme ▪ Number of incentives	MOSTI MITI MCMC MOF
Develop the AI risk management system.	Promote and implement a risk management system.	Incorporate risk management into the Public-Private Partnership approach.	▪ Risk Management System	MOSTI
	Review the roles and functions of government research institutes/ organizations related to AI; Technology Park Malaysia, MIMOS Bhd.	Develop proposal on the Transformation of Technology Park Malaysia into National AI Park.	• Formation of National AI Park	MOSTI

Strategic Initiative 1.2 Establishing digital platform for multidirectional committee interaction and horizon scanning

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Establish AI stakeholders Communication platform (Digital Platform) to facilitate Quadruple Helix inputs for multidirectional interaction at the Expert Group levels.	Develop Digital Platform into a one-stop center for all emerging hi-tech and AI data that are relevant to all four helixes.	Expand Digital Platform for use in other ministries and agencies.	▪ A Stakeholder Communication Platform	MOSTI MAMPU
Source local talents and companies to create full-fledged Digital Platform.	Monitor citizen-led problems and AI solution.	Optimization of governance data sharing among stakeholders.	▪ Number of local talents ▪ Number of companies created	MOSTI MAMPU
Optimize Digital Platform (existing AI-Rmap Platform) to collate and harmonize all current policies related to AI, including policies related to cybersecurity, data sharing, intellectual property, privacy and individual rights, SMEs etc.	Probe and test resilience of Digital Platform and make necessary improvements	Incorporate predictive analytics component into Digital Platform to complement or augment AI initiatives.	▪ % of Digital Platform Optimisation	MOSTI MAMPU

Strategic Initiative 1.3 Institutionalizing Cyber Security policies for AI implementation

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Incorporate and implement the Cyber security policy in all government AI projects.	Monitor and analyze the incorporation and implementation of the cyber security policy, and losses due to cyber threats and cyber attacks.	*Activity continues*	▪ 4 workshops on institutionalize cyber security policies in an organization ▪ 2 monitoring studies ▪ 100% of ministry and government agencies to adopt cyber security policies for AI implementation	MAMPU Chief Government Security Officer (CGSO) National Cyber Security Agency (NACSA) All ministries and government agencies

Strategic Initiative 1.4 Institutionalizing AI Principles for AI implementation

Timeline

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Implement AI code of ethics in AI-IE by the AI-CIU. Disseminate and distribute the AI Code of Ethics and Guideline to all stakeholders.	Conduct joint global intellectual discourse on AI principles. Conduct benchmark/ study on AI ethics.	Monitor and analyze ethical initiatives and impacts.	▪ 2 international conference / forum ▪ Conduct benchmark ▪ AI Code of Ethics & Guideline	MDEC

Strategic Initiative 1.5 Establishing clear guidelines for data sharing in government to enable AI implementation

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Create clarity on understanding and challenges of data sharing for AI implementations.	Implement clear guidelines on how to share data across government.	Monitor and evaluate the effectiveness of implantation.	▪ 4 workshops for effective implementation and monitoring across government on data sharing ▪ 100% ministry-agencies implement data sharing collaboration	MAMPU KKMM MDEC
Develop clear data classification guideline to expedite the open data sharing for AI implementations.	Disseminate data classification guideline of the data sharing for effective implementation.	Monitor and evaluate the effectiveness of data sharing implementation.	▪ 4 workshops for effective implementation clear data classification guidelines ▪ 100% increase of useful data made available to the public ▪ Top 40 ranking for Global Open Data Index	MAMPU KKMM MDEC
	Formulate data-sharing in AI-Catalyst consortium Develop legal agreement data collaboration templates	Improve on legal agreement data collaboration templates	▪ Effective legal agreement data collaboration templates for AI Innovation Ecosystem	MOSTI MAMPU KKMM MDEC

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STRATEGY 2: ADVANCING AI R&D

- Advancing AI R&D strategies is an initiative formed to enable Malaysia to adopt, develop, fund and accelerate AI Research internally towards the fundamental and applied research in solving the national problems faced by the end users. The key advancing R&D strategy is to encourage R&D commercialization and innovation that can strengthen the national AI R&D. By advancing AI R&D it will intensify the R&D initiatives that covers fundamental and applied research, while catalyzing rapid innovation to meet national digital aspirations responsibly.
- Five (5) main strategic initiatives to drive the Malaysian R&D in different areas were formulated and listed. Based on this, the overall initiatives have allocated 44.1% for fundamental research and 43% for applied research (initiative 2.2, 2.3 and 2.5) while 12.9% for other supporting R&D (initiative 2.1, 2.4)

Strategic Initiative 2.1 Embarking on fundamental and applied R&D in the relevant entities within the AI Innovation Ecosystem

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Conduct comprehensive AI technology foresight and horizon scanning to provide guidelines for AI R&D directions and funding.	Embark on R&D for developing next-generation AI technologies to be applied in fields that are of strategic importance to Malaysia	Produce next-generation AI systems through R&D.	▪ Continuously updated AI R&D priority areas ▪ Next-generation AI systems	MOSTI MOHE MITI

Strategic Initiative 2.2 Encouraging AI adoption in R&D for all areas (S&T and non-S&T)

Timeline

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Fundamental Research				
Postgraduate research scholarship and post-doctoral fellowship for AI R&D related to the 5 priority areas.	Postgraduate research scholarship and post-doctoral fellowship for AI R&D in other identified areas.	*Activity continues*	▪ 20 Postgraduate Scholarship awarded (Masters by Research & PhD) ▪ 20 Post-Doctoral Fellowship awarded	MOSTI MOHE MITI
Applied Research				
Establish special R&D grants for non-S&T project that incorporate AI.	*Activity continues*	*Activity continues*	▪ 50 AI-based non-S&T projects funded.	MOSTI MOHE MITI

Strategic Initiative 2.3 Institutionalizing AI within all National Research Institutes

Timeline

Target

Lead Agency & Collaborators

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Promote the establishment of AI Centre of Excellence (AI-XL) within the research institutions. Establish special funding for AI R&D conducted in the AI-XL.	Intensive AI R&D in domain areas.	Intensive AI R&D in domain areas continues.	▪ 10 AI-XL established ▪ 20 AI-based projects in domain areas funded	MOSTI Related Ministries for the RI's

Strategic Initiative 2.4 Leveraging global platform to accelerate R&D of advanced AI solutions

Timeline

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Establish a policy sandbox* that enable the use of hyperscale cloud for AI R&D. Establish a policy sandbox to enable the use and sharing of required data (local, global) while protecting privacy.	Establish a policy sandbox that allows the AI Catalyst Consortia to test and pilot AI solutions for the first 3 National AI use cases.	Fine-tune the policy sandbox to enable successful delivery of all national AI use cases using Global Platforms.	▪ 1 cloud-based policy sandbox for AI R&D established	MOSTI MOHE MITI MAMPU

Strategic Initiative 2.5 Prioritizing funding for AI R&D

Timeline

Target

Lead Agency & Collaborators

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Ringfence RM10 mil. R&D funds to accelerate advances in fundamental and applied AI R&D related to the 5 priority areas.	To ring-fence a further RM15 mil. R&D funds to accelerate advances in fundamental and applied AI R&D in all other areas.	Cross-border MOUs and Cooperation to generate research funds on AI innovations.	▪ Increase number of fundamental advanced AI publications ▪ 20% allocation for AI R&D investments	MOSTI MITI

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STRATEGY 3: ESCALATING DIGITAL INFRASTRUCTURE TO ENABLE AI

There is a complex infrastructure and technologies needed to sustain AI initiatives, including the need for a vast amount of computing capacity and the ability to transmit large volumes of data. Organisations not only need the ability to access the large volume of data generated by IoT/5G devices, but they also need infrastructure capable of achieving value through computation and data processing.

Digital infrastructure refers to the systems which connect people to digital information, products, and services. It serves as the backbone of the digital economy and includes both hard (physical) and soft (non-physical) digital infrastructure comprising connectivity, devices, data storage and processing, services, and applications. Similar to the way cables, wires, and generators provide for the electricity needs of citizens, digital infrastructure enables transmission of information and data, underpinning our social and economic lives.

Digital infrastructure once required large up-front investment in equipment such as fiber optics, satellites, and high-powered computing facilities, highly flexible and elastic on-demand cloud computing services. At present, there is a shift from capital expenditure to operational expenditure, lowering the barrier to entry for individuals, businesses, and governments.

Strategy 3 emphasizes the digital infrastructure that needs to be enabled to support the AI implementation. The nationwide AI-Rmap survey indicates that only 30% of the responding organizations are at the initial implementation of the digital infrastructure and data activities.

Malaysian organisations need to take a closer look at the technological requirements to execute the AI implementation and ensure that their infrastructure capabilities meet the technology's demands. Therefore, three initiatives are formulated in ensuring that the organisations can continuously deploy AI in their activities. T

- Strategic Initiative 1: Enabling adoption of cloud computing and storage for AI
- Strategic Initiative 2: Enabling data sharing in AI Catalyst Consortium
- Strategic Initiative 3: Improving network & connectivity for wider access to digital infrastructure for AI

Strategic Initiative 3.1 Enabling adoption of cloud computing and storage for AI

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Establish a baseline adoption and use of cloud computing for AI.	Measure the adoption and use of hyperscale AI cloud computing and storage adoption.	*Activity continues*	▪ 2 Studies on Status of adoption and use of cloud computing for AI	SME Corp - MEDAC
	Incentivize MSMEs/ organizations for cloud adoption to implement AI.	*Activity continues*	▪ 80% of organizations /MSMEs (875,000 MSMEs) adopt cloud computing and storage for AI	MIDA SME Corp -MEDAC Cloud Providers: – TM-Huawei – AWS – Microsoft – IBM – Google – Oracle – Alibaba – Local Data centers

Strategic Initiative 3.2 Enabling data sharing in AI Catalyst Consortium

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Provide storage of data sharing within the consortium for AI-Catalyst projects for the National AI use cases.	*Activity continues*	*Activity continues*	▪ 50 TB data storage per project per year	MOSTI

Strategic Initiative 3.3 Improving network & connectivity for wider access to digital infrastructure for AI

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Implement the National agenda – Jalinan Digital Negara (Jendela) for comprehensive and high-quality broadband coverage as well as prepare the country for the transition towards 5G technology.	Extend the benefits of lower connectivity cost to universities and companies embarked on AI works.	*Activity continues*	▪ Competitive Connectivity Cost like Singapore (Note 43.2) ▪ 100% household and organizations/SMEs access to the internet Wider broadband access/ coverage ▪ 100% real-time broadband access	MCMC Telco

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STRATEGY 4: FOSTERING AI TALENTS

"Shortage of AI Talents and AI experts" is one of the greatest challenges faced by organisations in adopting and implementing AI.

The pool of fresh AI Talents in Malaysia can be measured primarily by the number of computer science graduates and electrical engineering graduates, as well as the number of Science, Technology, Engineering and Maths (STEM) graduates. Since engineering and data science are the foundation of AI, these talents possess the basics for AI and are suitable for further upskilling and specialization in the area of AI. The nationwide AI-Rmap 2021 survey shows that AI Talents in Malaysia are mainly sourced by upskilling current employees, industry-university partnership, and advertisements.

The evolving list of skills expected in AI Talents include:

- AI Data Science skills - understands and able to contribute to the end-to-end data science process, which include data preparation, feature engineering, develop AI models, and evaluation of these models. Note that AI Data Scientists and AI Data Experts are roles that involve experience developed over time, rather than recruited fresh from graduation. However, fresh graduates from computer science or STEM programs are natural candidates for AI training.
- AI Engineering skills - ability to create technology architectures that scale, writing and deploying bulletproof software incorporating AI features, and integrating AI capabilities with existing systems.
- AI Business Strategist skills - multi-disciplinary skills that involve understanding the intersection of business strategy and AI methods, and able to leverage AI for business.

Amongst competencies that AI Talents are expected to have are:

- Analytical thought process enabling ability to solve problems with cost-effective solutions
- Technical skills to design, maintain and repair technology and software programs
- Statistical modelling and big data computational skills to develop algorithms powering AI technologies
- Ability to translate highly technical information for execution
- Foresight about technological innovations

AI Talents are defined as individuals who possess technical competencies necessary to strategize, develop, deploy, maintain and manage AI solutions in organizations in a way that conforms to the Responsible AI Principles.

TYPES OF AI TALENTS
Data Scientist
AI Developers
AI Engineers
AI Researchers

This strategy must be achieved through talent-by-design and not by chance:

- The core competency of the 21st century is the ability to learn, and this must be embedded, nurtured, reinforced and incentivized throughout the talent development value chain
- Need to invest in building the workforce of the future, by strengthening and expanding the science, technology, engineering and mathematics (STEM) talent pool
- Prioritise high level STEM specialisation in cutting edge, disruptive technology ahead of time taking the cue from foresight intelligence
- Sharpen talent pool competencies in the 4Cs: critical thinking, creativity, collaboration and communication
- Create opportunities and resources for talent in cutting edge technology areas to collaborate with the brightest and best globally

Fostering AI Talents strategy comprises a three-pronged approach, targeting three different segments (Table 44). Strategic Initiative 4.1 develops AI talents through offering comprehensive and inclusive AI Education, from school level to tertiary level. Strategic Initiative 4.2 targets on reskilling and upskilling employees in the workforce. Strategic Initiative 4.3 aims to attract AI talents in the AI diaspora to contribute to Malaysia's AI industry. They can either return to develop Malaysia's AI industry as AI champions, or to collaborate with Malaysian industries even if they choose not to return. The latent AI talents are those with AI related qualifications or skills but have retired or left the workforce for personal reasons. This latent workforce that has retired has to be brought back at work. Women make up most of the AI talents who chose to leave the workforce. Women in AI programmes will harness their talents.

Strategic Initiative 4.1 Offering Comprehensive and Inclusive AI Education

Talent development is core in building the workforce of the future. Education is the best way to prepare future talents with knowledge in AI. The ability to identify how AI can be utilized in various situations must be nurtured and reinforced throughout the education process. AI education must be comprehensive, where AI is introduced at all levels, beginning from the school level, up to tertiary level. Our children are growing up with various instances of AI driven devices and services. An intensive AI for Kids and Teens program introduces school children to basic principles of how AI operates and what AI is capable of. Hence, this program will shape these children's mental models of what AI is and how it manifests, so that they will not overestimate capabilities of AI. Principles of Responsible AI (fairness, reliability and security & control, privacy & security, inclusiveness, transparency, accountability and pursuit of human benefit and happiness) need to be infused into the Science, Technology, Engineering, Arts and Mathematics curriculum at secondary schools.

At undergraduate level, a full-scale AI convergence curriculum needs to be offered to ensure inclusivity of AI education, extending beyond the traditional discipline of computer science and engineering. Curriculum of non-STEM disciplines should be revised to include AI related subjects such as Data Science and Machine Learning. The traditional Computer Science curriculum must be revised to place more emphasis on AI related courses, as well as offered as specific industry-based AI programmes, whereby students are exposed to real-world applications of AI in industry. Such programmes would also enable Malaysia to increase the number of graduates in Data Science and AI who not only has knowledge of AI but also has exposure of how AI is applied in industry. Apart from that, all educators in Malaysia especially computer science educators in universities must constantly update their knowledge of AI via the AI Education for Educators (AI-EE) platform as they will be critical to implement the AI convergence curriculum (Table 45). AI-EE should also be extended to MOHR registered trainers.

At the industry, AI professionals in the workforce are encouraged to pursue professional doctorate and professional master's program to enable them to solve industry problems using the latest AI knowledge and skills. Employers are also encouraged to sponsor their AI professionals for postgraduate education by participating in AI-MyIndustry matching grants offered by agencies such as MDEC. Apart from the formal education, universities could also offer MOOC-based certification program on AI.

Strategic Initiative 4.1 Offering Comprehensive and Inclusive AI Education

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Infusing AI Principles in STEAM Education curriculum at secondary.	AI for Kids and Teens Program.	*Activity continues*	▪ 200,000 Future AI Talents	MOE
Full-scale AI Convergence Curriculum at undergraduate level.	Industry-based AI Curriculum at undergraduate level.	*Activity continues*	▪ 1,000 AI graduates with industry exposure (2,000 in the pipeline)	MOHE MBOT
AI-MyIndustry Matching Grant Funding.	AI Professional Doctorate (AI-Doc) Matching Grant Funding for AI Professionals.	*Activity continues*	▪ 20 AI professionals with Doctoral qualification (40 in the pipeline) ▪ 100 AI professionals with Masters Qualification (400 in the pipeline)	MOHE MBOT MDEC
	AI-MOOC-Based Micro-credential Certification Program	*Activity continues*	▪ 1,000 AI Certified Professionals	MOHE
	AI Education for Educators (AI-EE)	*Activity continues*	▪ 87,500 educators with AI Competency	MOHE MOE
	AI Professional Trainer certification program	*Activity continues*	▪ 2,000 AI Professional Trainers certified	MOF MITI MBOT

Strategic Initiative 4.2 *Reskilling and Upskilling Existing Workforce*

- The future of work will revolve around AI either in the form of AI used to strengthen analytics, AI empowering cognitive automation, or AI used to offer individualized services and products. Avoiding AI from disrupting existing jobs or displacing existing workers would require workers of today to be reskilled and upskilled to AI Talents so that they are equipped with necessary and relevant AI skills. However, AI reskilling activities needs to be strategic, and must also include upskilling activities for existing workers already equipped with AI skills.

- To consolidate all AI related reskilling and upskilling activities, a dedicated AI Reskilling and Upskilling System (AI-RUS) online platform needs to be developed (Table 46). As a start, AI-RUS will be focusing to reskill workers in sectors with the highest probability of AI disruption, before expanding to reskill workers from all sectors. In order to carry out this, AI-RUS will be equipped with relevant modules including asynchronous reskilling and upskilling module (for non-AI, mid-career workforce to be AI-Talents), job matching module (for reskilled AI-Talents), and mentoring module (for continuous upskilling of AI-Talents). AI-RUS will also be expanded to offer AI Skills and Competency awards and competitions that is envisioned to continuously test the abilities of top AI Talents in Malaysia. Apart from existing workforce, AI-RUS will also be equipped with Executive AI Upskilling module to upskill SME management AI skills to strategically achieve competitive goals. All users of AI-RUS who has received reskilling (and upskilling) will be integrated into the National AI Directory (AI-DI) and their skill progression will be recorded.

- Apart from having an online consolidated platform, AI reskilling activities must also engage the technicians and skilled labour population who might not have access to AI-RUS. For this, a dedicated hybrid on-site activity powered by asynchronous training module from AI-RUS to train technicians and skilled labour will be put in place. Trainers for this particular program will be those who are registered with MOHR (HRDF) which have credentials from AI-EE. Apart from this extended AI-RUS program, these trainers should also strengthen their offerings with additional and AI-RUS-complementing adult-learning, mid-career AI reskilling and upskilling programs. The use of AR/VR as part of the blended learning experience is highly encouraged. At the other end, apart from being part of AI-RUS, employers are also recommended to integrate reskilling and upskilling activities as part of annual appraisals and design On-Job-Training (OJT) that further supports reskilling of mid-career workers.

Strategic Initiative 4.2 Reskilling and Upskilling Existing Workforce

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
AI-RUS developed. Begin to reskill workers	AI-RUS expands to include AI Skills and Competency awards and competition. AI-RUS expands to include mentoring (continuous upskilling). AI-RUS expands to include employers. Begin to reskill top management AI-RUS expands to provide hybrid reskilling for technicians, skilled labor. Integrate AI-RUS with AI-DI.	AI-RUS expands to include job matching modules and offer mobility channel to AI-Talents	▪ 500,000 employees registered in AI-RUS with 5,000 active monthly user ▪ 30,000 SMEs registered as employer ▪ 5,000 employer/ top management reskilled ▪ 50,000 workers reskilled ▪ 133,000 technicians and skilled labor reskilled	MPC MOHR MDEC
	Promote AI and Data Science HRDF Programs.	*Activity continues*	▪ 5,000 HRDF reskilling programs subsidized	MOHR HRDF

Strategic Initiative 4.3 Attracting & Retaining AI Talents

- This strategic initiative aims to further boost the number of AI Talents in Malaysia by attracting latent AI Talents back to work and creating new AI Talents from the pool of unemployed workers. Furthermore, a specific program must be put in place to pull back female AI Talents in Malaysia who do not serve the AI workforce.

- Therefore, the AI-Latent-Workforce-Back-to-Work (AI-LWBW) program, which is designed to be run concurrently with the Women-in-AI program, aims to empower and attract latent AI Talents especially female AI Talents by providing scaffolding sub-programs such as Childcare for Women-in-AI, and AI-Work-From-Home, a sub-program that would allow AI Talents to be location independent and their productivity will be monitored via a Productivity and Goal-based Performance Measurement System.

- Apart from the private sector, the Public Service Department (JPA) should also be engaged to encourage Ageing-AI-Talents in the public sector to continue contributing even after retirement, as part of a knowledge management program and to address the dearth of AI talents in the Public Sector. This would be able to ensure continuity of AI implementation in the public sector.

- Malaysia must also look outwards and must attract world renowned expert AI Talents overseas in the AI talent diaspora to set up base in Malaysia and become AI Talent Champions. For this to be materialized, an AI Talent Visa under the AI Talent Champion Empowerment (AI-ChEmp) Program is proposed. The search for these AI Talent Champions must first prioritize Malaysian expert AI Talents who are globally sought-after but choose to remain in Malaysia, and to the Malaysian expert AI-Talents diaspora currently residing overseas. At the very least, these Malaysian expert AI-Talents must be registered and networked into the National AI Directory (AI-DI).

Strategic Initiative 4.3 Attracting & Retaining AI Talents

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Childcare for Women-in-AI. AI-Work-From-Home. Productivity and Goal-based Performance Measurement System for location independent AI Talents. Encourage AI Ageing Talents especially in the Public-Sector to continue contributing.	AI Latent Workforce Back-to-Work Program (AI-LWBW)	*Activity continues*	▪ 10,000 latent AI Talents back at work	KPWKM MOHR JPA
Women-in-AI (WAI) Programmes 1. WAICamp 2. WAI-2-Go 3. WAIDatathon	Women-in-AI (WAI) Awards	*Activity continues*	▪ 1,000 Women-in-AI (WAI)	KPWKM MOHR JPA

Strategic Initiative 4.3 Attracting & Retaining AI Talents (continued)

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Provide AI Talent Visa under the AI Champion Empowerment (AI-ChEmp) Program for: 1. Renowned global AI-Experts; 2. Globally sought-after Malaysian AI Talents (residing in Malaysia); 3. Malaysian AI Talents, AI Experts currently residing overseas	Expand AI-ChEmp to AI Talent Diaspora Directory and integrate with AI-DI	*Activity continues*	▪ 100 AI Champions Empowered	MOHR

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STRATEGY 5: ACCULTURATING AI

The Coronavirus pandemic has shown that we have become so dependent on data-driven technologies through AI and automation. Many businesses are also heavily leveraging AI-based technologies and capabilities during this time. AI applications have an enormous potential to transform our future fundamentally, and machine learning is already changing our society's fabric.

People acculturation is the way towards AI-driven society. We should start by acculturating our top leaders to get their support and engagement in the transformation process. We need to ensure that employees stay at the forefront of AI technologies and continuously develop their skills. Moreover, there exist large gaps in our society between the privileged and the underprivileged in applying and using AI. There is, therefore, a need to develop an AI acculturation strategy to increase AI awareness and adoption in all sectors and reduce AI fear among communities.

The objectives of AI Acculturation Strategy include giving Malaysians the opportunities to adapt, acquires and adjust to the new culture of AI and providing them a voice to increase their participation in this machine age by enhancing their AI knowledge and skills.

Strategic Initiative 5.1 *Cultivating AI Awareness*

- This strategy aims to raise awareness of the role of AI in our lives. The Malaysian population must understand that we are moving towards general AI applications, and AI will slowly replace repetitive tasks and future jobs. The awareness-raising activities involve all AI stakeholders. The activities outlined for this Strategic Initiative include:

Social media engagements on AI

- This activity focuses on cultivating AI awareness to the public. The aim of this activity is to establish and promote social media presence for AI in Malaysia. The activities will leverage social media in showcasing the latest AI technology and applications to inspire young people. The use of social media such as Facebook, Twitter, and LinkedIn will help develop essential AI awareness and AI understanding, hence, reduce AI fear across all economic sectors and all levels of society. Social media influencers, celebrities, and public icons will also contribute to creating viral contents of AI. The activities proposed in Horizon 1 will be further enhanced through the creation of AI podcasts/ YouTube/ Twitter postings in dual language as well as featuring AI technology/ developments/ products in TV/ Radio Talk shows. This is carried out to consistently engage the respective Quad Helix on updates in AI developments.

Online publications

- In 2021, the editorial board for AI online publications will be set up. The contents on AI news and updates will be contributed by the Quad Helix members. This activity will be monitored by the Corporate Communication Unit at the respective Ministries. Publications are expected to be produced 2 times per year in 2022 and 2023. The frequency of publications can be further increased to 4 online publications in 2024 and 2025.

AI Awareness programs for government officials

- The AI awareness-raising activities will also include top Federal, State Government officials, GOC and GLC C-Suites and Senior/ Middle/Junior Officials. These are the current and future leaders who will be responsible to oversee the country's AI development, hence their awareness and understanding on AI and its basic application is crucial. Towards the end of Horizon 3, it is expected that 3,600 officials have been trained for this program.

AI Roadshows/ Training for researchers and research institutes

- Another Quad Helix component are the academia and researchers from the public and private institutions who are potential and frequent users of AI. AI Roadshows/Training are carried out to promote the use of AI to this community of users (Table 49). The training activity will be carried out by MOSTI, KPLB, KWP in collaboration with the Higher Education Leadership Academy (AKEPT) to train specific researchers on AI. AKEPT is expected to train 600 potential AI researchers by 2025.

Strategic Initiative 5.1 Cultivating AI Awareness

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Social media strategy and public engagement to disseminate info on AI national programs by leveraging on existing structures and government/ industries' social media programs	AI podcasts/ YouTube/ Twitter postings in dual language and TV/ Radio Talk Shows featuring AI technology/ developments/ products to consistently engage the respective Quad Helix.	*Activity continues*	▪ No. of active social media engagements on AI: • AI Podcasts (260), YouTube (260), Twitter (260) • No. of Radio Talk Shows • Radio RTM (50), Hot FM (50) • No. of TV Shows • RTM (20), TV3 (20)	MDEC MOSTI
Set up an editorial board for AI online publications with contributions from the Quad Helix and rolling out of AI Publication.	*Activity continues*	*Activity continues*	▪ 12 online publications for 5 years	MOSTI KKMM MDEC

Strategic Initiative 5.1 Cultivating AI Awareness (continued)

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
AI Awareness program for Top Federal, State Government Officials, GOC and GLC C-Suites and Senior/ Middle/Junior Officials	*Activity continues*	*Activity continues*	▪ 8,000 AI Awareness programs attendees	MOSTI MOHE All Relevant Ministries
AI Roadshows/Training to promote the use of AI to University researchers and research institutes from the public and private institutions.	*Activity continues*	*Activity continues*	▪ 1,200 attendees for AI Roadshows/ Training ▪ 640 trained AI researchers	MOHE MOSTI KPLB KWP

Strategic Initiative 5.2 Accelerating AI Adoption

This Strategy aims to expedite the adoption of AI among Malaysian citizens. Successful adoption of AI requires a pragmatic approach. The activities to be promoted must develop AI knowledge, technical skills, and processes geared towards the rapid adoption of AI. The activities outlined for this Strategic Initiative include:

AI SCORE Program

This activity focuses on the small and medium-sized enterprises (SMEs) that have employed AI applications in their business pursuits via the introduction of AI SCORE rating. AI adoption among the SMEs is expected to accelerate via the AI SCORE Program. SME Corp-MEDAC and other Cloud providers will engage 10,000 SME representatives from 5,000 SMEs on AI adoption and AI SCORE Rating. The SMEs that support the widespread adoption of AI in the nation by developing AI technology and/or AI solutions will be incentivized. The final objective is to produce local SMEs with global AI potentials.

Accelerated AI programs for government officials

The AI Awareness and Basic Application program for top Federal, State Government officials, GOC and GLC C-Suites and Senior/ Middle/Junior Officials will be further extended by increasing the number of attendees to the program. These attendees are expected to accelerate the AI adoption in their respective departments/ agencies/ ministries via the AI SCORE rating. An AI Star Rating portal will be developed. Ministry/ government agencies will be annually awarded with 5 Stars AI Rating beginning in 2023.

Accelerated AI programs for researchers and research institutes

AI adoption among university researchers and research institutes are expected to accelerate via the AI SCORE rating. MOSTI and MOHE will work together to introduce the AI SCORE Rating Award to the public and private universities in 2022.

Malaysia AI Awards

This activity focuses on the rapid adoption of AI via incentive-driven activities (Table 50). The Malaysian AI Awards will be introduced for individuals, government agencies and companies heavily involved with AI adoption in the country.

Strategic Initiative 5.2 Accelerating AI Adoption

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Accelerate AI adoption among SMEs via AI SCORE rating.	*Activity continues*	*Activity continues*	▪ 10,000 SME reps from 5,000 SMEs introduced to AI adoption and AI SCORE Rating	SME Corp - MEDAC MDEC Cloud providers
Incentivize SMEs with AI potentials.	*Activity continues*	*Activity continues*	▪ 2,000 SMEs awarded with AI adoption incentives	MOSTI SMECORP MDEC MITI MEDAC
(Follow through from Strategy 5-1 H1)	Accelerate AI adoption among Federal & State Government Ministries & Agencies, GOC and GLC via AI SCORE rating.	*Activity continues*	▪ One AI Star Rating portal ▪ 15 Ministry/ government agencies with 5 Stars AI Rating ▪ 15 GOC and GLC C-Suites with 5 Stars AI Rating	MOSTI

Strategic Initiative 5.2 Accelerating AI Adoption (continued)

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
(Follow through from Strategy 5-1 H1)	Accelerate AI adoption among university researchers and research institutes from public and private sectors via AI SCORE rating	*Activity continues*	▪ 10,000 SME reps from 5,000 SMEs introduced to AI adoption and AI SCORE Rating	MDEC MOSTI MOHE
(Follow through from Strategy 5-2 H1)	Incentivize 10 SMEs with global AI potentials.	*Activity continues*	▪ 30 SMEs with global AI potentials	MDEC MOSTI SMECORP
	(Follow through from 5-2 H2) Malaysian AI Awards for individuals, government agencies and companies heavily involved with AI adoption in Malaysia.	*Activity continues*	▪ Malaysian AI Awards	MOSTI

SCAN here

STRATEGY 6: KICK-STARTING A NATIONAL AI INNOVATION ECOSYSTEM

The key element in kickstarting the innovation ecosystem for Malaysia is effective collaborations between various stakeholders. Quadruple Helix collaboration or consortium encompasses players from four key sectors: Academia, Government, Industries and Community, with the support from international partners. The functions of the consortium are crucial in bridging the different strengths and opportunities available from each key sector. The consortium, with its strong and diverse expertise, will drive this grand collaboration and simultaneously augment the key enablers of this roadmap. The formation of such a flexible yet inclusive consortium will create a long-term platform for both the government and the relevant industry players to commit to the national AI agenda.

There are 2 levels of Quad Helix collaboration in this roadmap:

(1) A National-level alliance of AI experts and players (MyAI-Alliance) that unites the various AI communities in the country (e.g., Women in AI, Artificial Intelligence Society of Malaysia, IEEE Malaysia Computational Intelligence Society, various university-level Centres of Excellence in AI etc), as an apt avenue to pool various resources, increase visibility, effectively attract international partnership and create more opportunities for all stakeholders. Similar set-ups are created in other countries such as Norway (NORA – Norwegian Artificial Intelligence Research Consortium), Europe (AI4EU) and AECAIR (Asia-European Consortium on AI Research). The AI community in Malaysia can then be represented as a united entity, especially at the global level.

(2) Collaborations on the National AI Use Cases projects, where quadruple helix collaboration will be the key element in the project implementations for each AICatalyst Consortium. This is the most critical part of the AI Innovation Ecosystem (AIIE) in the roadmap.

Strategy 6: Kick-Starting a National AI Innovation Ecosystem

To increase Malaysia's visibility in AI at the international level, it is important for Malaysia to be part of global AI platforms such as the OECD Network of Experts on AI (ONE AI) and WEF's Global AI Action Alliance; participate in world AI ranking, participate in the UN's AI programs such as the AI for Good Global Summit organized by UN's ITU (International Telecommunication Union); as well as establish official partnership with world renowned AI research centres such as the Alan Turing Institute UK, NTU Data Science & AI Research Centre, Singapore and Allen Institute for AI, USA.

A systematic and effective public-private R&D&I collaboration that benefits the societies is the key determinant of the development of successful AI innovations. To strengthen the synergies between all the quadruple helix actors, this strategy proposes the initiatives that are realistic and able to enhance the collaboration towards producing impactful R&D&I outcomes and AI adoption especially by business users. This strategy also acknowledges the importance of international connections that will add values to our knowledge, technology and global opportunities.

Under this strategy, there are 4 strategic initiatives with 12 key activities. The activities are distributed throughout the three horizons.

Strategic Initiative 6.1 Establishing AI-Catalyst as the Innovation Hub to implement the Quadruple Helix AI Innovation Ecosystem Model

- The nucleus of the Innovation Hub of the AI Innovation Ecosystem (AI-IE) is the AI-Catalyst. The AI-Catalyst acts as a virtual host for the quadruple helix National AI Use Cases consortia. Therefore, for successful implementation of the AI-IE, the AI-Catalyst must first be established. Under this initiative, there are 3 key activities:

- Establishing the administration for the AI-Catalyst that will manage the consortia and assist them in conducting their activities. Dealing with inter-partite agreements/arrangements, various issues may arise and the support from a dedicated administrative team is essential. Therefore, the AI-Catalyst administration must be established within Horizon 1 to ensure any processes related to the establishment of the AI-Catalyst Consortia and their activities are properly administered.

- Establishing the AI Catalyst Consortia to implement the National AI Use Cases projects (AI-Cases). The process to establish the AI Catalyst Consortia will be determined by the AI-CIU or similar task force/unit that will be appointed by MOSTI.

- Forming a collaborative network among tech providers to share AI resources such as data, digital infrastructure, funding etc.

Strategic Initiative 6.1 Establishing AI-Catalyst as the Innovation Hub to implement the Quadruple Helix AI Innovation Ecosystem Model

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Establish the administration for the AI-Catalyst.	Form a collaborative network among tech providers to share AI resources	Make AI-Catalyst a self-sustainable model	▪ Administration for the AI Catalyst established within the first year	MOSTI
Establish the AI Catalyst Consortia to implement the National AI Use Cases projects, AI-Cases.			▪ 11 AI Catalyst Consortia are established within first years	MOSTI

Strategic Initiative 6.2 Implementing Proposed National AI Use-Cases focusing on AI-driven Supply Chain

- Strategic Initiative 6.2 focuses on ensuring successful implementation of the proposed National AI Use Cases. During Horizon 1 (2021), there are 2 key activities:
- Establishing a priority funding for the proposed National AI projects/use cases (AI Use Cases), from MOSTI's Malaysia Grand Challenge fund. However, additional funding from other industries and government agencies are also expected especially for projects whose the main beneficiaries are the industries or agencies.
- Implementing AI Use Cases is the most important activity in this initiative. The implementation starts in Horizon 1 and delivery of the results from some projects are expected to start in Horizon 2. Complete delivery of results/solutions from all other projects will be in Horizon 3.

Strategic Initiative 6.2 Implementing Proposed National AI Use-Cases focusing on AI-driven Supply Chain

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Establish a priority funding for the proposed National AI use cases, AI Use Cases, from MOSTI's Malaysia Grand Challenge fund Implement the proposed National AI Use Cases via the AI Catalyst Consortia	Start delivering the AI solutions from the AI Use Cases	Deliver all other AI Use Cases solutions	▪ Implementation and delivery of 7 AI Use Cases for 3 priority areas (Agric. & Forestry, Medical & Healthcare, Smart Cities & Transportation) ▪ Implementation and delivery of 4 AI Use Cases for 2 priority areas (Education and Public Services) as supports ▪ Secure 50% of the total project funding from the Malaysia Grand Challenge Fund ▪ Secure 50% of the total project funding from government-industry matching grant scheme	MOSTI MOHE Ministries related to the National AI Use Cases

Strategic Initiative 6.3 Establishing a Quadruple Helix Collaborative Platform for AI R&D&I

The Government-Academia-Industry-Society Collaboration is fundamental for the success of the AI Innovation Ecosystem and is the key enabler of the National AI Use Cases implementation. The collaboration effort must outline its expectations and targeted achievements. All parties that will involve in this consortium must embrace the similar fundamental belief towards the national agenda. The consortium pact must be impervious to any stagnation that can jeopardise its roles and functions. To facilitate the consortium in performing its expected roles and duties, a working structure or a formal committee, with endorsement from the government, must be in place.

The Strategic Initiative 6.3 ensures that the quad-helix collaboration is nurtured at the earliest stage possible through 4 key activities:

- Establishing the Malaysia AI Alliance (MyAI-Alliance), which brings together AI collaborators from the government, academia, industries and societies, to support the implementation of the AI-IE, in Horizon 1:
- MyAI-Alliance will connect and promote collaborations among all the different quadruple helix actors to engage in the National AI Use Cases and other collaborative arrangements. Because MyAI-Alliance also consists of AI experts, it can provide technical advice to the government on matters related to AI when engaging with international partners e.g. through the ASEAN Committee on Science, Technology and Innovations (ASEAN COSTI).
- The alliance should also participate actively in AI discussions held globally, for example, on the official discussion platform of the United Nation Commissions on Science & Technology for Development (CSTD).
- Formulate an AI Investment Fund Guidelines for AI start-ups, in Horizon 2.
- Establish the National Directory of AI experts and companies (AI-DI), in Horizon 2, to allow national and international entities to search for our local AI experts and organizations to collaborate with.
- Establish a regional AI in Supply Chain Centre of Excellence that focuses on quadruple helix collaboration on AI R&D&I in Supply Chain to establish Malaysia as the regional global AI leader in supply chain management sector, in Horizon 3. This pursuit will be part of our initiatives to position Malaysia as the leader in AI-driven SCM.

Strategic Initiative 6.3 Engaging with Global Knowledge and Innovation Networks for AI

Timeline

Horizon 1 (2021 - 2022)	Horizon 2 (2023-2024)	Horizon 3 (2025 onwards)	Target	Lead Agency & Collaborators
Establish the Malaysia AI Alliance (MyAI-Alliance) which brings together AI collaborators from the government, academia, industries and societies, to support the implementation of the AI-IE.	Formulate an AI investment Fund Guidelines for AI start-ups. Establish the National AI Directory of experts and communities, AI-DI.	Establish a regional AI in Supply Chain Centre of Excellence that focuses on quadruple helix collaboration on AI R&D&I in Supply Chain.	▪ Malaysia AI Alliance is established ▪ An AI investment guideline for AI start-ups ▪ AI-DI, a National AI directory is established ▪ 1 regional centre for AI R&D&I in Supply Chain is established	MOSTI MOHE MITI

Strategic Initiative 6.4 *Engaging with Global Knowledge and Innovation Networks for AI*

- International collaborations encourage mutually beneficial discourse and promote more discoveries. Hence, activities that encourage international partnership and alliances in AI must be promoted. These can be achieved through the activities outlined in the Strategic Initiative 6.4, which are:

- Cross-border partnerships between governments to share AI knowledge through AI-eX (International AI Joint Intellectual Discourse), in Horizon 1. This include engaging with other AI leading countries on their AI policy implementation to learn from their experiences, organizing intellectual discourses on AI ethics, AI principles, social impacts of AI, etc.

- Cross-border MOUs, cooperation and collaboration initiatives for data sharing, high-impact innovations and AI adoption, in Horizon 2 through Horizon 3.

- A close synergy with the regional and global players is the enabler that will position Malaysia in the international AI ecosystem. Participations from global and regional entities are crucial to enhance our local ecosystem and will assist in positioning Malaysia as one of the active proponents for the deployment of AI based solutions.

Strategic Initiative 6.4 Engaging with Global Knowledge and Innovation Networks for AI

Timeline			Target	Lead Agency & Collaborators
Horizon 1 (2021 - 2022)	**Horizon 2 (2023-2024)**	**Horizon 3 (2025 onwards)**		
Cross-border partnerships between governments to share AI knowledge through AI-eX (International AI Joint Intellectual Discourse)	Cross-border MOUs, cooperation and collaboration initiatives for data sharing, high-impact innovations and AI adoption.	*Activity continues*	▪ An official platform to link Malaysia's AI players with international AI networks is formed. ▪ 5 impactful international AI intellectual discourse conducted ▪ 5 MOUs signed with international AI centres or industries	MOSTI

5 National AI Use Cases

Malaysia as World Leader in AI-Driven Supply Chain

Supply chain can essentially be defined as any environment or ecosystem across which there is a flow of resources. These resources can be physical such as products and materials or nonphysical such as human or services.

Why supply chain? Malaysia's economic foundations are based primarily on manufacturing, plantation, trading, logistics and distribution, and retail activities. These strengths are punctuated by Malaysia boasting two of the top five ports in Southeast Asia.

These foundational activities thrive on an efficient, agile and resilient supply chain, the backbone of Malaysia's and global economy. As the supply chain becomes more complex and more sophisticated, the challenges, in terms of being able to adapt to constantly evolving needs and constraints, has rapidly become beyond human capacity to manage. Global trends in digitization, digitalization and digital transformation reinforce the need for a transformation towards a more resilient, agile, intelligent and efficient supply chain.

While other countries strategically focus on specific areas of AI such as national security, defence, cybersecurity, energy and healthcare to drive their national agenda, at least, in the public arena, it is therefore proposed that Malaysia places a strategic focus on AI in Supply Chain Management (SCM).

National AI Use Cases and Supply Chain Management (SCM): 4 of the 11 proposed National AI Use Cases are directly addressing different supply chain management challenges.

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MALAYSIA AS A WORLD LEADER IN AI-DRIVEN SUPPLY CHAIN

HOW TO LEAPFROG?

- *Not Capital Intensive*
- *Innovate, not Invent*
- *Scalable & Replicable*
- *Leverage Collaborations & Existing Infrastructure*
- *Big Bets & Bold*
- *Pre-comm Ready*

WHAT ARE THE NATIONAL IMPACTS?

- *INDUSTRIES: AI-Driven Transformation*
- *TALENT: 200,000 Future AI Talents Nurtured*
- *Global Employment Opportunities*

National Priority Area	National AI Use Cases
Agriculture & Forestry	*AI-Driven Supply Chain Management System for Palm Oil* *Autonomous Robotics Oil Palm Harvesting Management System*
Medical & Healthcare	*Autonomous Vaccine Distribution & System*
Smart Cities & Transportation	*AI-Driven Mass Public Transport*

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NATIONAL AI USE CASES WITHIN NATIONAL PRIORITY AREAS

NATIONAL PRIORITY AREA	NATIONAL AI USE CASES	Technology Drivers
Agriculture & Forestry	• **AI-Driven Supply Chain Management System for Palm Oil** • **Autonomous Robotics Oil Palm Harvesting System**	SENSOR TECHNOLOGY
Medical & Healthcare	• **Autonomous Vaccine Distribution & Management System** • Personalized Proactive Healthcare • Autonomous A-eye System • AI-Nasoalveolar (AI-Na) System	ADVANCED INTELLIGENT SYSTEMS
Smart Cities & Transportation	• **AI-Driven Mass Public Transport**	AUG. ANALYTICS & DATA DISC
Education	• Quality and Inclusive Data Systems for Students Profiling • Personalised Learning System • Intelligent Automated Marking System	
Public Service	• Intelligent Automation in Public Services	

Agriculture & Forestry

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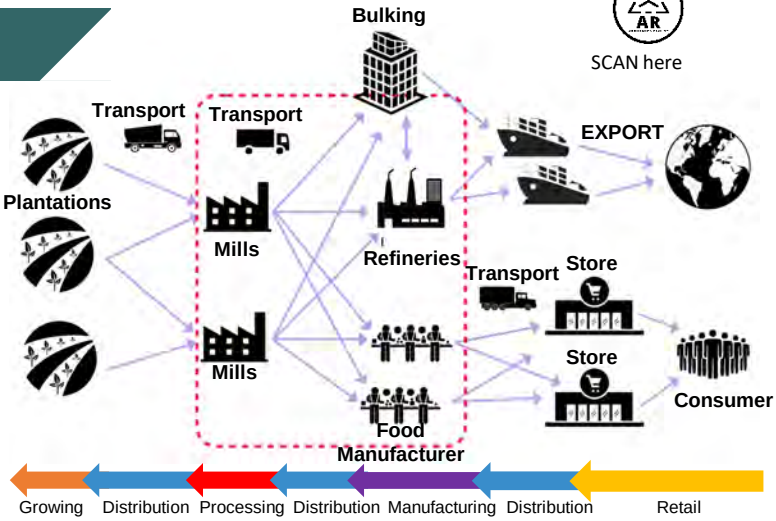

Project 1

AI Driven Supply Chain Management System for Palm Oil

Objective: To develop an integrated autonomous harvesting system for use in palm oil plantation areas to sustain the productivity and revenue of the plantation companies despite shortage of labour

Project 2

Autonomous Robotics in Oil Palm Harvesting Management System

Objective: To optimize profitability and minimize supply chain inefficiencies by leveraging an AI-driven Autonomous Procurement & Inventory Management System

1. UGV for Palm Oil Plantations

An autonomous UGV for palm oil plantations equipped with intelligent FFB grabber, fertiliser sprayer and loose fruits collector.

2. Drones for Data Collection & Monitoring

Drone system that collect data for use in plantation inspection, FFB quality monitoring and yield prediction.

3. FFB Harvesting Exoskeleton

Light and effective assistive device to reduce workers' load during harvesting

4. Centralised Data Monitoring System for Plantation Management

Provides bird's eye view of plantation KPI's and data collected from various sensors on the ground, the UGV and the drones.

Education

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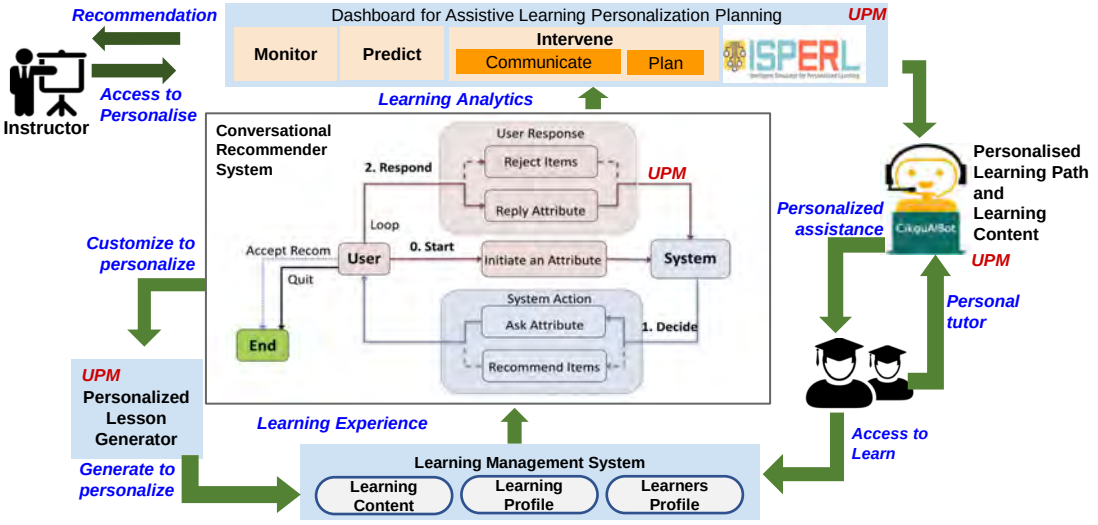
Project 3

Personalized Learning System

Objective: To develop a personalized learning system to boost students' engagement and results using AI.

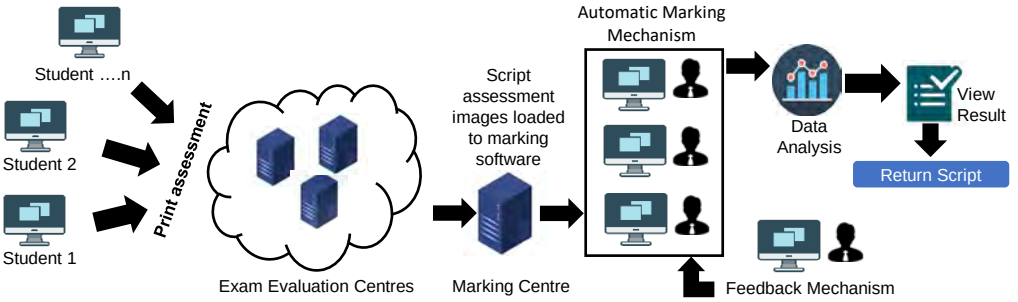
Proposed Architecture for CRS4PerL



Project 4

Intelligent Automated Assessment System

Objective: To develop an intelligent automated assessment system to support the personalized learning system.



Education

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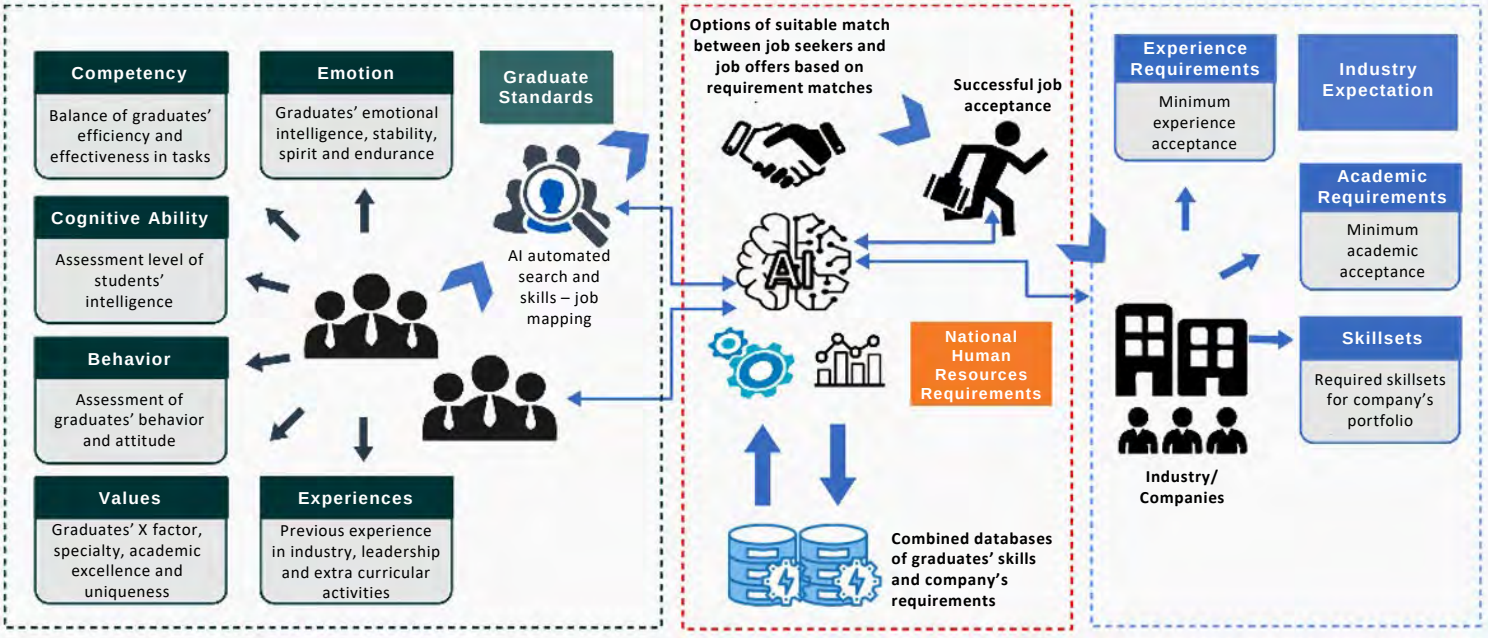
Project 5 — Intelligent Graduates Profiling for National Future-Driven Workforce

Objective: To develop an intelligent personalized learning system to boost students' engagement and results using AI.



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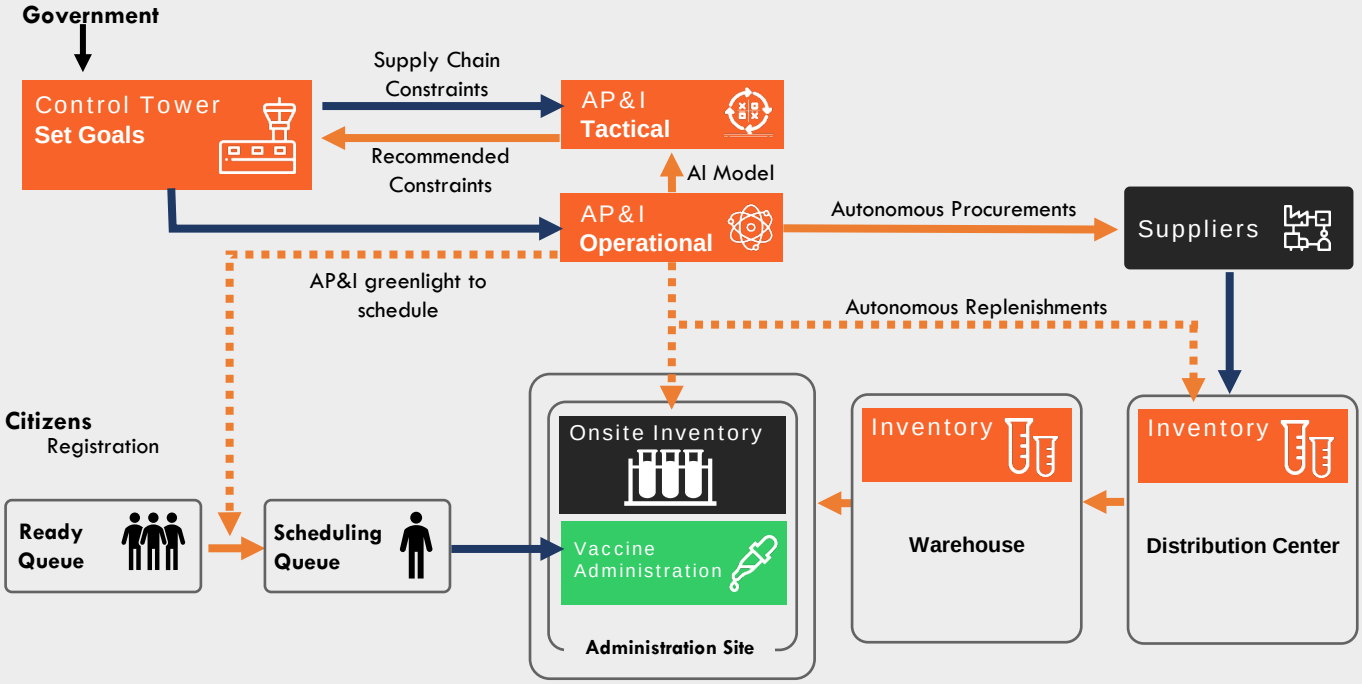
Project 6 **Autonomous Vaccine Distribution and Management System**

Objective: To boost the operational efficiency of COVID-19 vaccine distribution by using AI to reduce supply spend by 20% and logistic cost by 40%. To overlay an AI layer on top of current workflow and systems so that vaccine doses scheduling can be administered autonomously and effectively at scale.



Medical & Healthcare

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Project 7

Personalized Proactive Healthcare

Objective: To enable a national Proactive Healthcare Strategy for cardiovascular disease and reduces healthcare cost.

Project 8

Autonomous A-eye System

Objective: To provide an autonomous A-eye system to prevent blindness using AI-powered image analysis.

Project 9

AI-Nasoalveolar (AI-Na) System

Objective: To develop an AI-assisted predictive model CIAPAI Series of 3D printed presurgical nasoalveolar mold (PNAM) with AI prediction on changes of cleft separation after the application of PNAM.

Smart Cities and Transportation

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Project 10 AI-Driven Mass Public Transport

Objective: To develop and deploy an AI-driven autonomous maintenance, repair and operations (MRO) for public transport system towards excellent operation, customer service as well as security and safety management.

Challenges:
Current technologies in city-wide mass transportation provide live information but lacking intelligence that is needed for public transport operators to provide efficient service at reduced cost, increased operational efficiency and better system reliability.

Key Benefits:
The system will deliver better customer experience and services and intelligence amongst authorities and operators with real-time management. It can also provide operational excellence through AI deployment to drive system improvement, operational efficiencies and reliability, greater efficiency of asset management including predictive maintenance and improved operational safety and security such as more a efficient revenue capture and property management.

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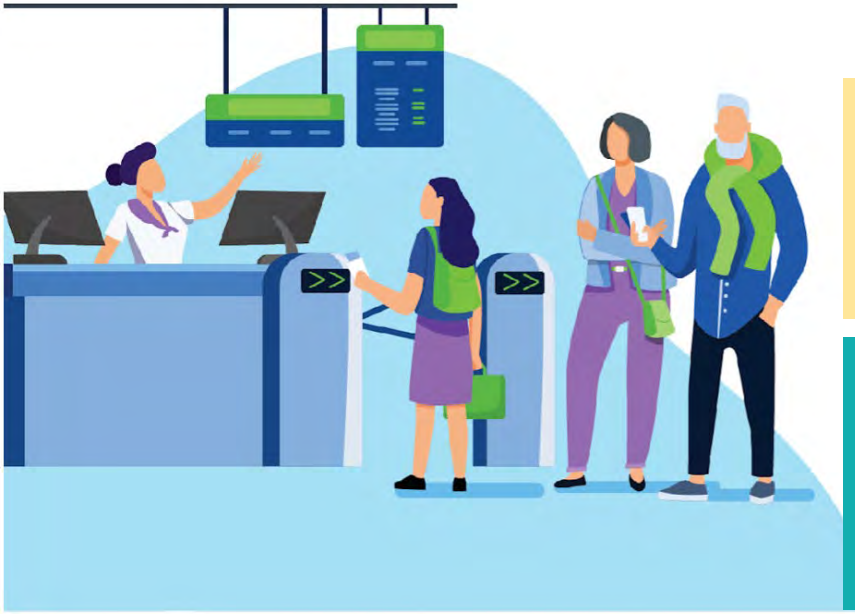
Project 11 Intelligent Automation in Public Services

Objective: To create more responsive, reliable, and timely services as well as to keep up with citizens' demands and desire for consumer-grade service levels. This will reduce cost, boost productivity and allow organisations to focus on delivering critical public services.



Challenges:

- Huge amount of time spent on repetitive and routine tasks.
- More complex problems that require human judgement.
- A growing backlog of work, and limited capacity to tackle it.

Key Benefits:

The systems developed will improve workplace productivity and delivery, enhance citizens' satisfaction and improve the quality of information for critical decision- making processes. They will also improve service delivery and process efficiency.

6 AI-Rmap as a Living Document on https://airmap.my

AI-Rmap as A Living Document

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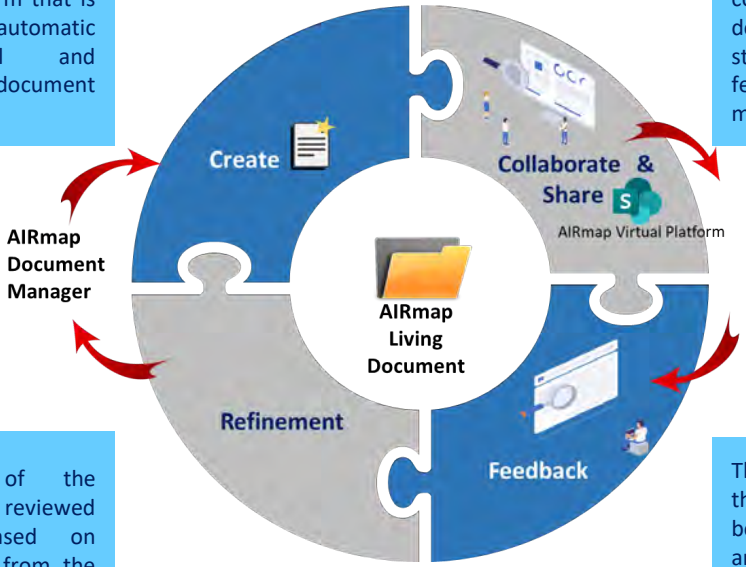
AI related initiatives demand for continuous and sustainable planning involving various parties. Therefore, in formulating AI-Rmap, the Roadmap document has been designated as a living document.

AI-Rmap as a living document can be realised through:

AI-Rmap document was created in a platform that is supported by automatic version control and collaborative document editing.



The document is continuously shared the document with relevant stakeholders to gather their feedback and views through multiple channels.

- **AI-Rmap Portal**
- Annual Panels, Workshops, Syndications and Conferences
- Establishing AI Open Community
- Utilisation of Interactive Digital Platform

The contents of the documents were reviewed and refined based on feedback received from the stakeholders.

The feedback gathered from the various stakeholders will be consolidated, analysed and synthesised to identify changes or updates required for the documents.

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Critical Success Factors

There are six Critical Success Factors for AI-Rmap, as shown in the Figure.

- First, the Quadruple Helix model for all AI-Rmap funded projects within the AI-Catalyst must be embraced by all, creating a strong demand for AI technology, services and expertise in Malaysia.
- Second, adequate funding must be ensured for all the strategies in the AI-Rmap, and for developing a sustainable model for the AI-IE in the longer term.
- Third, the success depends very much on the establishment of an empowered AI-ICU to oversee the governance of the AI-IE that will transcend any leadership and political changes within the government.
- Fourth, Malaysia must have sufficient local AI talents to meet AI local and global AI opportunities.
- Fifth, the government must ensure mindset change to fully understand and embrace the digital economy that demands intensifying the use of trusted digital platforms and open data, and ensuring the local talents are skilled to fully support the digital economy.
- The final strategy is to leverage on democratized digital infrastructure particularly the intelligent hyper-scale cloud and smart devices as a preferred approach to benefit from the economics, agility and security compliance.

AI-Rmap has outlined a 5-year plan across three horizons. The document aims to provide strategic directions and initiatives towards creating a thriving national AI ecosystem in Malaysia that allows all sectors and stakeholders to capitalize on the benefits of AI. AI-Rmap emphasizes that key to its success is the quadruple helix collaboration between all stakeholders. government.

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IIB Ventures Sdn Bhd
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Jabatan Kerajaan Tempatan
Jabatan Laut Malaysia
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Jabatan Penilaian Dan Perkhidmatan Harta
Jabatan Perhilitan
Jabatan Perkhidmatan Pembetungan
Jabatan Perkhidmatan Veterinar
Jabatan Warisan Negara
Jabil
Kejora
Kementerian Pembangunan Usahawan Dan Koperasi
KOPSEL Bhd
Kulim Technology Park Corporation Sdn Bhd
Lembaga Getah Malaysia
Lembaga Kemajuan Johor Tenggara
Lembaga Kemajuan Kelantan Selatan (KESEDAR)
Lembaga Kemajuan Terengganu Tengah (KETENGAH)
Lembaga Kemajuan Wilayah Kedah (KEDA)
Lembaga Kemajuan Willayah Pulau Pinang
Lembaga Perindustrian Nanas Malaysia
Malakoff Corporation Berhad
Malaysia Productivity Corporation (MPC)
MARii
Micron Memory Malaysia
MIDA
MINISTRY OF FOREIGN AFFAIRS MALAYSIA
Multimedia University
MyAIS
NEC Capital Solutions Malaysia Sdn Bhd
Nexperia Malaysia Sdn Bhd
NT Business Consulting Training
NVIDIA Corporation
Perbadanan Kemajuan Filem Nasional Malaysia
Perbadanan Kemajuan Negeri Pahang
Perbadanan KotaBuku
Permodalan Nasional Berhad
Pihak Berkuasa KemajuanPekebun Kecil Perusahaan Getah
Politeknik
PRASARANA MALAYSIA BERHAD
RAILWAY ASSET CORPORATION
SilTerra
SIRIM Berhad
Skymind Holdings Berhad
Statworks (M) Sdn Bhd
STMicroelectronics
SunPower
Talent Corporation Malaysia Berhad
Technip FMC
Telekom Malaysia Berhad
Tomcare Resources Sdn Bhd
Trovicor Technology Sdn Bhd
Microsoft Malaysia Sdn Bhd
UCSI University
Universiti Islam Antarabangsa Malaysia
Universiti Kebangsaan Malaysia
Universiti Malaya
Universiti Malaysia Kelantan
Universiti Malaysia Pahang
Universiti Malaysia Perlis
Universiti Malaysia Sabah
Universiti Malaysia Sarawak
Universiti Malaysia Terengganu
Universiti Pendidikan Sultan Idris
Universiti Pertahanan Nasional Malaysia
Universiti Putra Malaysia
Universiti Sains Islam Malaysia
Universiti SainsMalaysia
Universiti Teknologi Malaysia
Universiti Tun Hussein Onn Malaysia
Universiti Teknikal Malaysia Melaka
Universiti Teknologi MARA
Universiti Utara Malaysia
Universiti Tenaga Nasional
Universiti Teknologi Petronas
Venture Electronics Services Malaysia
Vettons Sdn Bhd
Visa International (Asia Pacific), LLC
Xylem Water Solutions (M) Sdn Bhd

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