NATIONAL FOURTH INDUSTRIAL REVOLUTION (4IR) POLICY

4TH INDUSTRIAL REVOLUTION

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NATIONAL 4IR POLICY

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FOREWORD BY

PRIME MINISTER OF MALAYSIA

YAB Tan Sri Dato' Haji Muhyiddin bin Haji Mohd. Yassin

The Fourth Industrial Revolution (4IR) is already upon us. The global economy is being fundamentally transformed as we speak, by breakthroughs in technology, cutting across the physical, digital and biological worlds. Emerging technologies such as automation, robotics, artificial intelligence (AI), machine to machine (M2M) and the internet of things (IoT), are changing the way the world operates. Most recently, these technologies have assisted in the global fight against the COVID-19 pandemic. The possibilities are endless.

The National 4IR Policy to be launched, is the guiding principle for Malaysia to stay ahead of the 4IR curve. It should be utilised to harness the power of science and knowledge as the most important drivers for development, progress and prosperity, now, and in the foreseeable future. Malaysia needs to take advantage of this window of transformational opportunity, to uplift its people, businesses and government.

The process of cultivating human resources, nurturing capacities and skills to serve the goals of society, is the very essence of societal development. This is clearly underlined in the National 4IR Policy. Regardless of the technology a nation might create, the ability to capitalise or squander this knowhow, depends on the quality of its human capital as the instrument of development.

At the end of the day, the successful execution of the National 4IR policy will all come down to people and culture. Promoting a culture of innovation and creativity in society is crucial as we face the uncertainties of our times. We need to shape a sustainable future that works for all Malaysians by putting society first and empowering them.

I pray that this National 4IR Policy will be a platform to incorporate the best parts of Malaysian technological creativity, empathy and stewardship. I also wish it will be one of the springboards to lift Malaysia into a new collective, based on our Shared Prosperity Vision of a fair, equitable and inclusive nation by 2030. It is now incumbent on us all, to make it a reality.

PREFACE BY

MINISTER IN THE PRIME MINISTER'S DEPARTMENT (ECONOMY)

YB Dato' Sri Mustapa bin Mohamed

The Fourth Industrial Revolution (4IR) is a fusion of technology, which cuts across the physical, digital and biological worlds. It evolves exponentially as a result of the multifaceted, deeply interconnected world we live in. Emerging fields of knowledge continue to produce newer and ever more capable technology.

As Malaysia embarks on its journey towards greater digitalisation and sustainable development, more efforts need to be done to ensure we keep abreast with current trends to stay competitive in the future. We are witnessing profound shifts across all aspects of life due to the COVID-19 pandemic, which has brought about numerous challenges. The pandemic has led to a major realignment of the Malaysian economy, particularly in the form of new business models and the reshaping of production patterns as well as consumption preferences. To ensure that Malaysia receives optimum benefits from 4IR, the Government has developed the National 4IR Policy in anticipation of emerging developments. This Policy provides an overarching direction that gears the country for the 4IR. It provides guidance and promotes coherence in achieving the 4IR agenda, besides managing potential risks that could arise from 4IR.

The 4IR involves the transformation of the entire ecosystem, across and within companies, industries, society and countries. It emphasises and shapes the way technology and society co-exists and contributes to one another. The National 4IR Policy serves to assist in leveraging innovation and ethical use of 4IR technologies for the country's strategic socioeconomic transformation.

By harnessing this technological revolution, we are taking the opportunity to provide transformation that will ensure industries and society work better, smarter and more seamlessly with each other, while protecting the environment and leading society towards a better future.

The National 4IR Policy will be supported by the Malaysia Digital Economy Blueprint, which was launched on 19 February 2021. The Policy and the Blueprint will act as guiding documents for the rakyat to leverage the potential of 4IR. A governance structure, led by the National Digital Economy and 4IR Council has also been established to drive and ensure effective implementation of initiatives, which cut across various ministries and agencies. The Government recognises the benefits we could enjoy in harnessing 4IR towards achieving Malaysia's long term goals outlined in our national policies.

The emergence of 4IR is estimated to increase productivity by 30% across all sectors by the year 2030. This contribution will ensure Malaysia provides better services in the future, besides increasing the number of skilled workers and producing higher value added products. Preservation of ecological integrity using 4IR technologies is also expected to improve Malaysia's ranking in the Environmental Performance Index from 68 among 180 countries to Top 50 in 2030. With all the prospective benefits that 4IR will bring to Malaysia, it is our hope that the National 4IR Policy will be able to guide us in carving our path in embracing and leveraging 4IR's potential towards achieving balanced, responsible and sustainable growth.

FOREWORD BY

MINISTER OF SCIENCE, TECHNOLOGY AND INNOVATION

YB Khairy Jamaluddin

The National 4IR Policy is a testament of the Government's commitment towards realising the digital revolution, today. It will drive efforts to implement the 4IR agenda and leverage the transformation of technology for the socioeconomic development of the people and the nation. The policy, that is built on a whole-of-nation approach through people-private-public partnerships will address and optimise the challenges and opportunities that the digital age will have on our economy, society and environmental development.

A comprehensive 4IR policy is necessary to provide and equip the *rakyat* with 4IR knowledge and skill sets whilst also boosting workforce productivity. The World Bank has reported that human skills are increasingly being replaced by technology-led productivity. This is why it is important for our workforce to harness 4IR technology and embark on digital innovation to thrive in a fast-changing work environment.

The National 4IR Policy is aligned with the National Policy on Science, Technology and Innovation (DSTIN) 2021-2030, that aims to develop Malaysia as a high-tech nation by 2030. In this regard, the National 4IR Policy will further drive the aspirations of DSTIN 2021-2030 in creating a science, technology, innovation and economy (STIE) led ecosystem. It will also facilitate local technology development by creating more opportunities within 4IR technologies like AI, IoT and blockchain.

With the introduction of this policy, the competitiveness of the nation will be further enhanced through greater productivity. Coupled with the adoption of emerging technologies, our industries will thrive. Although 4IR is said to be more related to disruptive technologies, the policy also underlines strategies that will strike the right balance between the need to achieve technological advancement whilst also solving social problems by safeguarding the moral and cultural values of our society.

I hope the *rakyat* as a whole will come together in driving the 4IR agenda towards national development, so that all Malaysians will be able to enjoy the benefits of a brighter tomorrow, through the application of technology.

INTRODUCTION BY

DIRECTOR GENERAL OF ECONOMIC PLANNING UNIT, PRIME MINISTER'S DEPARTMENT

YBhg. Datuk Saiful Anuar bin Lebai Hussen

The Fourth Industrial Revolution (4IR) is unfolding the age of digitalisation that pervades virtually every aspect of modern life. In responding to rapid development of digitalisation and the impact of 4IR, the National 4IR Policy will serve as a broad, overarching national policy to drive the nation's 4IR agenda and to support national development policies, such as the Twelfth Malaysia Plan (RMKe-12) and *Wawasan Kemakmuran Bersama* 2030 (WKB 2030). It also complements the recently launched MyDIGITAL - Malaysia Digital Economy Blueprint in driving the growth of digital economy.

The National 4IR Policy was developed through various engagements with 25 ministries, 51 agencies, state governments and private sector including 460 companies, 22 industry associations and 33 technology providers through focused meetings, surveys and workshops. This is to ensure findings are validated with the right sources, and recommendations are syndicated to obtain buy-ins and support. The Economic Planning Unit would like to thank all contributors from both the public and private sectors including individuals for their valuable comments and suggestions in drafting this policy. Various ministries and agencies have accelerated their efforts in embedding digitalisation in their development agenda. Thus, with the National 4IR Policy, action plans and initiatives of various ministries and entities will be aligned by leveraging technology adoption and innovation in steering the country to achieve a balance, responsible and sustainable growth.

The National 4IR Policy advocates the use of technologies for good from the social, economic and environment perspective. To address the risks and seize the opportunities from the advent of 4IR, Malaysia needs to gear up to catch up to the exponential pace of the 4IR. With this in mind, the National 4IR Policy is anchored to three main objectives, which is to seize growth opportunities arising from 4IR, create a conducive ecosystem to cope with 4IR and build trust in an inclusive digital society.

The National 4IR Policy aims to ensure *rakyat* will enjoy improved quality of life through leveraging technologies and enabling a conducive doing-business environment that allows more technology innovation for business to flourish. A technologically-enabled government will provide more efficient, effective and modernised public service to meet the demand and expectations of the *rakyat*. The success of this policy will require a number of significant changes from all stakeholders. We are hopeful that the National 4IR Policy will serve as the impetus for all stakeholders to make a leap into the technological revolution.

NATIONAL 4IR POLICY: QUICK FACTS

What is the Fourth Industrial Revolution (4IR)?

4IR refers to the disruptive transformation of industries through the application of emerging technology. It is characterised by new technology that is fusing the physical, digital and biological worlds, impacting all disciplines, industries and the economy. For instance, bioprinting uses digital file (digital) to print an object such as organs (physical) with cells and biomaterials (biological).

Digital economy[1] and 4IR are interdependent and mutually reinforcing. Digitalisation enables more sophisticated technology applications, innovations and the emergence of new business models across all sectors. The wide adoption of 4IR technologies will accelerate the growth of digital economy.

What is National 4IR Policy?

The National 4IR Policy is a broad, overarching national policy that drives coherence in transforming the socioeconomic development of the country through ethical use of 4IR technologies. It supports national development policies such as the Twelfth Malaysia Plan (RMKe-12) and *Wawasan Kemakmuran Bersama* 2030 (WKB 2030)[2]. It is also complementing the Malaysia Digital Economy Blueprint in driving the growth of digital economy. The policy outlines the key focus areas which impact the *rakyat*, business and government, in order to seize growth opportunities and to address potential risks arising from 4IR.

Why National 4IR Policy?

4IR is inevitable. It is already changing the existing processes and systems affecting all aspects of human life. 4IR technologies has the potential to improve the wellbeing of society by raising income levels, increasing societal cohesion, improving efficiency, providing convenience, safety and security, and better protecting and conserving limited natural resources. It presents new and promising opportunities for Malaysia to attain a high-income nation status by elevating our strengths and advancing our existing competitive edge for the betterment of the society. However, irresponsible use and manipulation of technology can also pose significant risks to the labour market, widening inequality and deterioration of value and ethics.

The National 4IR Policy is needed to provide:

- Key guiding principles and strategic direction to ministries and agencies in formulating policies and action plans in order to optimise resource allocation and implementation coordination in matters related to emerging technologies.
- Guidelines to address risks from 4IR technologies whilst preserving values and culture.

Note:
[1] Digital economy is defined as economic and social activities that involve the production and use of digital technologies by individual, businesses and government (Malaysia Digital Economy Blueprint)
[2] Embracing 4IR was identified as a key economic growth area in WKB 2030

Where are we going – vision and outcomes?

With the National 4IR Policy, action plans and initiatives of various ministries and entities will be aligned in steering the country to achieve a **balanced, responsible and sustainable growth** by leveraging technological adoption and innovation. The National 4IR Policy advocates **the use of technology for good – social, economic and environment.**

SOCIETY - The *rakyat* will enjoy improved quality of life. Technologies will be used to achieve better work-life balance, greater convenience, safety and security, job transformation into higher value-add and higher pay, improved social wellbeing and environmental sustainability.

BUSINESSES - Businesses will become more productive, competitive and innovative in their offerings, business operations and value delivery to the consumers. Conducive doing-business environment that allows more flexibilities for technology innovation will be established to create greater opportunities for integration, or cross-sectoral technology applications.

GOVERNMENT - A technologically-enabled government will provide more efficient, effective and modernised public services. National planning will become more data-driven and intelligent to meet the demand and expectations of the *rakyat*.

TO ACHIEVE BY 2030

QUALITY OF LIFE

- Malaysian Wellbeing Index(MyWI)* 136.5
  - Economic Wellbeing 146.0
  - Social Wellbeing 131.2
- Increase survival probability from chronic diseases from 82.8% in 2019 to 90%**
- Increase healthy life expectancy from 67 years old in 2019 to 72 years old
- Median emergency and police response time within 8 minutes
- Reduce 30% of travel time during congestion period

LOCAL CAPABILITIES

- Top 20 in Global Innovation Index
- 30% productivity increase across all sectors, compared to 2020 levels
  - 55% improvement in the Agriculture sector
  - 30% improvement in the Manufacturing sector
  - 45% improvement in the Services sector
- Transform 20% of semi- and low-skilled labour to highly skilled labour
- All teachers are trained to use 4IR technology in teaching and learning
- 3.5% GERD, including for 4IR related R&D
- More home-grown 4IR technology providers
- Top 20 in United Nations E-Government Development Index
- 80% of online government services are integrated and supported by 4IR technology application including AI

ECOLOGICAL INTEGRITY

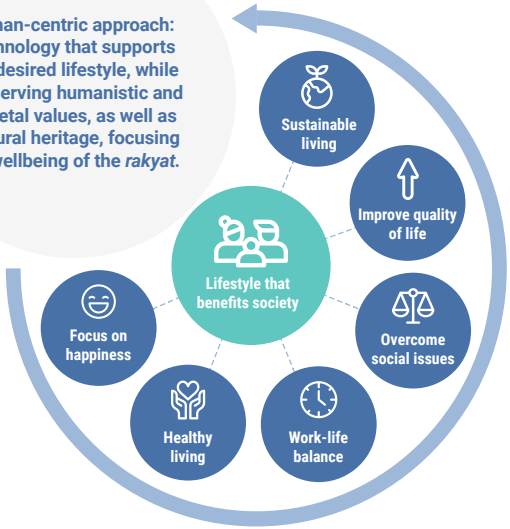
- Top 50 in Environmental Performance Index
- Reduction in greenhouse gas emissions intensity by 45% by 2030

*The base year is 2000, where the value of the index equals 100
**Any of cardiovascular diseases (CVD), cancer, diabetes, chronic respiratory disease (CRD) between age 30 and 70

HOW DO WE ACHIEVE THE ASPIRATION OF THE NATIONAL 4IR POLICY?

1. Human-centric - The National 4IR Policy emphasises wellbeing of the *rakyat* as the main goal. This approach enables people to envision their future lifestyle, and leverage technology to achieve one's aspiration while preserving humanistic and societal values as well as cultural heritage.

Human-centric approach: Technology that supports the desired lifestyle, while preserving humanistic and societal values, as well as cultural heritage, focusing on wellbeing of the *rakyat*.



- **Social wellbeing** as the fundamentals
- Envisions **aspired lifestyle**
- **Leverages technology** to achieve the aspirations
- Embraces the fundamental **cultural and value heritage**, as well as **humanity**

2. Whole-of-nation approach – Coherent readiness across the nation is of critical importance for the country to cope with 4IR. No one shall be left behind.

- The government will continue to play its role as the policy makers to facilitate and enable more innovations in the country.
- Businesses will need to step up and embrace changes to adapt to 4IR, in order to stay resilient and competitive.
- The *rakyat* needs to be more aware and make use of the emerging technologies for good.

3. Clear policy thrusts and targeted strategies – The National 4IR Policy outlines 4 policy thrusts, 16 strategies and 32 national initiatives, which set the direction for all ministries and agencies to align their plans in relation to 4IR and emerging technologies. Each policy thrust is supported by customised strategies and initiatives targeting businesses, society and the government, considering the interdependency of each group to uplift the readiness of the country for 4IR.

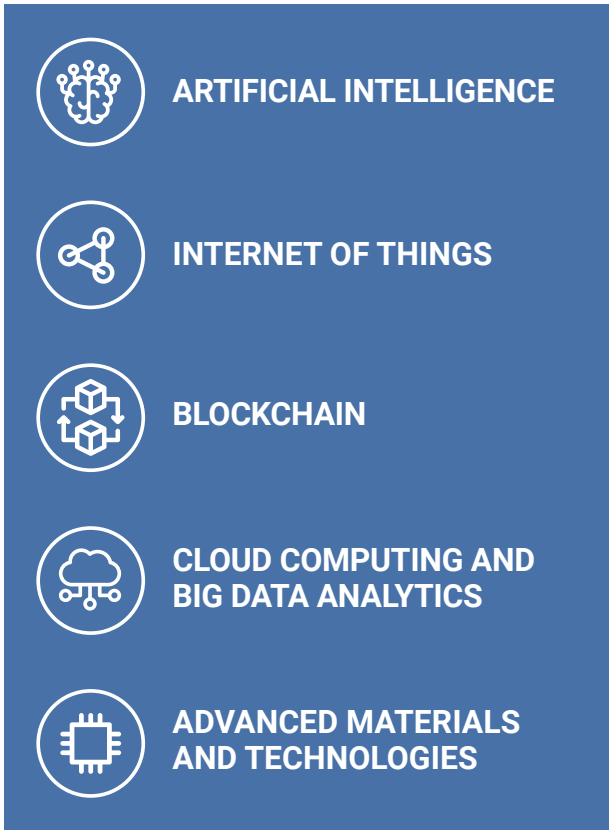
4 POLICY THRUSTS

Equip the *rakyat* with 4IR knowledge and skill sets	Forge a connected nation through digital infrastructure development	Future-proof regulations to be agile with technological changes	Accelerate 4IR technology innovation and adoption
BUSINESSES			
SOCIETY			
GOVERNMENT			
Strategy 1 Industry-led upskilling and reskilling of the existing workforce for the 4IR	**Strategy 6** Strengthen digital infrastructure via strategic investment projects	**Strategy 9** Advocate anticipatory and agile regulatory approach in response to the 4IR	**Strategy 13** Facilitate the adoption of 4IR technologies among local businesses through integrated support
Strategy 2 Match the talent pipeline with the future needs of the economy	**Strategy 7** Minimise disparity in access to technologies across the nation	**Strategy 10** Safeguard the society from irresponsible use of technology	**Strategy 14** Enhance financial support to facilitate 4IR technology adoption and development
Strategy 3 Equip future workforce with 4IR skill sets	**Strategy 8** Enhance public sector digital infrastructure	**Strategy 11** Update legal framework governing personal data management and cyber security to build trust in the society	**Strategy 15** Support 4IR technology innovation focusing on solving social and environmental issues
Strategy 4 Provide equal access to 4IR opportunities across the population			
Strategy 5 Upskilling and reskilling the civil servants		**Strategy 12** Update regulatory approach and review regulations that hinder the application or development of 4IR technologies	**Strategy 16** Prioritise the use of 4IR technologies for policy formulation, implementation, regulatory functions and public service delivery

Beneficiary groups: Businesses Society Government

Note:
*Details of the initiatives will be reflected in the action plans of the ministries and agencies based on their portfolio respectively.

4. Five foundational technologies – Resources will be focused on building technological capabilities in 5 foundational 4IR technologies, which are able to support the deployment and optimisation of other 4IR technologies.



5. Ten key focus sectors – Deployment of 4IR technologies will be focused on 10 key sectors, along with 6 supporting sectors, to deliver benefits to the *rakyat*, creating new socioeconomic growth opportunities for the economy:

6. Governance – The National 4IR Policy will be governed by the National Digital Economy and 4IR Council, chaired by the Prime Minister to optimise resource allocation and coordination in elevating the country's readiness for 4IR.

CONTENT

CHAPTER 1

4IR IN PERSPECTIVE

4IR: AN INEVITABLE WAVE OF CHANGE

The Fourth Industrial Revolution (4IR) is changing how we live, work and communicate through the use of technologies like artificial intelligence (AI), autonomous vehicles (AV) and the Internet of Things (IoT). Its pace of change is unprecedented. The 4IR is disrupting the traditional sectors, which feature centralised factories, large number of employees and huge corporations. In addition, the speed, breadth and depth of the 4IR requires the transformation of entire systems of production, management and governance. With disruption, comes a significant opportunity to rethink and restructure the society's building blocks. The 4IR can potentially improve the wellbeing of the society if it is steered in the right direction. The 4IR can raise income levels, increase societal cohesion, improve efficiency, provide convenience and better protect limited natural resources.

4IR is characterised by a fusion of technologies that is blurring the lines between the physical, digital and biological domains.

Let us take the agriculture sector as an example of the fusion of technologies. A 4IR-ready farmer will oversee a fleet of sensors and robots, and grow tailor-made crops packed with nutrition. The fresh produce will be purchased by consumers from the comfort of their own homes, enabled by the internet and peer-to-peer business models platform.

Instead of in-person collection, autonomous vehicles will transport the goods without the need for human travel. Though this scenario may still be years away for some parts of the world, in many places, this is already commonplace.

Today, the 4IR is already present in our everyday life. For example, AI has enabled services such as chatbots to answer queries in eCommerce platforms. It has also allowed smartphones to perform highly sophisticated functions such as creation of augmented reality, speech recognition and indoor navigation. IoT is also being used to improve road safety as it enables quick information exchange for relevant authorities to act more efficiently in reducing road fatalities and carbon emissions. 3D printing is being used widely in engineering, aviation, healthcare, architecture and even fashion. Drones are already being deployed to perform tasks such as delivery services.

These changes have brought about many risks which need to be properly managed, especially disruption to the labour market and lifestyles. Hence, strong policy actions are needed to address such risks. The 4IR is transforming systems and economies, which necessitates an improved and agile governance.

IMPACT OF 4IR

BENEFITS AND RISKS

The application of 4IR technologies has huge potential economic and social benefits, as well as risks, as shown in *Figure 1-1*. It provides innovative solutions to address critical social and environmental challenges. AI has the potential to increase gross domestic product (GDP) by up to 26% over the coming decade[1]. Meanwhile, 70% of the targets in the United Nations (UN) Sustainable Development Goals (SDGs) are achievable by utilising 4IR technology applications.

These targets are related to, among others, good health, affordable and clean energy and sustainable communities[2].

Rapid technological progress could also disrupt traditional sectors that underpin the economy and change the labour force landscape. Without proper mitigation measures, it could exacerbate social inequalities and wealth disparities, as well as erode trust within the society.

***Figure 1-1*: Potential benefits and risks from 4IR**

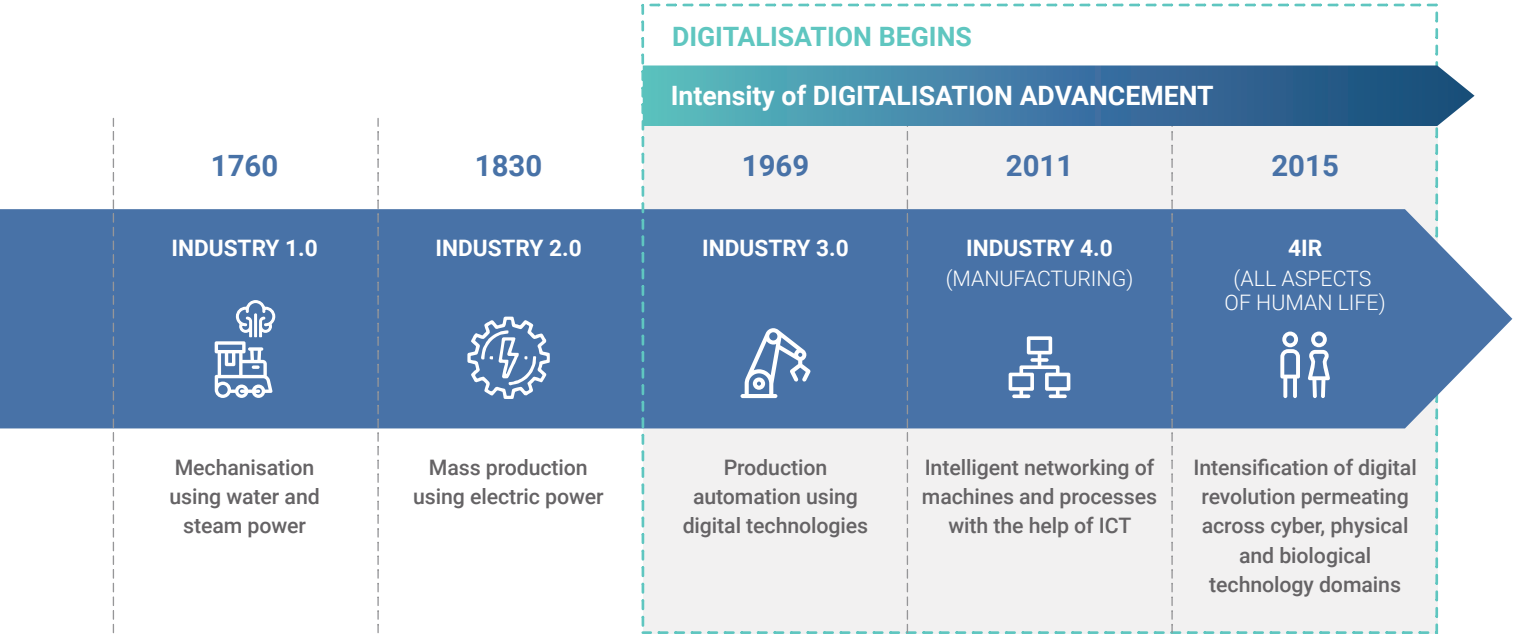
POTENTIAL BENEFITS	POTENTIAL RISKS
New business opportunities and value creation	Job redeployment due to change in skills requirements
Efficiency and productivity gains	Irresponsible use and manipulation of technology
New job creation	Erosion of trust in society due to increased privacy concerns and cyber threats
Transformation of '*dangerous, dirty and difficult* (3D)' jobs	Widening inequality
Improved quality of life	Deterioration of value and ethics
Improved environmental quality	Social interaction and societal wellbeing affected

[1] PricewaterhouseCoopers (PwC) (2017), Sizing the prize: What's the real value of AI for your business and how can you capitalize?
[2] World Economic Forum (WEF) and PwC (2020), Unlocking Technology for the Global Goals

4IR BEYOND PRODUCTION

The first industrial revolution (Industry 1.0) started as early as 1760. It featured the use of water and steam power to mechanise production, from hand tools to machine tools. The revolution continued to the 1830s. This was superseded by Industry 2.0 (1830 – 1915), where a number of industries started using electric power to create division of labour, assembly lines and mass production. Industry 3.0 (1969 – 2010s) focused on the use of electronics and information technology to automate production. The various stages of industrial revolution and intensity of digitalisation is shown in *Figure 1-2*.

Figure 1-2: The industrial revolutions and intensity of digitalisation



Industry 4.0 aims to optimise what has been done in Industry 3.0. Industry 4.0 which originates from Germany's 'Industrie 4.0', refers to the intelligent networking of machines and processes using information and communication technology (ICT). Industry 4.0 transforms manufacturing processes from product design to fabrication, operation and maintenance.

It fosters automation and data exchange in manufacturing technologies and processes through physical-cyber systems.

Industry 4.0, a subset of the 4IR, focuses on the manufacturing sector, whereas 4IR encompasses almost every industry and all aspects of human life as depicted in *Figure 1-3*.

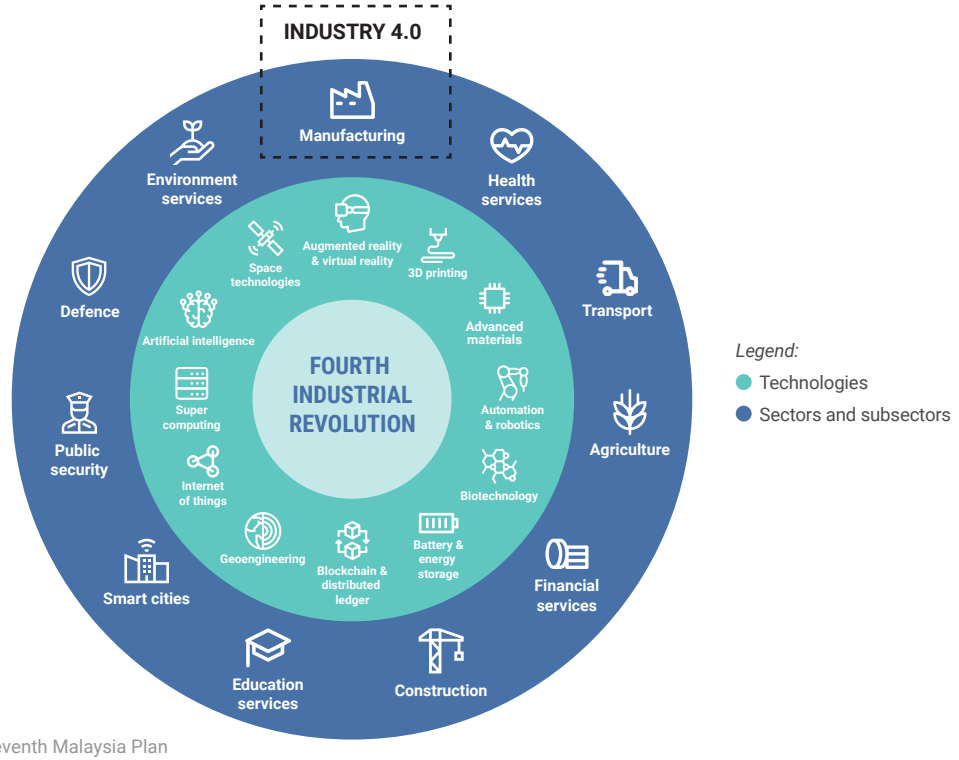
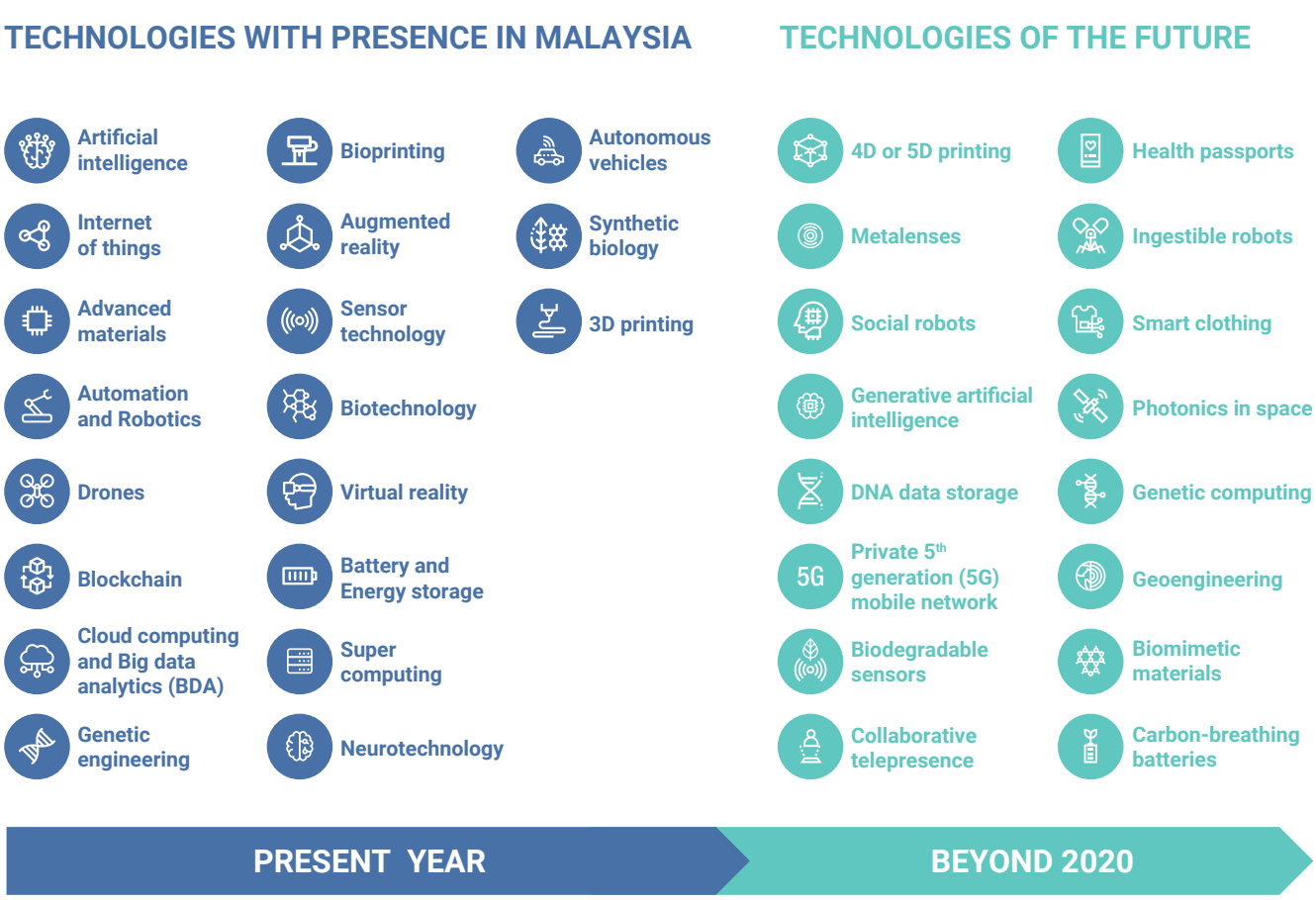


Figure 1-3: Coverage of 4IR

Source: Mid-Term Review of the Eleventh Malaysia Plan
Note: The list of 4IR technologies is non-exhaustive.

EVOLUTION OF TECHNOLOGIES

Figure 1-4: Example technologies of the 4IR and beyond



Source: Academy of Sciences Malaysia (2020), 10-10 Science, Technology, Innovation and Economic (STIE) Framework; WEF (2019), Top 10 Emerging Technologies; Futurism (2019), Things to Come: A Timeline of Future Technology

The 4IR comes in various forms such as through the digitally connected products and services people consume, advancements in smart cities and factories and increasingly common automation of tasks and services in homes and workplaces. In Malaysia, there has been a shift in the way information technology is being used, particularly through cloud computing, system integration and IoT. For drone technology, Malaysia has collaborated with the WEF to design and pilot drone-related policy principles. Drone applications can be seen in Malaysia's agriculture sector. Besides, AI is also present in some sectors in Malaysia, such as the healthcare, retail and professional services.

Going forward, other new technologies and innovations will gain more traction locally. Some of these new technologies have been identified as key science and technology drivers within the 10-10 Science, Technology, Innovation and Economic (STIE) Framework by Academy of Sciences Malaysia[3]. Examples of these science and technology drivers include neuro technology, 4D or 5D printing and sensor technology.

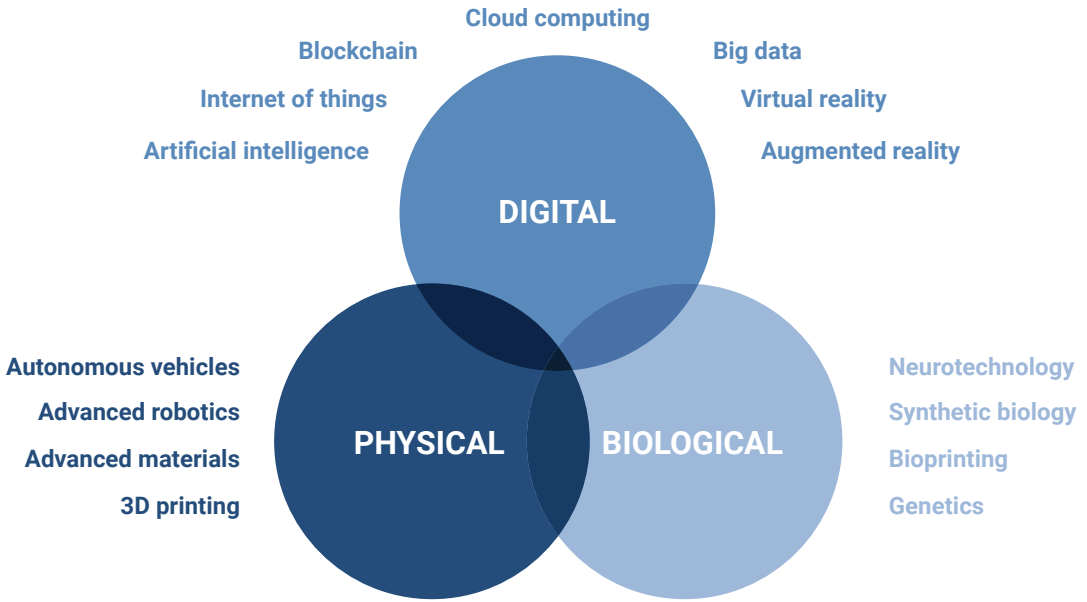
The convergence of individual technologies is expected to yield future technologies to provide powerful solutions. Technologies such as metalenses, collaborative telepresence and deoxyribonucleic acid (DNA) data storage, which are mentioned in the WEF's list of top 10 emerging technologies for 2019, are expected to positively disrupt the existing order and achieve considerable scale[4]. Therefore, it is important for the nation to strive for continuous innovation towards future technologies such as those shown in *Figure 1-4*. The next wave of technological innovation promises to multiply our capacity to work better, smarter and more seamlessly through technology, while protecting the environment and leading the society towards a better future.

[3] The 10-10 Science, Technology, Innovation and Economic (STIE) Framework is an integration of 10 key Malaysian socioeconomic drivers with 10 science and technology drivers aligned to Malaysia's strengths and needs
[4] WEF (2019), Top 10 Emerging Technologies

RELATIONSHIP BETWEEN 4IR AND THE DIGITAL ECONOMY

The digital economy is defined as economic and social activities that involve the production and use of digital technologies by individuals, businesses and government. The 4IR entails the intensification of digital advancement across digital, physical and biological domains, as shown in *Figure 1-5.* As digitalisation intensifies, which will enable more sophisticated technology applications, innovations and the emergence of new business models across all sectors, the 4IR accelerates the growth of the digital economy. As such, the development of the digital economy is an outcome of the 4IR when digital technologies are adopted widely.

Figure 1-5: Convergence of digital, physical and biological domains in the 4IR



THE NATIONAL 4IR POLICY AND MALAYSIA DIGITAL ECONOMY BLUEPRINT

The Government has developed two guiding documents, namely The National 4IR Policy and the Malaysia Digital Economy Blueprint to improve the country's readiness to harness the potential of the 4IR and embrace the digital economy.

Ministries and agencies have stepped up efforts to embed digitalisation in their agenda. More is needed for the nation to keep up with the pace of change, especially in technological advancement, labour market requirements, business model innovation and changing public expectations.

The National 4IR Policy serves as a broad, overarching national policy to drive coherence towards the nation's 4IR agenda and to manage emerging risks from the 4IR. The policy provides key guiding principles and strategic direction to ministries and agencies in formulating policies and action plans to optimise resource allocation.

The Malaysia Digital Economy Blueprint charts the trajectory of the digital economy contribution to the Malaysian economy and builds the foundation to drive digitalisation across the nation, including bridging the digital gap. The relationship between the two documents is as shown in *Figure 1-6*.

These policies also adopt a whole-of-nation approach involving innovative people-private-public partnerships to address economic, social and environmental challenges. The implementation of these policies will be overseen by a delivery-driven governance structure. This mechanism aims to increase the clarity of focus areas as well as improve overall efficiency and accountability, which can ultimately facilitate change across the nation.

Figure 1-6: Relationship between the National 4IR Policy and Malaysia Digital Economy Blueprint

THE NATIONAL 4IR POLICY

Facilitates socioeconomic transformation through ethical use of 4IR technologies:

An overarching policy that:

- Drives policy direction and supports the delivery of national agenda
- Provides guidelines to address risks from 4IR technology whilst preserving values and culture
- Creates conducive ecosystem to embrace 4IR through the development of talent, supporting infrastructure and agile regulations.

MALAYSIA DIGITAL ECONOMY BLUEPRINT

- Charts the growth trajectory of the digital economy
- Builds foundation to drive digitalisation across the nation, including bridging the digital divide

INTENDED OUTCOME

Towards inclusive, balanced, responsible and sustainable socioeconomic development

Business growth in all sectors

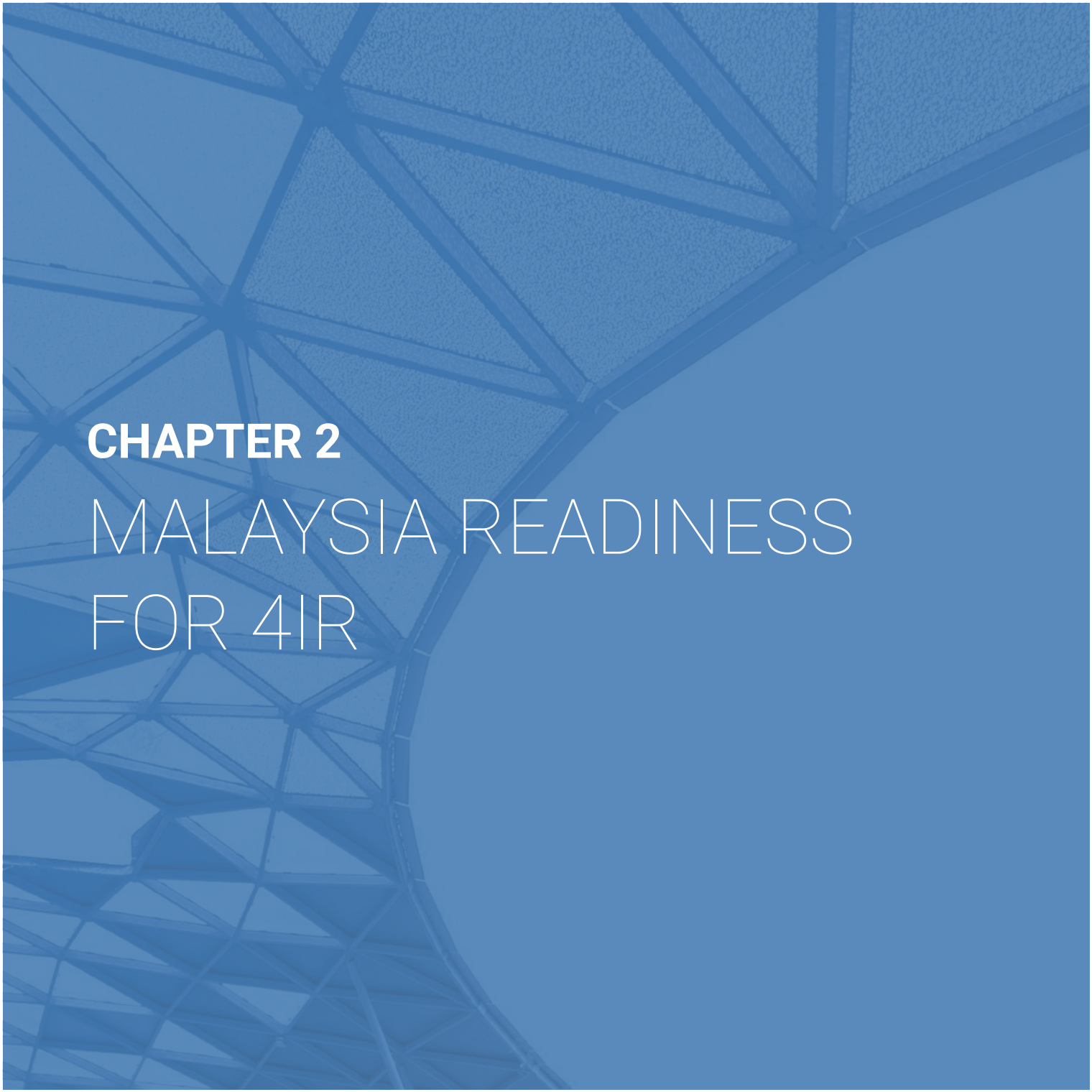
Socio-environmental wellbeing for all

Fit-for-future government

Whole-of-nation approach (People-Private-Public Partnership(PPPP))

Outcome-oriented cohesive strategies and initiatives

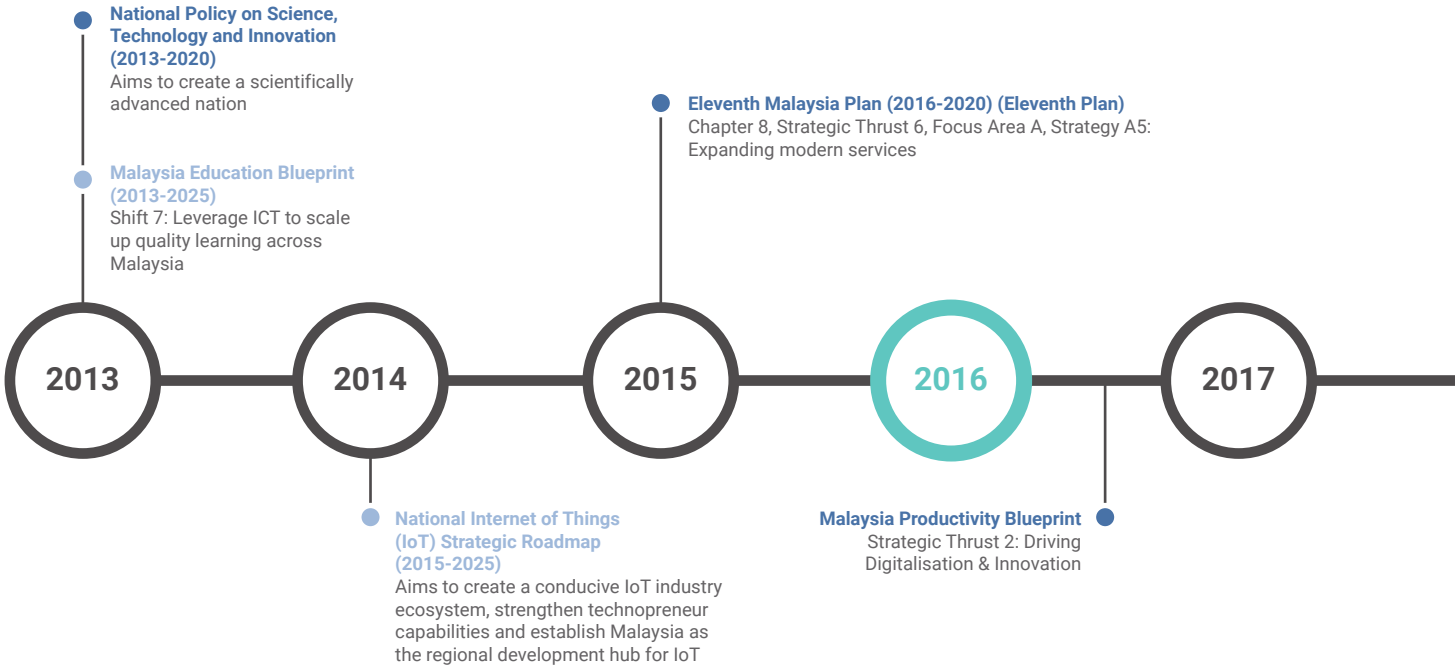
Delivery-driven governance structure



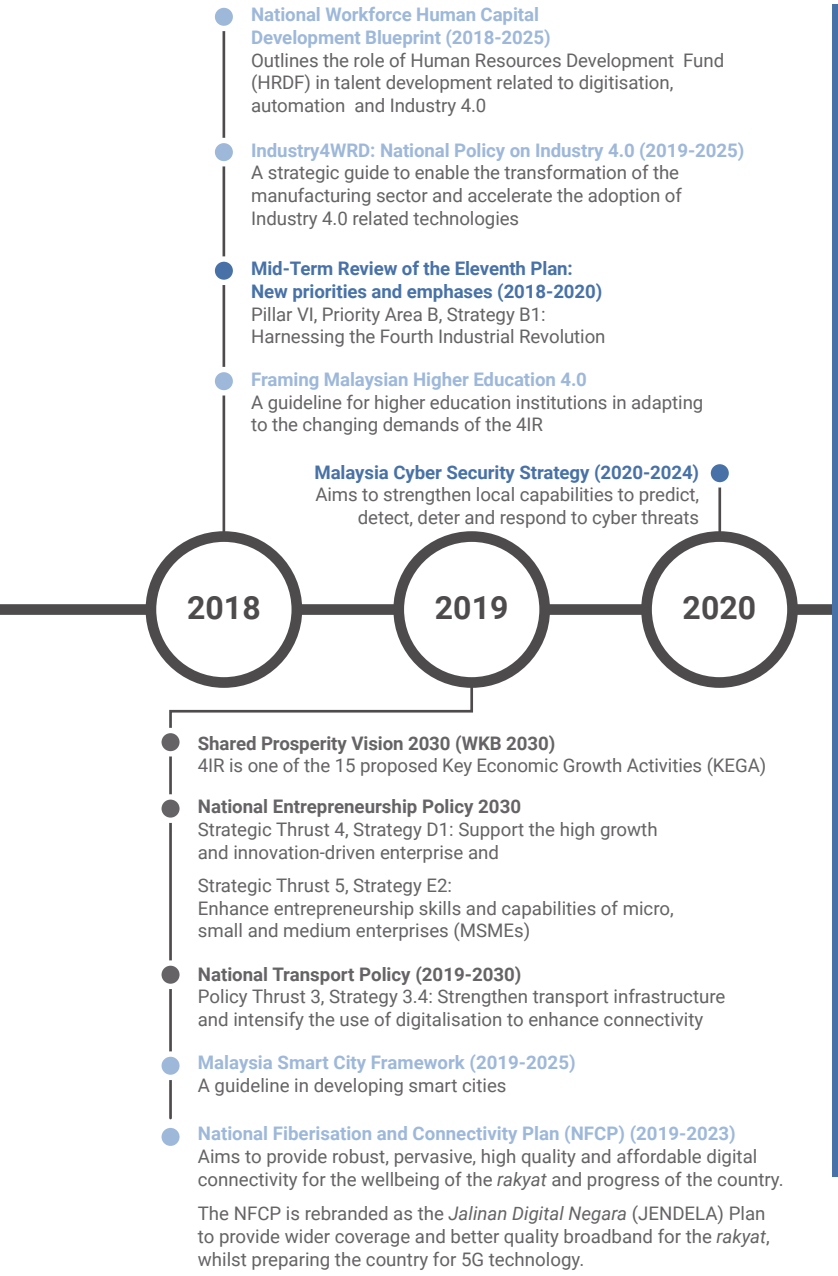
CHAPTER 2
MALAYSIA READINESS FOR 4IR

EMBRACING TECHNOLOGICAL ADVANCEMENT

Figure 2-1: 4IR-related policies in Malaysia



Note: List of 4IR-related policies is non-exhaustive



EXISTING POLICIES

Various policies were introduced to gear up the country for technological and digital advancement as shown in *Figure 2-1*.

The Government's efforts to promote the adoption of advanced technologies started in 2013 through the National Policy on Science, Technology and Innovation. In preparing the manufacturing sector for 4IR, the National Policy on Industry 4.0 (Industry4WRD) was launched in October 2018. The Industry4WRD aims to transform the sector into one that is smart, systematic and resilient, leveraging Industry 4.0 technologies.

The Government undertook significant steps to provide digital infrastructure, with the implementation of the National Fiberisation and Connectivity Plan 2019-2023 (NFCP), paving the way for full digitalisation. The NFCP was rebranded as the *Jalinan Digital Negara* (JENDELA) Plan in 2020.

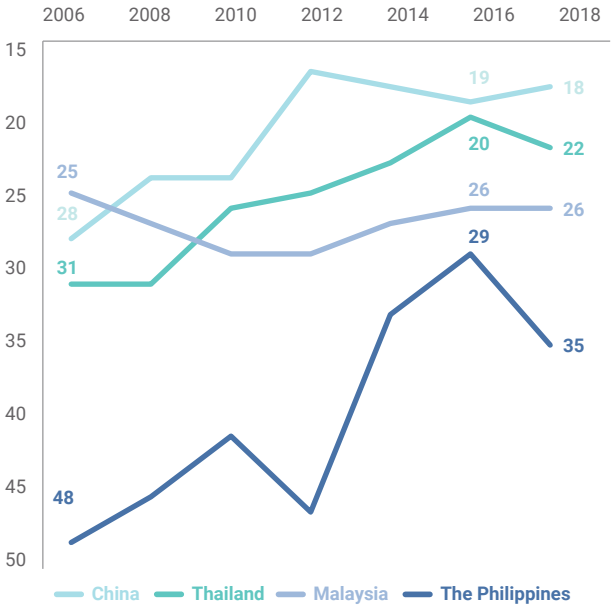
4IR technologies are being leveraged to manage the socioeconomic impact of the COVID-19 pandemic. In this regard, several initiatives for local businesses were introduced under the *Pelan Jana Semula Ekonomi Negara* (PENJANA) to promote digitalisation and encourage technological innovation.

Recognising the ability of emerging technologies and the 4IR to propel the nation forward, the nation needs to be well-prepared to reap the rewards and mitigate the associated risks. The Budget 2021 had allocated RM9.4 billion to accelerate digitalisation, including RM7.4 billion to improve broadband services in rural areas and RM1.0 billion for the industrial digitalisation transformation scheme.

A NEED TO ELEVATE COMPETITIVENESS

Malaysia's performance in the Economic Complexity Index during the past 15 years, indicates a diminishing competitive edge over its regional competitors. Countries, such as China, Thailand and the Philippines have significantly improved their positions, while Malaysia has not changed much since 2006, as shown in *Figure 2-2*. Meanwhile, Malaysia's labour productivity is 50% to 80% lower than advanced economies.

***Figure 2-2*: Country rankings based on Economic Complexity Index**



Source: Harvard Growth Lab (2019), The Atlas of Economic Complexity

As Malaysia progresses towards becoming a high-income nation, its growth model needs to shift from production factor accumulation to productivity-driven. This shift is necessary for sustainable growth. Without it, the nation risks remaining in the middle income trap, where innovation and economic advancement are stifled.

Malaysia has also recorded a decline in rankings on selected global competitiveness-related indices, as shown in *Figure 2-3*. These demonstrate an urgent need for Malaysia to harness the benefits of the 4IR in accelerating the competitive edge for the advancement of the society.

***Figure 2-3*: Malaysia's ranking on selected global competitiveness-related indices, 2015 and 2019**

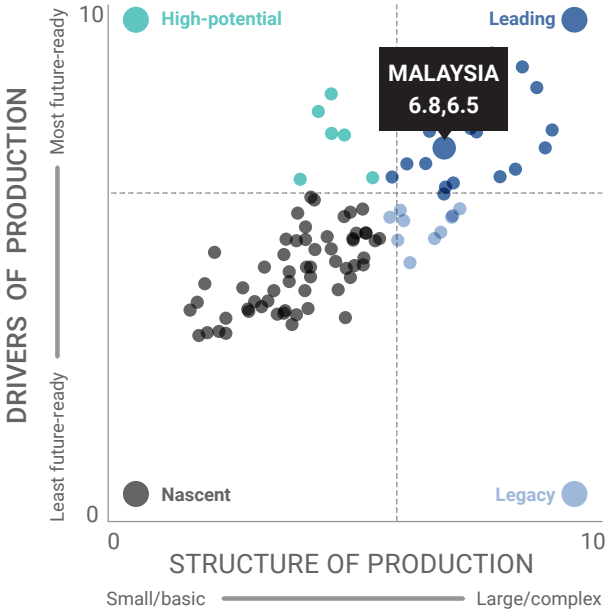
	IMD	WEF	WIPO
2015	21st	18th	32nd
2019	26th	27th	35th

- Institute for Management Development (IMD) World Digital Competitiveness Ranking
- WEF Global Competitiveness Index
- World Intellectual Property Organization (WIPO) Global Innovation Index

LEVERAGING EXISTING STRENGTHS

Despite declining performance in several global competitiveness indices, Malaysia still maintains above average ranking in key technology and innovation related global indices reported in the WEF Readiness for the Future of Production Report 2018 and International Telecommunication Union (ITU) Global Cybersecurity Index 2018.

Figure 2-4: **Malaysia's position in the Map of Readiness Assessment**



Source: WEF (2018), Readiness for the Future of Production Report

Malaysia together with 24 other countries were categorised as leading countries in the WEF report, as shown in *Figure 2-4.* This signifies that Malaysia is poised to do well in shaping and benefitting from the changing nature of production through the adoption of emerging technologies.

A conductive ecosystem is needed for digital networks to succeed. These include appropriate policies and regulatory frameworks, accommodating bureaucratic processes for start-ups as well as strong and inclusive education. According to World Bank in the World Development Report 2016: Digital Dividends, Malaysia is on par with high income nations in terms of quality of complements[5] and technologies.

These rankings demonstrate that Malaysia's digital journey has provided a strong foundation for the nation to seize growth opportunities and mitigate risks arising from the 4IR. Strengths in these areas can be leveraged to raise the potential for inclusive growth and narrow the digital divide. The 4IR offers Malaysia an opportunity to position itself amongst innovative global players.

Malaysia stands to position itself strongly in the future by enhancing its readiness to adapt, exercising flexibility in facing the coming rapid pace and scale of change as well as enhancing competitive edge in its areas of strength.

[5] Complements refer to a favourable business climate, strong human capital and good governance.

MALAYSIA AND 4IR

GEARING UP FOR 4IR

The Study of National Policy Framework for the 4IR commissioned by the Economic Planning Unit, Prime Minister's Department found that the relevant building blocks are already in place for the nation to embrace 4IR. Nevertheless, the country must strive to improve its capacity and capability for 4IR.

BUSINESSES

The adoption of ICT applications is on the rise among businesses. However, 4IR-readiness for digital and technology adoption among micro, small and medium enterprises (MSMEs) is generally low. Given that MSMEs make up 97.2% of business establishments, a conducive ecosystem is needed to support technology investment among these businesses. This includes funding, infrastructure, talent, awareness and leadership-driven change management.

Strong growth in 4IR technology adoption is anticipated in the manufacturing, ICT and education sectors within the next five years. There are 4IR innovators in the country who are capable of developing new products or services. Small technology providers are increasingly willing to invest in the 4IR for long-term growth. These signal the growth potential in innovation and technology development. To help businesses enhance their technological capabilities, government support is needed in terms of facilitating collaboration, providing incentives and removing regulatory constraints.

SOCIETY

Malaysia has implemented a number of measures to mitigate some of the societal impacts of 4IR. Moving forward, the following challenges must be addressed:

- Limited coverage of cross-border data transactions in the current Personal Data Protection Act.
- Inadequate coverage of 4IR-related education and relevant upskilling programmes.
- Unequal access to technologies that widen urban-rural, gender, income and generation gaps.
- Lack of social safety nets to mitigate job displacements due to 4IR technology adoption.
- Limited potential for online transactions due to low trust.
- Lack of awareness in society to protect against cybercrimes.

In this regard, Malaysia requires a more agile governance approach. Policy-making mechanisms need to keep pace with the rapid change and exponential impact of the 4IR on the society.

GOVERNMENT

Digitalising the public service is a prerequisite to the adoption of 4IR technologies in enhancing public service delivery. The government has embarked on various initiatives, such as 1GovCloud, Malaysia Government Central Data Exchange (MyGDX) and Government Data Optimisation (GDOTS), to digitalise and improve public service delivery. In the UN E-Government Survey 2020, Malaysia improved its ranking to 47th in the E-Government Development Index (EGDI) as compared to 60th in 2016.

Malaysia was also among the 16 upper-middle income group of economies which scored highly in the Online Service Index (OSI) and shifted from the 'High' to the 'Very High' EGDI group with its EGDI score of 0.79. Meanwhile, in the ITU Global Cybersecurity Index 2018, Malaysia ranked 8th globally and 2nd in Asia-Pacific, demonstrating that comprehensive security controls are in place to secure data and prevent unauthorised access to digital infrastructure.

Nevertheless, more needs to be done in moving towards 4IR-enabled government. Digital and technology adoption capabilities need to be enhanced. The systems and processes in the public sector need greater automation to enable real-time response. As talent and infrastructure readiness gaps still remain, strong leadership-driven change is needed to gear up the public sector for the 4IR.

GLOBAL SHOCK

The COVID-19 pandemic has further highlighted the need to cope with shocks and disruptions on a global scale. The pandemic has accelerated digitalisation of the world in general, as the nations transition into the new normal. Malaysia needs to be better prepared for similar shocks in the future including those stemming from disruptive technologies and climate change.

CASE FOR CHANGE

Several crucial building blocks need to be put in place to pave the way for Malaysia to successfully embrace the 4IR. These building blocks are grouped into four themes as a case for change. Hence, the National 4IR Policy has been developed, containing policy thrusts, strategies and initiatives, in driving the needed changes.

Society needs an innovation-led mindset

Innovation-led mindset among society, businesses and the public sector is a prerequisite for the successful adoption of the 4IR technologies. Malaysia outperforms most ASEAN countries and is at par with high income economies in terms of digital technology adoption by the society and the government. However, there is much room for improvement in business adoption. Resistance remains an issue, limiting 4IR technology adoption and innovation. Government assistance and financing need to be more accessible to encourage innovation-led mindset.

Talent needs to be 4IR-ready to address current and future demands

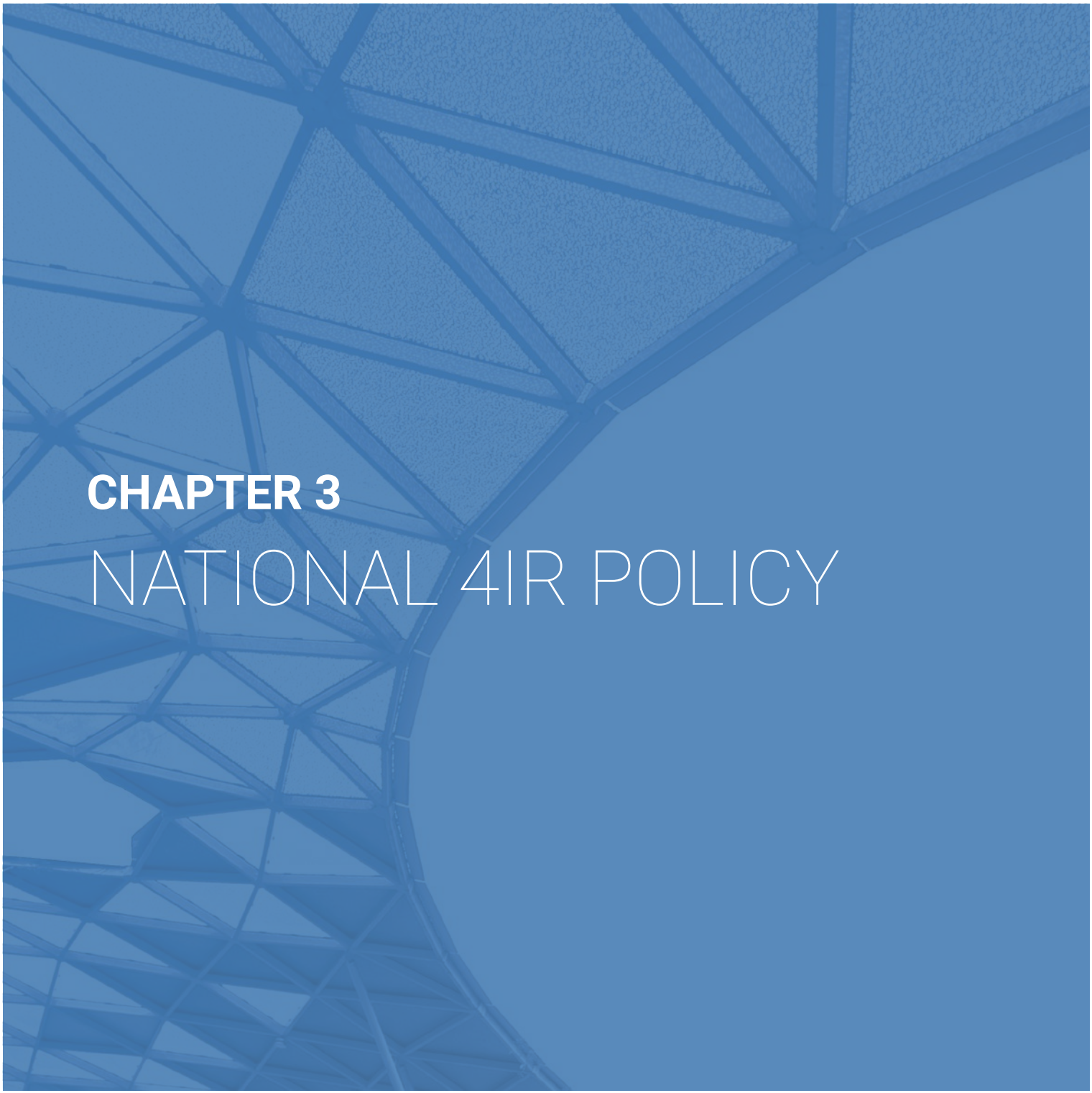
As 4IR transforms the society, the required skill sets also change. The current talent pool must be equipped with the necessary skills to develop and use the 4IR technologies. This is a significant challenge that will require reskilling, upskilling and a lifelong approach to education and development. In addition, coherent policy surrounding labour issues and adequate social safety nets are necessary to help local talent thrive in the 4IR era.

Affordable and high quality 4IR-enabling digital infrastructure needs to be easily accessed

The foundation of the 4IR lies in reliable infrastructure of mobile and fixed broadband telecommunication networks that can support wider connectivity at faster speed. In areas where infrastructure to support digital and other 4IR technologies is either underdeveloped or non-existent, the implementation of new technological solutions becomes more challenging. Such areas face higher risk of being left behind leading to unequal distribution of benefits and may also widen the digital divide. Thus, the nation needs to ensure quality and inclusive broadband coverage. To encourage service providers to develop the needed infrastructure, investment costs need to be lowered to increase returns. The capacity to deliver services needs to be improved through the provision of adequate basic hardware and digital infrastructure that enables secured connectivity.

Coherent regulations and shared accountability are necessary to persistently pursue effective change

Greater integration and coordination involving multiple stakeholders are needed to address the interconnected and fast-changing nature of emerging technologies across the biological, digital and physical domains. As the 4IR creates more new cross-sectoral economic activities, bureaucratic processes need to be streamlined while duplication of roles and functions should be removed. Policy makers and implementers will also need to improve shared accountability, impartiality and transparency. This would serve to create a regulatory environment that is ideal for innovative-led businesses and resource optimisation.



CHAPTER 3

NATIONAL 4IR POLICY

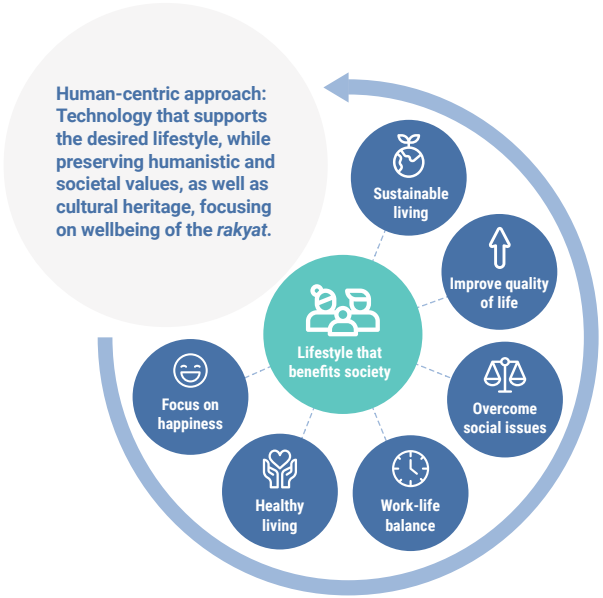
NATIONAL 4IR POLICY APPROACH

The National 4IR Policy adopts a human-centric approach to enhance the wellbeing of the *rakyat*. This approach enables people to envision their future lifestyle, and leverage technology to achieve one's aspirations while preserving humanistic and societal values as well as cultural heritage. The approach is as shown in *Figure 3-1*.

This approach balances the need for achieving technology advancement, solving social problems as well as safeguarding moral and cultural values of the society. In contrast, the traditional technology-centric approach revolves mainly around technologies that can be adopted to achieve tangible economic outcomes.

The National 4IR Policy emphasises wellbeing of the *rakyat* as the main goal in this tech-enabled growth era, especially in realising the *Wawasan Kemakmuran Bersama* 2030 (WKB 2030).

Figure 3-1: The human-centric approach of the National 4IR Policy



ENSURING COHERENT READINESS TO EMBRACE 4IR

The National 4IR Policy serves as a national framework to align the government's policy responses in unlocking the potential socioeconomic benefits and managing the risks arising from the 4IR. The National 4IR Policy takes into account resource optimisation and implementation coordination of other related policies.

Examples of new initiatives in four focus areas under the National 4IR Policy, namely human capital, infrastructure, regulations and innovation, are shown in *Figure 3-2*. This Figure highlights enhancements of existing initiatives as well as other key features unique to the National 4IR Policy. These initiatives are introduced to gear up the country for technological and digital advancement.

The National 4IR Policy also highlights 10 focus sectors to leverage 4IR technologies to uplift productivity, and five foundational technologies that the country needs in building local capabilities to support the deployment of other 4IR technologies.

The National 4IR Policy is an overarching policy to which other sectors and technology-specific policies are to be aligned to. This would ensure coherent readiness of the nation to embrace this industrial revolution and to elevate Malaysia's competitiveness amidst technological disruptions.

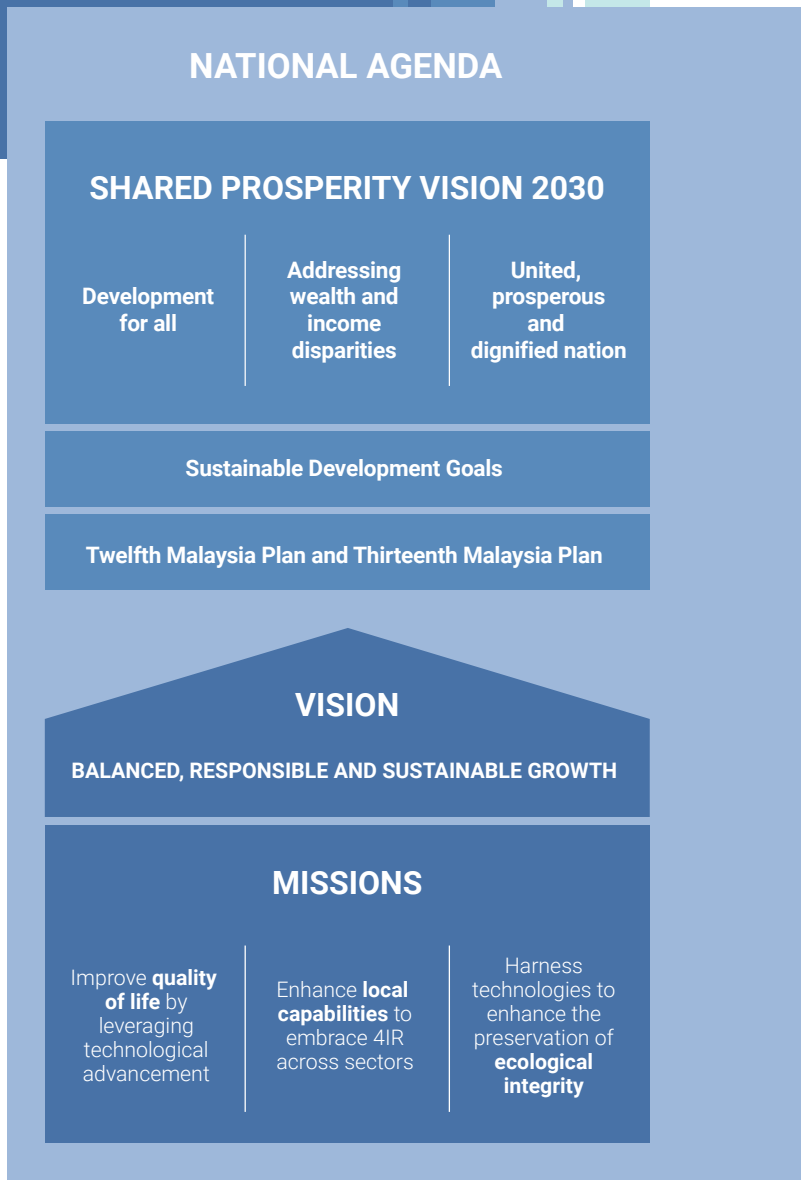
Figure 3-2 : Highlights of new and enhanced initiatives in the National 4IR Policy based on the four policy thrusts

Focus areas	Human capital development	Infrastructure improvement	Regulations improvement	Technology adoption and innovation
Examples of new initiatives in the National 4IR Policy	• Ensuring coherence of labour policies • Addressing job displacement due to 4IR • Accelerating the implementation of 4IR within the public sector	• Developing 4IR Innovation Parks and Application Centres	• Developing 4IR ethics framework • Introducing co-solutioning approach in addressing regulatory issues	• Developing 4IR Business Platform • Introducing Government Experience Lab
Examples of enhanced initiatives from the existing policies in the country	• Mobilising co-investment fund for 4IR technology adoption by industries • Prioritising research, development, commercialisation and innovation (R&D&C&I) funding for technological innovations • Adopting agile regulatory approach and expand regulatory sandbox • Establishing data driven policies and improve data sharing environment • Introducing specific legislation on cyber security			
Other highlights of the National 4IR Policy	• Aligned to the SDGs and WKB 2030 • Aims to seize growth opportunities arising from 4IR • Includes both ecosystem and sectoral approach with government facilitating private sector innovation and application of technologies to cope with 4IR • Leverages cross-platform collaborations and private sector for solutions • Prioritises change management as one of the key focus areas for implementation • Emphasises the need to embed trust and inclusivity within the digital society			

VISION FOR THE FUTURE

Malaysia has invested substantial resources to cope with technological changes and laid the foundation for the 4IR through rapid digitalisation. Malaysia faces some issues and challenges in embracing 4IR such as insufficient innovation-led mindset, inadequate 4IR-ready talent and lack of quality basic infrastructure. Moving forward, the country needs a clear governance structure and implementation framework to roll out a whole-of-nation approach to drive the 4IR agenda.

The National 4IR Policy will put Malaysia in a strong competitive position in the coming decades and will continue to improve the economic, social and environmental wellbeing of the nation. The Policy will ensure the country is on a sustainable growth trajectory.



TO ACHIEVE BY 2030

QUALITY OF LIFE

- Malaysian Wellbeing Index(MyWI)* 136.5
  - Economic Wellbeing 146.0
  - Social Wellbeing 131.2
- Increase survival probability from chronic diseases from 82.8% in 2019 to 90%**
- Increase healthy life expectancy from 67 years old in 2019 to 72 years old
- Median emergency and police response time within 8 minutes
- Reduce 30% of travel time during congestion period

LOCAL CAPABILITIES

- Top 20 in Global Innovation Index
- 30% productivity increase across all sectors, compared to 2020 levels
  - 55% improvement in the Agriculture sector
  - 30% improvement in the Manufacturing sector
  - 45% improvement in the Services sector
- Transform 20% of semi- and low-skilled labour to highly skilled labour
- All teachers are trained to use 4IR technology in teaching and learning
- 3.5% GERD, including for 4IR related R&D
- More home-grown 4IR technology providers
- Top 20 in United Nations E-Government Development Index
- 80% of online government services are integrated and supported by 4IR technology application including AI

ECOLOGICAL INTERGRITY

- Top 50 in Environmental Performance Index
- Reduction in greenhouse gas emissions intensity by 45% by 2030

* The base year is 2000, where the value of the index equals 100

** Any of cardiovascular diseases (CVD), cancer, diabetes, chronic respiratory disease (CRD) between age 30 and 70

The intended outcomes of the National 4IR Policy by 2030 based on the three policy missions are as follows:

- Enhanced quality of life of the *rakyat* reflected by the improvement in the MyWI, from 124.4 in 2018 to 136.5 in 2030. This will be achieved by leveraging technological advancement.

- 30% uplift in productivity, across all sectors by 2030, compared to 2020 levels, achieve 3.5% gross expenditure on R&D (GERD) to GDP as well as increase in investment in 4IR-enabling infrastructure and the number of home-grown 4IR technology providers. These will be achieved with the enhancement of local capabilities in embracing the 4IR.

- Improvement in Malaysia's ranking in Environmental Performance Index from 68 among 180 countries to top 50 in 2030 with the preservation of ecological integrity using 4IR technologies.

THE NATIONAL 4IR POLICY OVERVIEW

The National 4IR Policy provides an overarching direction in gearing up the country for the 4IR.

The National 4IR Policy is important to serve the following purposes:

- Enhance policy coherence in enabling sustainable resource optimisation and implementation coordination of other related policies.
- Support the delivery of national agenda, including the strategic direction outlined in WKB 2030, as well as the country's commitment to the SDGs.
- Provide guidelines to address risks arising from 4IR technology adoption, whilst preserving values and culture.

National 4IR Policy Framework is as shown in *Figure 3-3*.

3 MISSIONS

3 OBJECTIVES

4 POLICY THRUSTS

16 STRATEGIES

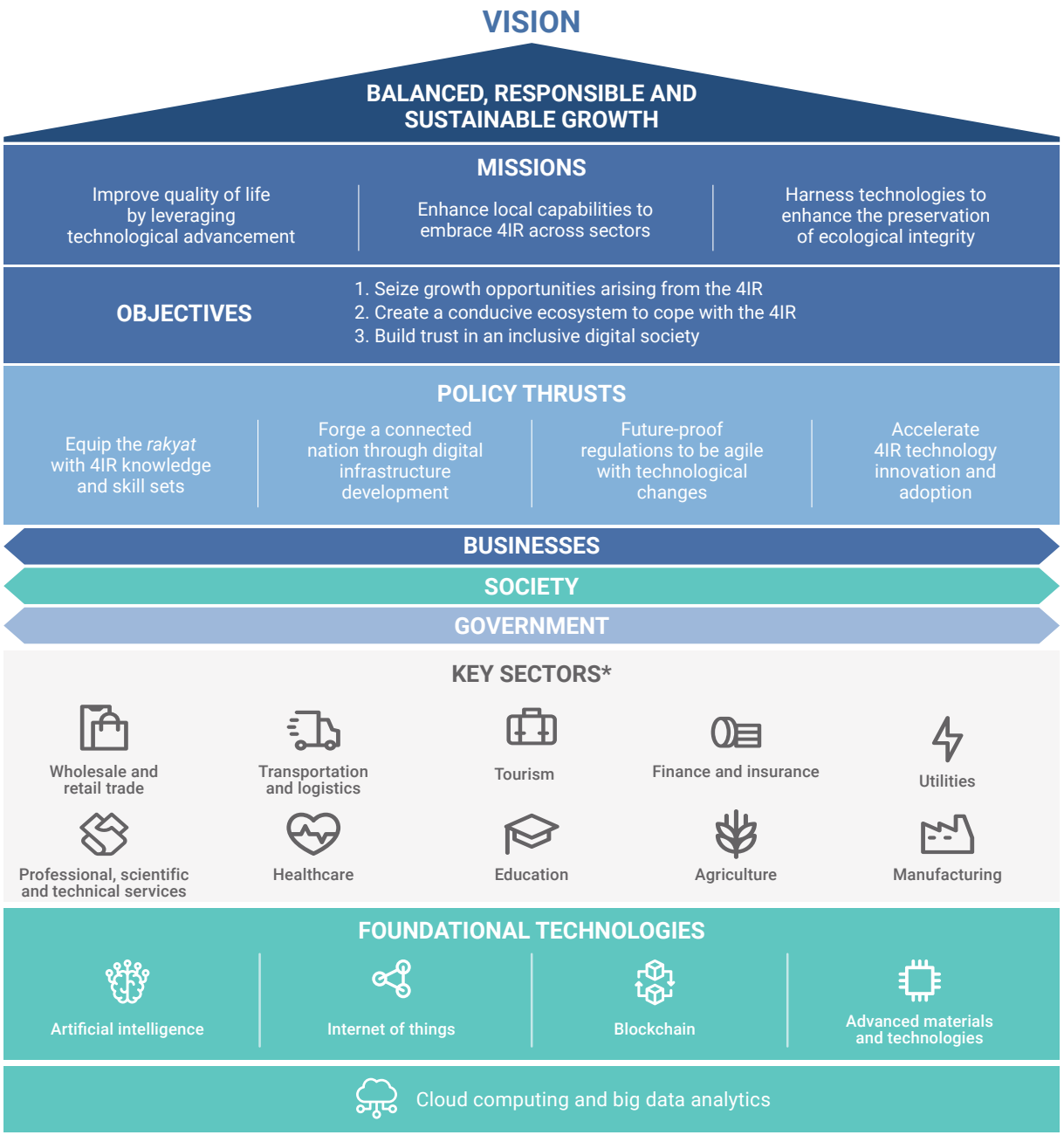
32 NATIONAL INITIATIVES

10 KEY SECTORS

60 SECTORAL INITIATIVES

5 FOUNDATIONAL TECHNOLOGIES

Figure 3-3: National 4IR Policy Framework



*Potential 4IR applications are also identified for the six supporting sectors, that is, construction, real estates, mining and quarrying, arts, entertainment and recreation services, information and communication services as well as administrative and support services.

VISION

The National 4IR Policy envisions to drive balanced, responsible and sustainable growth for the country by harnessing the potential of the 4IR technologies, for the following:

- Socio-environmental wellbeing. For example, social connection, environmental preservation, cultural responsiveness, family institutions and inclusivity.
- Economic growth. For example, productivity, investment, revenue, innovation, technology and household Income.

MISSIONS

The National 4IR Policy aims to fulfil the following three missions:

- **Improve quality of life by leveraging technological advancement**, which include seizing growth opportunities arising from the 4IR and building trust in an inclusive society to proactively mitigate potential negative impacts;
- **Enhance local capabilities to embrace 4IR across sectors**, by creating a conducive ecosystem to cope with the 4IR; and
- **Harness technologies to enhance the preservation of ecological integrity**, by leveraging 4IR technologies and its growth opportunities in particular to enable sustainable consumption and production, and to solve environmental issues.

BENEFICIARIES

The National 4IR Policy, supported by national and sectoral initiatives, targets three key beneficiary groups:

- Businesses of all sizes, including but not limited to those under the 10 key sectors.
- Society, which includes current and future workforce, and vulnerable groups.
- Government, comprising ministries and agencies, state governments and local authorities.

Five foundational 4IR technologies, to be developed to unlock the potential of other technologies, which will benefit all beneficiary groups.

Role of key stakeholders in ensuring balanced, responsible and sustainable growth

Overall, the National 4IR Policy focuses on creating a conducive ecosystem for the country to seize opportunities and mitigate risks arising from the 4IR. The vision, missions and objectives of the National 4IR Policy can only be achieved when the key stakeholders actively take up their roles and strong people-private-public partnerships are forged.

BUSINESSES

The private sector plays a role in driving the national 4IR agenda by leading a responsible and sustainable approach in delivering goods and services. This approach should focus on the development of innovative businesses, functions, processes and infrastructure to address socio-environmental challenges.

Private sector players are able to leverage platforms, ecosystems and digital marketplaces of the 4IR to co-create and collaborate in new partnership models. Private sector players need to invest in innovation and adopt digital solutions, as well as take the lead for several of the National 4IR Policy initiatives. The growth and sustainable development of the private sector can then accentuate its meaningful participation in community and socioeconomic development agenda.

SOCIETY

Digitalisation and emerging technologies offer immense opportunities to members of the civil society to improve the way we relate to each other and to our institutions.

To reap the benefits of the 4IR, society needs to be willing and adaptable to change. The *rakyat* must be ready to embrace opportunities in ensuring personal digital readiness, by furthering their knowledge and skills.

The 4IR also presents tremendous opportunities for the civil society organisations (CSOs) to leverage new technologies to scale up impact and achieve critical missions. Emerging technologies can help these organisations to engage more deeply with their communities and better measure their impact to improve accountability and transparency.

Ultimately, the society's actions need to be underpinned by a sense of responsibility and motivation to influence the use of technologies for common good.

GOVERNMENT

The government serves as a guide and enabler for the nation to achieve its 4IR agenda. Through the National 4IR Policy, the government provides strategic direction and policy decisions on areas of focus and actions needed to develop a complementing ecosystem for a responsible and sustainable revolution to take place. The government's key role is to set up appropriate policies and regulatory frameworks for businesses and society to have equal access to the opportunities and socioeconomic benefits of the 4IR.

STRATEGIC POLICY THRUSTS AND INITIATIVES

To seize opportunities arising from 4IR technologies, there is a need to accelerate the adoption of these technologies while building the local capability to innovate new solutions. This can be made possible through the creation of a conducive ecosystem, especially from the aspects of talent, infrastructure readiness, regulatory approach and technological capability.

4 Policy Thrusts, 16 Strategies and 32 National Initiatives

The National 4IR Policy outlined the following four key policy thrusts:

- Equip the *rakyat* with 4IR knowledge and skill sets
- Forge a connected nation through digital infrastructure development
- Future-proof regulations to be agile with technological changes
- Accelerate 4IR technology innovation and adoption

The policy thrusts are supported by 16 strategies and 32 national initiatives, targeting three key beneficiaries, namely society, businesses and government.

To mitigate potential social-related risks arising from the 4IR, elements of trust, inclusivity, cyber security, value and ethics, as well as socio-environmental wellbeing have been woven across the initiatives.

4	POLICY THURSTS
3	BENEFICIARIES
16	STRATEGIES
32	NATIONAL INITIATIVES

The four policy thrusts will guide 4IR related policies and programmes formulation by ministries and agencies. In line with the whole-of-nation approach in driving the 4IR agenda, it is important to enhance policy coherence in enabling sustainable resource optimisation and implementation coordination of related policies.

Figure 3-4: 4 Policy thrusts and 16 strategies of National 4IR Policy

THE NATIONAL 4IR POLICY TO GEAR UP MALAYSIA FOR THE 4IR

OBJECTIVES

Seize growth opportunities arising from the 4IR	Create a conducive ecosystem to cope with the 4IR	Build trust and an inclusive digital society

4 POLICY THRUSTS

Equip the *rakyat* with 4IR knowledge and skill sets	Forge a connected nation through digital infrastructure development	Future-proof regulations to be agile with technological changes	Accelerate 4IR technology innovation and adoption

BUSINESSES

SOCIETY

GOVERNMENT

Strategy 1 Industry-led upskilling and reskilling of the existing workforce for the 4IR	**Strategy 6** Strengthen digital infrastructure via strategic investment projects	**Strategy 9** Advocate anticipatory and agile regulatory approach in response to the 4IR	**Strategy 13** Facilitate the adoption of 4IR technologies among local businesses through integrated support
Strategy 2 Match the talent pipeline with the future needs of the economy	**Strategy 7** Minimise disparity in access to technologies across the nation	**Strategy 10** Safeguard the society from irresponsible use of technology	**Strategy 14** Enhance financial support to facilitate 4IR technology adoption and development
Strategy 3 Equip future workforce with 4IR skill sets	**Strategy 8** Enhance public sector digital infrastructure	**Strategy 11** Update legal framework governing personal data management and cyber security to build trust in the society	**Strategy 15** Support 4IR technology innovation focusing on solving social and environmental issues
Strategy 4 Provide equal access to 4IR opportunities across the population		**Strategy 12** Update regulatory approach and review regulations that hinder the application or development of 4IR technologies	**Strategy 16** Prioritise the use of 4IR technologies for policy formulation, implementation, regulatory functions and public service delivery
Strategy 5 Upskilling and reskilling the civil servants			

Beneficiary groups: Businesses Society Government

POLICY THRUST 01

Equip the *rakyat* with 4IR knowledge and skill sets

This policy thrust focuses on both the education and talent management components. It covers the entire labour force, both current and future, including the latent workforce. Talent in the current workforce comprises both public and private sectors. Future workforce are those currently in the education system, including primary, secondary and tertiary levels. Latent workforce is potential labour force, which is currently not in the labour market such as, older persons, housewives and person with disabilities.

It is important to provide all segments of the population, including Orang Asli and people living in remote and underserved areas, the opportunities to equip themselves with the necessary knowledge and skill sets. These skill sets are important for them to keep pace with the rapid changes in technological advancement and meet industry demands. This policy thrust enlists five strategies and 12 initiatives as follows:

Figure 3-5: Strategies and initiatives of Policy Thrust 1

5 STRATEGIES		12 INITIATIVES	
S1	Industry-led upskilling and reskilling of the existing workforce for the 4IR	Initiative 1:	Establish industry-led, sectoral-based 4IR-skills development centres
		Initiative 2:	Incentivise industry to upskill and reskill talent in 4IR areas
S2	Match the talent pipeline with the future needs of the economy	Initiative 3:	Establish an AI-enabled data platform to facilitate human capital planning
		Initiative 4:	Reconcile labour policies with talent pipeline projection and other 4IR- related incentives to gradually reduce foreign labour dependency
S3	Equip future workforce with 4IR skill sets	Initiative 5:	Scale up exposure to 4IR technologies among the young generation and encourage innovation by making all schools in Malaysia "My Digital Maker Champion Schools"
		Initiative 6:	Enhance and implement PAK-21 in all public schools to develop humanistic soft skills for future workforce to be 4IR-ready
		Initiative 7:	Enhance 4IR-related courses in higher education institutions (HEIs) and technical and vocational education and training (TVET) institutions through better programme design and delivery
S4	Provide equal access to 4IR opportunities across the population	Initiative 8:	Rationalise and enhance collaboration to ensure equal access to 4IR learning opportunities for all
		Initiative 9:	Provide incentives to minimise the risk of job displacements
		Initiative 10:	Enhance formal social protection mechanism for gig workers
S5	Upskilling and reskilling the civil servants	Initiative 11:	Introduce a 4IR Innovation Accelerator, dedicated to driving adoption of 4IR technologies in public sector at all levels of government
		Initiative 12:	Provide 4IR-related training to all civil servants

Beneficiary groups: Businesses Society Government

POLICY THRUST 02

Forge a connected nation through digital infrastructure development

Digital infrastructure development, ranging from connectivity to access to the necessary hardware and software, for example, cloud services, aims to uplift mobility and enhance inclusivity. Investment in digital infrastructure is key to drive the adoption of 4IR technologies throughout the nation. In the past decade, the government has invested more than RM36 billion to provide better coverage and access as well as to enhance digital services across all levels of society. NFCP, which aims to reduce broadband services prices and provide internet access across all levels of society was launched in 2019.

To cope with the COVID-19 pandemic, the industry committed to upgrade the network coverage and capacity to upkeep the readiness and quality of communications network. Malaysia is also taking steps to embrace 5G technology, which is the next generation of wireless technology necessary to realise the full potential of the 4IR. These are among existing initiatives to address regional disparity in connectivity and affordable access to services. Hence, this policy thrust emphasises other digital infrastructure aspects towards a better connected nation. This policy thrust enlists three strategies and six initiatives as follows:

Figure 3-6: Strategies and initiatives of Policy Thrust 2

3 STRATEGIES		6 INITIATIVES	
S6	Strengthen digital infrastructure via strategic investment projects	Initiative 13:	Establish 4IR innovation parks with 4IR application centres to provide a secure test-bed for 4IR technology providers
		Initiative 14:	Develop critical 4IR-enabling infrastructure to enable wider application of 4IR technologies
S7	Minimise disparity in access to technologies across the nation	Initiative 15:	Expand digital marketplace for the digitally underserved rural community to bridge the technology adoption gap
S8	Enhance public sector digital infrastructure	Initiative 16:	Expand the MyGovCloud to promote cloud computing environment in the public sector
		Initiative 17:	Strengthen data-driven policy development and improve data sharing environment to ensure data quality
		Initiative 18:	Enhance workforce mobility of the public sector

Beneficiary groups: Businesses Society Government

POLICY THRUST 03

Future-proof regulations to be agile with technological changes

An agile regulatory framework, approach and governance related to the 4IR are critical to build trust in the society and provide conducive environment for innovation. Rapid changes in technology and the convergence of physical, digital and biological domains in the 4IR necessitates the government, especially the regulators and authorities to embrace a more agile and collaborative regulatory approach. This is needed to future-proof the regulations while improving the ease of doing business and safeguarding the society's interests. This policy thrust enlists four strategies and seven initiatives as follows:

Figure 3-7: Strategies and initiatives of Policy Thrust 3

4 STRATEGIES		7 INITIATIVES
S9	Advocate anticipatory and agile regulatory approach in response to the 4IR	**Initiative 19:** Adopt agile regulatory approach to meet the needs of the digital economy businesses
S10	Safeguard the society from irresponsible use of technology	**Initiative 20:** Introduce an ethics framework for technological development, deployment and utilisation to ensure responsible use of technology
S11	Update legal framework governing personal data management and cyber security to build trust in society	**Initiative 21:** Introduce specific legislation on cyber security **Initiative 22:** Enhance personal data protection law, regulations and guidelines
S12	Update regulatory approach and review regulations that hinder the application or development of 4IR technologies	**Initiative 23:** Establish WEF Centre for the 4IR in Malaysia as a hub of global stakeholders cooperation to facilitate the development of policy frameworks **Initiative 24:** Co-create and co-design 4IR-related policies and regulations via a *rakyat*-centric approach **Initiative 25:** Enhance the existing cyber security framework by incorporating safeguard measures for the implementation and operationalisation of 4IR across the public sector, with a focus on IoT

Beneficiary groups: Businesses Society Government

POLICY THRUST 04

Accelerate 4IR technology innovation and adoption

Globally, 4IR is evolving at an exponential rate and is disrupting almost every industry. Therefore, it is crucial for Malaysia to accelerate 4IR technology innovation and adoption to seize opportunities for both economic growth and the wellbeing of the *rakyat*. As such, this policy thrust focuses on R&D&C&I, access to financing, as well as technical and informational support. This policy thrust enlists four strategies and seven initiatives as follows:

Figure 3-8: Strategies and initiatives of Policy Thrust 4

4 STRATEGIES	7 INITIATIVES
S13 Facilitate the adoption of 4IR technologies among local businesses through integrated support	**Initiative 26:** Allow real time matching, provide coordinated support and facilitation to accelerate innovation and scaling of 4IR technologies among businesses, including MSMEs and entrepreneurs
S14 Enhance financial support to facilitate 4IR technology adoption and development	**Initiative 27:** Incentivise 4IR technology applications for business improvement (performance-linked incentives) **Initiative 28:** Mobilise co-investment fund for 4IR technology adoption by industries
S15 Support 4IR technology innovation focusing on solving social and environmental issues	**Initiative 29:** Provide support to innovative businesses and social enterprises to leverage 4IR technology to solve socio-environmental issues **Initiative 30:** Prioritise public sector R&D&C&I funding for technology innovations
S16 Prioritise the use of 4IR technologies for policy formulation, implementation, regulatory functions and public service delivery	**Initiative 31:** Drive greater adoption of 4IR technologies within the government services with the National Digital Identity acting as the catalyst **Initiative 32:** Establish Government Experience Lab to drive 4IR innovation

Beneficiary groups: Businesses Society Government

KEY SECTORS

In addition to the national-level initiatives, the National 4IR Policy outlines sectoral-specific initiatives to capture opportunities that emerge from global and regional trends.

The National 4IR Policy focuses on 10 key sectors, along with six supporting sectors. The selection of key focus sectors is based on their contribution to the GDP, as well as their role to influence the growth of other sectors. The application of 4IR technologies in these sectors is anticipated to create the highest impact on the *rakyat*. This impact includes the creation of new socioeconomic growth opportunities as follows:

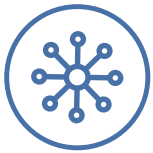
- Introduction of new products and services as well as 4IR-enabled business models through 4IR technologies
- Integration with the global value chain
- Enhanced capacity and capability to reap new markets domestically and globally
- Creation of new high value-added jobs
- Reduction in over reliance on low-skilled foreign labour

Figure 3-9: Key focus sectors of the National 4IR Policy

In line with the National 4IR Policy thrusts, sectoral-specific initiatives across 10 key sectors are grouped into four common themes, namely human capital development, infrastructure improvement, regulations improvement, as well as technology adoption and innovation.

HUMAN CAPITAL DEVELOPMENT

As 4IR transforms sectors and industries, the skills demanded for the workforce will also change. It is important to enhance the readiness of existing workforce to thrive in a fast-changing work environment. The existing and future workforce will be equipped with the necessary skills to meet changing industry demands. Competency frameworks, incorporating redesigned jobs, and new roles and skills, are also needed to provide the necessary information to guide the development of a highly-skilled talent pool. This will enable industries to adopt and harness 4IR technologies to uplift productivity and competitiveness.



INFRASTRUCTURE IMPROVEMENT

Most of the 4IR solutions are dependant on basic infrastructure, such as electricity and broadband. As such, the provision of adequate basic infrastructure is crucial for the deployment of 4IR solutions. Digital infrastructures such as database and system are also needed for connectivity and interoperability within and across sectors. The private sector's role in accelerating the development of relevant infrastructure is important to support the adoption of 4IR technologies across various sectors.

REGULATIONS IMPROVEMENT

As the nation embraces 4IR, new economic activities will emerge and become increasingly cross-sectoral. To cope with the fast-changing pace of technologies, the government's regulatory approach needs to be more agile and facilitative. Existing sector-specific regulations will be reviewed to cater to changing business environment and work culture.

TECHNOLOGY ADOPTION AND INNOVATION

Sector-specific initiatives are important to ensure the creation and adoption of the right 4IR technologies to contribute towards balanced growth in the country. To this end, highly coordinated and integrated support, including access to financing, will be provided in leveraging foundational 4IR technologies such as AI, IoT, blockchain, advanced materials and technologies as well as cloud computing and BDA. Resources will be optimised to channel outcome-driven targeted support, ranging from R&D&C&I to advisory services in 4IR adoption.

Figure 3-10: Sectoral initiatives of the National 4IR Policy

SECTORAL INITIATIVES FOR THE 10 KEY SECTORS

A total of 60 initiatives are identified across the 10 key sectors. These initiatives will serve as catalysts in driving the 4IR agenda.

Wholesale and retail trade

- Equip the workforce in the wholesale and retail trade sector for the future
- Protect consumer data and rights in eCommerce transactions
- Leverage blockchain technology in compliance with data transparency and disclosure requirements across the supply chain
- Provide a conducive and competitive environment in the digital economy
- Develop 4IR adoption programme for the wholesale and retail trade sector
- Encourage R&D&C&I in advanced materials used for packaging

Transportation and logistics

- Equip workforce in the transportation and logistics sector with 4IR skills sets
- Enhance digitalised logistics systems by adopting 4IR technologies to promote interoperability
- Increase the robustness of the regulatory framework to support adoption of transportation and logistics-related 4IR technologies
- Amplify mobility through development and adoption of centralised and open transport-related database, including traffic management
- Support R&D&C&I for 4IR technologies to develop low carbon mobility solutions
- Enhance efficiency in cyber security management to mitigate cyber risks

Tourism

- Invest in upskilling and reskilling of workforce
- Protect consumers and regulate businesses to be fit-for-future through the establishment of suitable regulations
- Establish open access to centralised tourism database
- Promote greater 4IR adoption in the tourism sector by leveraging 4IR application centres
- Implement 4IR green solutions to promote responsible and sustainable tourism

Finance and insurance

- Equip the sector workforce with knowledge and skills sets to thrive in the 4IR environment
- Adopt an anticipatory regulatory approach to balance between the needs for risk management and to facilitate innovative sectoral growth
- Promote the collection and standardisation of data for the insurance sector, supported by sector-specific technical guide on personal data protection

- Human capital development
- Infrastructure improvement
- Regulations improvement
- Technology adoption and innovation

Professional, scientific and technical services

- Upskill and reskill current workforce with 4IR skill sets
- Enhance public administrative systems related to professional services to promote interoperability by adopting 4IR technologies
- Develop and establish technical and ethical guidelines for the usage of 4IR technologies
- Develop sector-specific 4IR toolkits to improve capacities and capabilities of businesses

Utilities

- Review existing financing schemes to facilitate the development of 4IR technologies in the provision of utilities
- Review existing regulations to facilitate 4IR technology innovation and applications
- Establish 4IR smart waste management centres of excellence
- Provide financial incentives for companies to upgrade to 4IR-enabled machines and equipment for resource efficiency
- Develop national programme to address the issue of non-revenue water through application of 4IR technologies

Education

- Upskill and reskill educators to harness 4IR technologies
- Expand 4IR technical and humanistic soft skills courses and programmes
- Harmonise and streamline policies, legislations and processes for efficient education delivery, while ensuring a collaborative approach and agile governance
- Promote a centralised and open education database
- Ensure fit-for-future, 4IR-ready education delivery through focused support
- Develop change management programmes to instil humanistic soft skills

Manufacturing

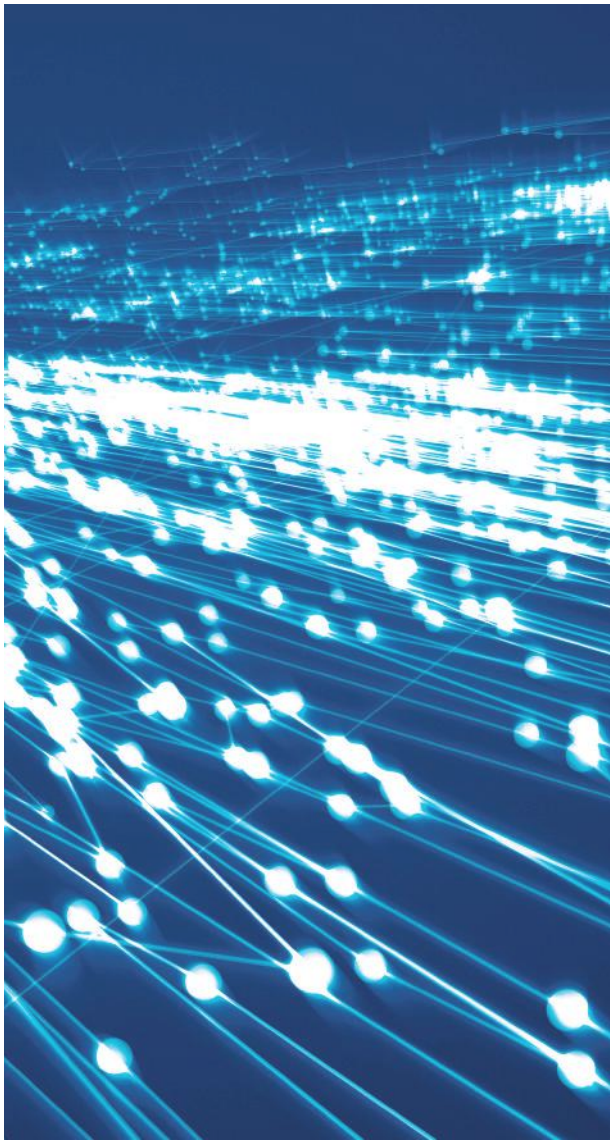
INDUSTRY4WRD contains 13 initiatives, which continue to be relevant and consistent with the National 4IR Policy

Healthcare

- Reduce supply chain and services delivery mismatches in the healthcare industry by leveraging 4IR technologies
- Develop a rapid technology adoption framework for healthcare-related 4IR technologies
- Establish national standards and guidelines for healthcare-related robotics and drones programme
- Create a healthcare endowment fund to support the creation and adoption of 4IR technologies
- Utilise emerging technologies to improve healthcare service delivery, including in personalised medicine and genomics

Agriculture

- Increase talent and technology in agri-cluster programme through multi-agency integrated support
- Create more local digital platforms to enable Farm-to-Table digital marketplace
- Invest in basic infrastructure in rural areas to enable the adoption of 4IR technologies
- Establish 4IR agriculture technology application centre
- Establish 4IR agriculture facilitation fund to encourage adoption of emerging technologies
- Set up regulated co-investment trust fund to pool capital from government and the private sector to invest in 4IR-related technologies
- Provide tax incentives to encourage adoption of 4IR technologies



INDUSTRIES OF THE FUTURE

Although the National 4IR Policy emphasises 10 key sectors, it is important to note that convergence in the 4IR is characterised by the fusion of technologies and growing integration of various sectors. For some industries, the revolution will be more far-reaching. The intensification of digitalisation across different realms will change the interactions of various entities in the future, blurring traditional boundaries between industries. New business models and industries are expected to emerge as the boundaries between suppliers, producers and consumers and, in some cases, within the whole industries shift. It will become necessary for businesses to adopt 4IR technologies as they continue to provide vast prospects to increase efficiency and lower costs. Businesses will thus need to embrace technological advancements, or risk disappearing.

FOUNDATIONAL 4IR TECHNOLOGIES

Malaysia needs to focus on building capabilities in five foundational 4IR technologies, namely AI, IoT, blockchain, advanced materials and technologies as well as cloud computing and big data analytics.

ARTIFICIAL INTELLIGENCE

AI encompasses computer science learning algorithms that are capable of performing tasks that normally require human intelligence and beyond, such as visual perception, speech recognition and decision-making. AI is expected to create the most impact among all other technologies, permeating all industries and playing an increasing role in daily life. It is also estimated to increase global GDP by an additional USD15.7 trillion in 2030; and could boost GDP in the developed Asian region (excluding China) by 10.4%[5]. Various countries have embarked on formulating and implementing national strategies for AI, starting with Canada in 2017[6]. AI is the "electricity" of the 4IR as more devices, applications and interconnected systems are embedded with intelligence.

Initiatives such as the development of a National AI Framework and an AI Park signify the nation's commitment to increase AI adoption in Malaysia.

INTERNET OF THINGS

IoT can be defined as networks of advanced sensors and actuators in land, air, sea and outer space, embedded with software, network connectivity and computer capability, that can collect and exchange data over the internet and enable automated solutions to multiple problem sets. The number of IoT connected devices is estimated to exceed 38 billion in 2020. IoT is a critical component of AI solutions, which enables billions of smart devices to sense, respond and communicate data.

Data is also a key enabler to unleash the full potential of AI solutions. Just as oil was considered crucial to the previous industrial revolutions, data is now considered as one of the most valuable commodities for the 4IR.

Various efforts to drive the adoption of IoT have been carried out and are under way. The National Internet of Things (IoT) Strategic Roadmap was launched in 2014. IoT is also promoted actively in the agriculture sector to modernise farming and improve the overall efficiency and productivity of the sector.

BLOCKCHAIN

Blockchain's defining features are its distributed and immutable ledger and advanced cryptography. These features enable transactions, including the transfer of a range of assets automatically, efficiently, securely and inexpensively without third-party intermediaries. Beyond that, it is commonly known as a tool to enable digital currencies and can be applied to transform many existing processes in businesses, government and society.

Blockchain is anticipated to generate an annual business value of more than USD3 trillion by 2030. It is estimated that 10% to 20% of global economic infrastructure will be on blockchain-based systems by that very year[7].

In Malaysia, there has been increasing interest in the application of blockchain technologies across various industries such as food and beverage as well as finance.

[5] PwC (2017), Sizing the prize:What's the real value of AI for your business and how can you capitalise?
[6] WEF (2019), A Framework for Developing a National Intelligence Strategy
[7] PwC (2018), Global Blockchain Survey

CLOUD COMPUTING AND BIG DATA ANALYTICS

Cloud computing is the delivery of computing services over the internet, to offer capabilities for faster innovation, flexible resources and economies of scale. BDA is the application of advanced analytic techniques on very large and diverse data sets from different sources. The adoption of cloud computing and BDA is critical in setting the foundation to unlock further opportunities in new computing technologies. These include technologies such as quantum computing, DNA data storage, and combination of technologies of the third industrial revolution with current technologies, including IoT and advanced sensor platforms.

Malaysia has implemented a number of initiatives over the years to drive the nation's shift to cloud and BDA services. For example, the 6th Annual AI and Big Data Week (AIDW) by Malaysia Digital Economy Corporation was held in 2019. This event was to help catalyse the integration and adoption of AI and big data among the participants.

ADVANCED MATERIALS AND TECHNOLOGIES

Advanced materials and technologies refer to a set of nanotechnologies and other material science technologies to produce materials with significantly improved or completely new functionalities. These materials are lighter, stronger, more conductive and have higher electrical storage, such as nanomaterials, biological materials or hybrids. From its basic forms (atom), to micro and macrostructure, the properties of materials could be manipulated through complex R&D analytical techniques for very specific applications. The availability of materials with the required properties and performance characteristics has the potential to solve socio-environmental problems.

Advanced materials could also improve the competitive edge of a country's manufacturing sector, by reducing its reliance on foreign input and producing higher value-added products for exports. There are also potential spillover effects, which will pave the way for opportunities in energy consumption, such as power grid support market and energy efficiency, as well as in sectors such as aerospace, defence and healthcare.

Malaysia has actively embarked in the advanced materials field. NanoMalaysia launched the Advanced Materials Industrialisation Programme, with noteworthy achievements such as the development of high efficiency fuel cell packs for unmanned aerial vehicle (UAV) applications in 2019.

The five technologies, namely AI, IoT, blockchain, advanced materials and technologies as well as cloud computing and big data analytics, were identified as foundational to the nation's 4IR agenda as they are able to support the deployment and optimisation of other 4IR technologies.

New breakthroughs in the 4IR are often not the result of individual technologies but a combination of technologies working in concert, and also from the emergence of new business models facilitated by the adoption of these technologies.

Malaysia needs to leverage its strong electrical and electronics (E&E) industry to boost the growth of these foundational technologies. The industry is Malaysia's largest export earner and has gained recognition as one of the preferred industry cluster locations in the world, reflecting a comparative advantage for the nation over its neighbouring countries.

E&E has cross-industry linkages and applications such as IoT, automotive electronics and personal computing. The 4IR will both impact and be impacted by the E&E industry; 4IR technologies can be used to significantly improve the manufacturing of E&E goods while the outputs of the industry are also necessary to embrace digitalisation and 4IR. This shows that the E&E industry is key in enabling digitalisation and the nation's move towards the 4IR.

Hence, there is great urgency for the local E&E industry to grow its talent pool and raise its participation in higher value-added activities such as generating intellectual property (IP) as well as design and development (D&D) to move further up the value chain and be globally competitive.

IMPLEMENTATION OF NATIONAL INITIATIVES UNDER THE NATIONAL 4IR POLICY

The national initiatives under the National 4IR Policy will be implemented in three phases to achieve the long-term aspirations and outcomes. The phases and corresponding initiatives are as shown in *Figure 3-11*.

***Figure 3-11*: Phases and initiatives of the National 4IR Policy**

PHASE 1: Completion by 2022

ENHANCE 4IR AWARENESS AND ADOPTION

BUSINESS

- **Initiative 1:** Establish industry-led, sectoral-based 4IR-skills development centres
- **Initiative 2:** Incentivise industry to upskill and reskill talent in 4IR areas
- **Initiative 3:** Establish an AI-enabled data platform to facilitate human capital planning
- **Initiative 9:** Provide incentives to minimise the risk of job displacements
- **Initiative 19:** Adopt agile regulatory approach to meet the needs of the digital economy businesses
- **Initiative 26:** Allow real time matching, provide coordinated support and facilitation to accelerate innovation and scaling of 4IR technologies among businesses, including MSMEs and entrepreneurs
- **Initiative 27:** Incentivise 4IR technology applications for business improvement (performance-linked incentives)
- **Initiative 28:** Mobilise co-investment fund for 4IR technology adoption by industries

SOCIETY

- **Initiative 5:** Scale up exposure to 4IR technologies among the young generation and encourage innovation by making all schools in Malaysia "My Digital Maker Champion Schools"
- **Initiative 6:** Enhance and implement PAK-21 in all public schools to develop humanistic soft skills for future workforce to be 4IR-ready
- **Initiative 7:** Enhance 4IR-related courses in higher education institutions (HEIs) and technical and vocational education and training (TVET) institutions through better programme design and delivery
- **Initiative 8:** Rationalise and enhance collaboration to ensure equal access to 4IR learning opportunities for all
- **Initiative 10:** Enhance formal social protection mechanism for gig workers

GOVERNMENT

- **Initiative 11:** Introduce a 4IR Innovation Accelerator, dedicated to driving adoption of 4IR technologies in public sector at all levels of government
- **Initiative 12:** Provide 4IR-related training to all civil servants
- **Initiative 16:** Expand the MyGovCloud to promote cloud computing environment in the public sector
- **Initiative 18:** Enhance workforce mobility of the public sector
- **Initiative 25:** Enhance the existing cyber security framework by incorporating safeguard measures for the implementation and operationalisation of 4IR across the public sector, with a focus on IoT

Phase 2: Completion by 2025

DRIVE TRANSFORMATION AND INCLUSIVITY OF 4IR

Initiative 4: Reconcile labour policies with talent pipeline projection and other 4IR-related incentives to gradually reduce foreign labour dependency

Initiative 13: Establish 4IR innovation parks with 4IR application centres to provide a secure test-bed for 4IR technology providers

Initiative 14: Develop critical 4IR-enabling infrastructure to enable application of 4IR technologies

Initiative 15: Expand digital marketplace for the digitally underserved rural community to bridge the technology adoption gap

Initiative 20: Introduce an ethics framework for technological development, deployment and utilisation to ensure responsible use of technology

Initiative 21: Introduce specific legislation on cyber security

Initiative 22: Enhance personal data protection law, regulations and guidelines

Initiative 17: Strengthen data-driven policy development and improve data sharing environment to ensure data quality

Initiative 23: Establish WEF Centre for the 4IR in Malaysia as a hub of global stakeholders cooperation to facilitate the development of policy frameworks

Initiative 31: Drive greater adoption of 4IR technologies within the government services with the National Digital Identity acting as the catalyst

Initiative 32: Establish Government Experience Lab to drive 4IR innovation

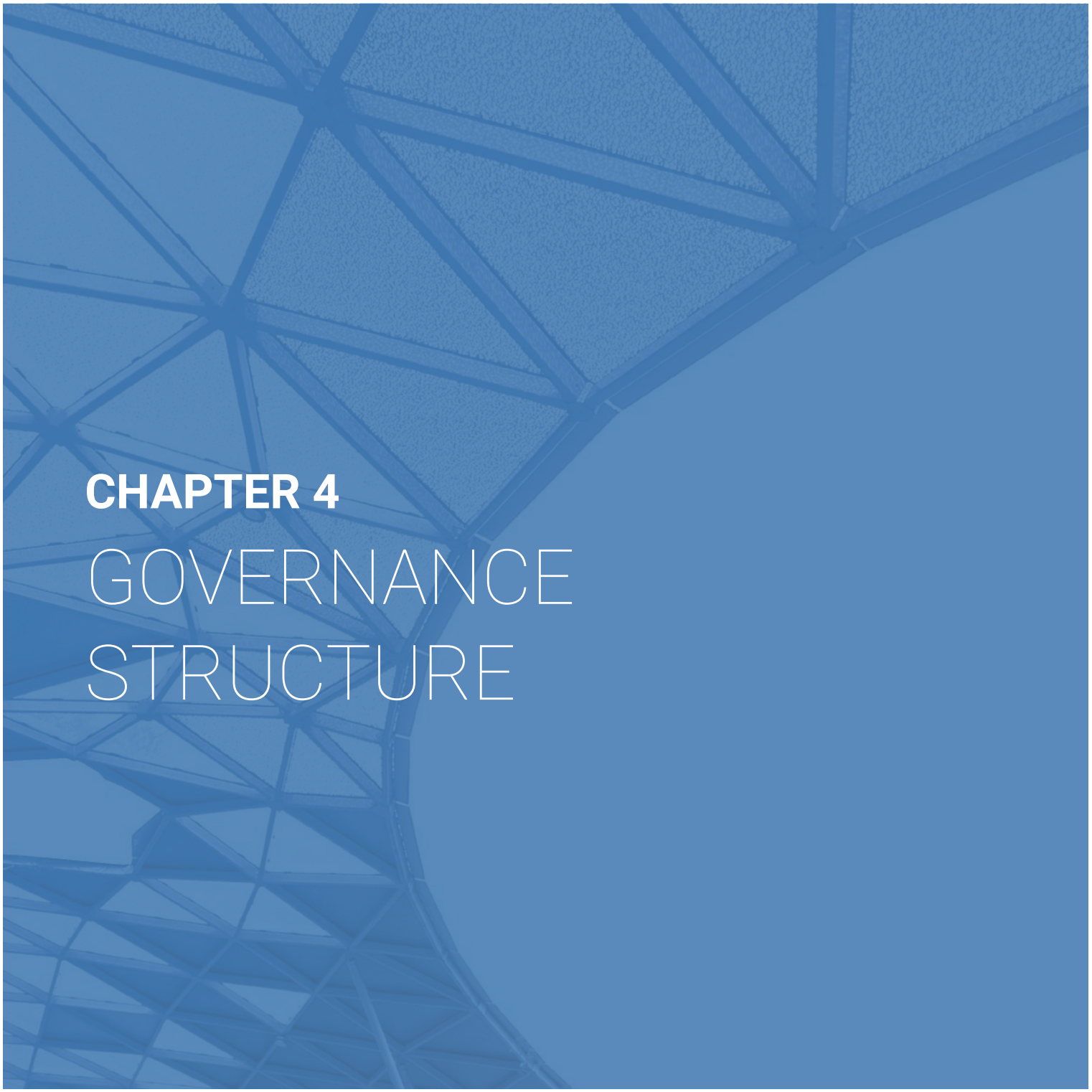
Phase 3: Completion by 2030

ACHIEVE BALANCED, RESPONSIBLE AND SUSTAINABLE GROWTH BY LEVERAGING 4IR TECHNOLOGIES

Initiative 29: Provide support to innovative businesses and social enterprises to leverage 4IR technology to solve socio-environmental issues

Initiative 30: Prioritise public sector R&D&C&I funding for technology innovations

Initiative 24: Co-create and co-design 4IR-related policies and regulations via a *rakyat*-centric approach



CHAPTER 4
GOVERNANCE STRUCTURE

OPTIMISING COORDINATION

The National 4IR Policy and the Malaysia Digital Economy Blueprint complement each other towards achieving an inclusive, balanced, responsible and sustainable economic growth. Strong collaboration is required across ministries and agencies as some of the initiatives under these Policy and Blueprint involve multiple entities with relevant portfolios. This is to ensure an efficient roll out of initiatives targeting at different beneficiary groups. Hence, the implementation of the National 4IR Policy will also be governed by the same governance structure which governs the Blueprint.

The 4 policy thrusts and the national initiatives in the National 4IR Policy are linked to 6 thematic clusters of the National Digital Economy and 4IR Council governance structure. These clusters are digital talent, digital infrastructure and data, emerging technology, economy, society, and government, as shown in *Figure 4-1*. This governance structure will inculcate shared responsibilities and improve overall efficiency, accountability and public-private collaboration.

While the clusters focus on specific area, matters related to agile regulation, cyber security, as well as inclusivity and sustainability will be common themes across all clusters.

Figure 4-1: Thematic clusters of the National Digital Economy and 4IR Council

Thematic cluster	Scope	Link to policy thrust
Digital talent	Digital skill sets; labour market management; future workforce	1, 3
Digital infrastructure and data	Hard and soft infrastructure; data	1, 2
Emerging technology	Technology and innovation; technology enablers	3, 4
Economy	Trade; investment; economic sectors	1, 2, 3, 4
Society	Societal wellbeing; environmental sustainability	1, 2, 3, 4
Government	Public service delivery; data-driven policies and strategies; 4IR-enabled government	1, 2, 3, 4

Policy Thrust

1. Equip the *rakyat* with 4IR knowledge and skill sets
2. Forge a connected nation through digital infrastructure development
3. Future-proof regulations to be agile with technological changes
4. Accelerate 4IR technology innovation and adoption

GOVERNANCE STRUCTURE

A governance structure that has been established to drive effective implementation and monitoring of the National 4IR Policy comprises of five key components:

1. **National Digital Economy and 4IR Council** provides leadership and policy direction
2. **Clusters** provide expert and technical support for policy development and direction
3. **Steering Committee** functions to coordinate and monitor effective implementation
4. **Strategic Change Management Office** functions as the (i) change management driver, (ii) overall monitoring and evaluation unit and (iii) secretariat to the National Digital Economy and 4IR Council and Steering Committee
5. **Working Groups** act as lead implementers of the initiatives and provide technical expertise

The governance structure is as shown in *Figure 4-2*.

The governance structure and the policy implementation approach have the following key features to ensure accountability, efficiency and effectiveness:

Strategic Change Management Office to roll out and drive change to ensure acceptance across the nation

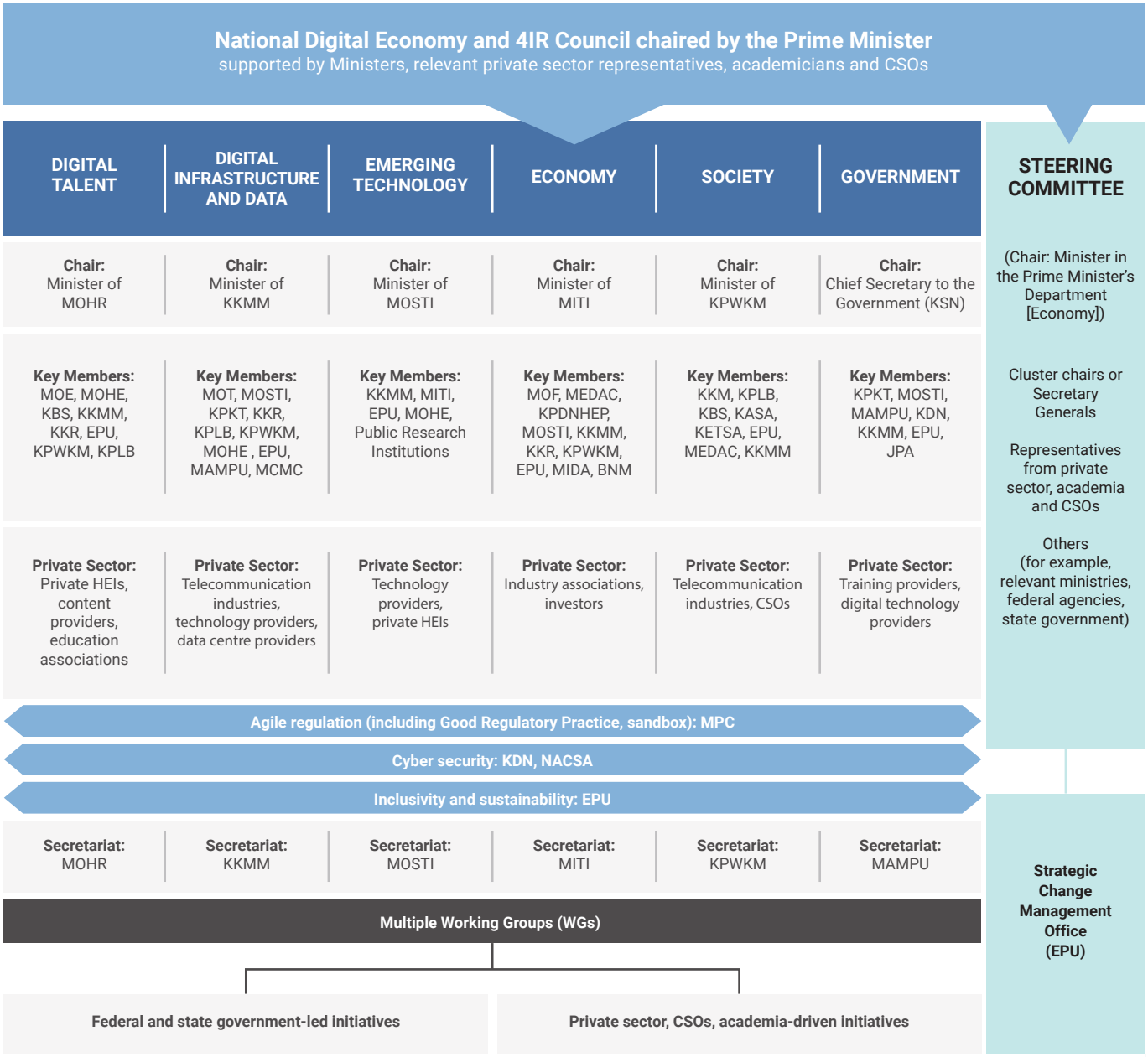
Implementation through people-private-public partnerships, including academicians and civil society organisations (CSOs)

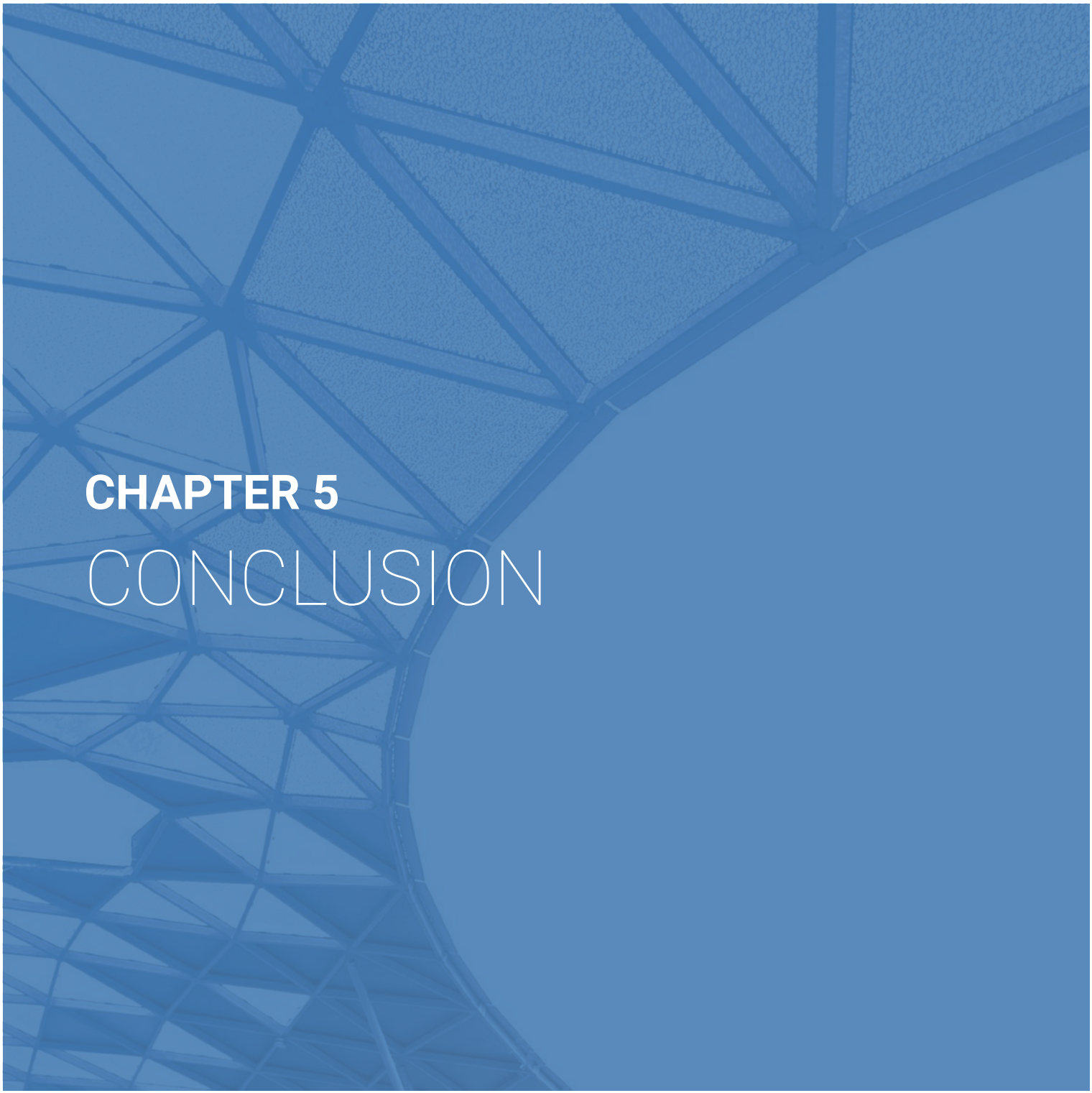
Transparent and clear monitoring and evaluation mechanism to establish complete feedback loop

Specific clusters chaired by Ministers and the Chief Secretary to the Government to improve overall efficiency, accountability and inter-ministry collaboration

Clear timelines for measurable outcomes

Figure 4-2: National 4IR Policy governance structure





CHAPTER 5
CONCLUSION

CONCLUSION

The 4IR is the intensification of digitalisation across the physical, digital and biological domains. It has the capacity to transform the way we live, work and communicate. Apart from opportunities for countries to grow sustainably, the 4IR also poses risks that need to be mitigated.

The National 4IR Policy sets the direction to harness the potential of 4IR technologies and address potential risks. It paves the way towards realising the vision to achieve a balanced, responsible and sustainable growth. The National 4IR Policy outlines three objectives, four policy thrusts and is supported by 16 strategies to prepare the country to embrace the 4IR and cope with current and future disruptions of emerging technologies. The national and sectoral initiatives aim to increase local capabilities in seizing growth opportunities arising from the 4IR, enhance the preservation of ecological integrity and improve the quality of life of the *rakyat*.

Effective implementation of the strategies and initiatives through a whole-of-nation approach under the purview of the National Digital Economy and 4IR Council will create a conducive ecosystem for the country to embrace the 4IR. The government has set forth the direction through the National 4IR Policy and will continue to play its role as an enabler. The success of the policy will depend on the willingness of all stakeholders, namely businesses, society, and the government, to change and their close collaboration to systematically and effectively implement the policy thrusts, strategies and initiatives. Steadfast commitment and support from all will ensure that the vision, missions and objectives of the National 4IR Policy will be realised.

16 STRATEGIES

3 OBJECTIVES

32 NATIONAL INITIATIVES

4 POLICY THRUSTS

60 SECTORAL INITIATIVES


BERSEKUTU
BERTAMBAH MUTU