社会经济研究中心
SOCIO-ECONOMIC RESEARCH CENTRE

SERC

National Policy on Industry 4.0

Industry4WRD

Attract   Create   Transform

1 November 2018

Agenda

Industrial Revolution 4.0 (IR 4.0) in brief

Global factors shaping IR 4.0

Malaysia's National Policy on Industry 4.0

Strategic enablers, outcomes and action plans

Commentary and conclusion
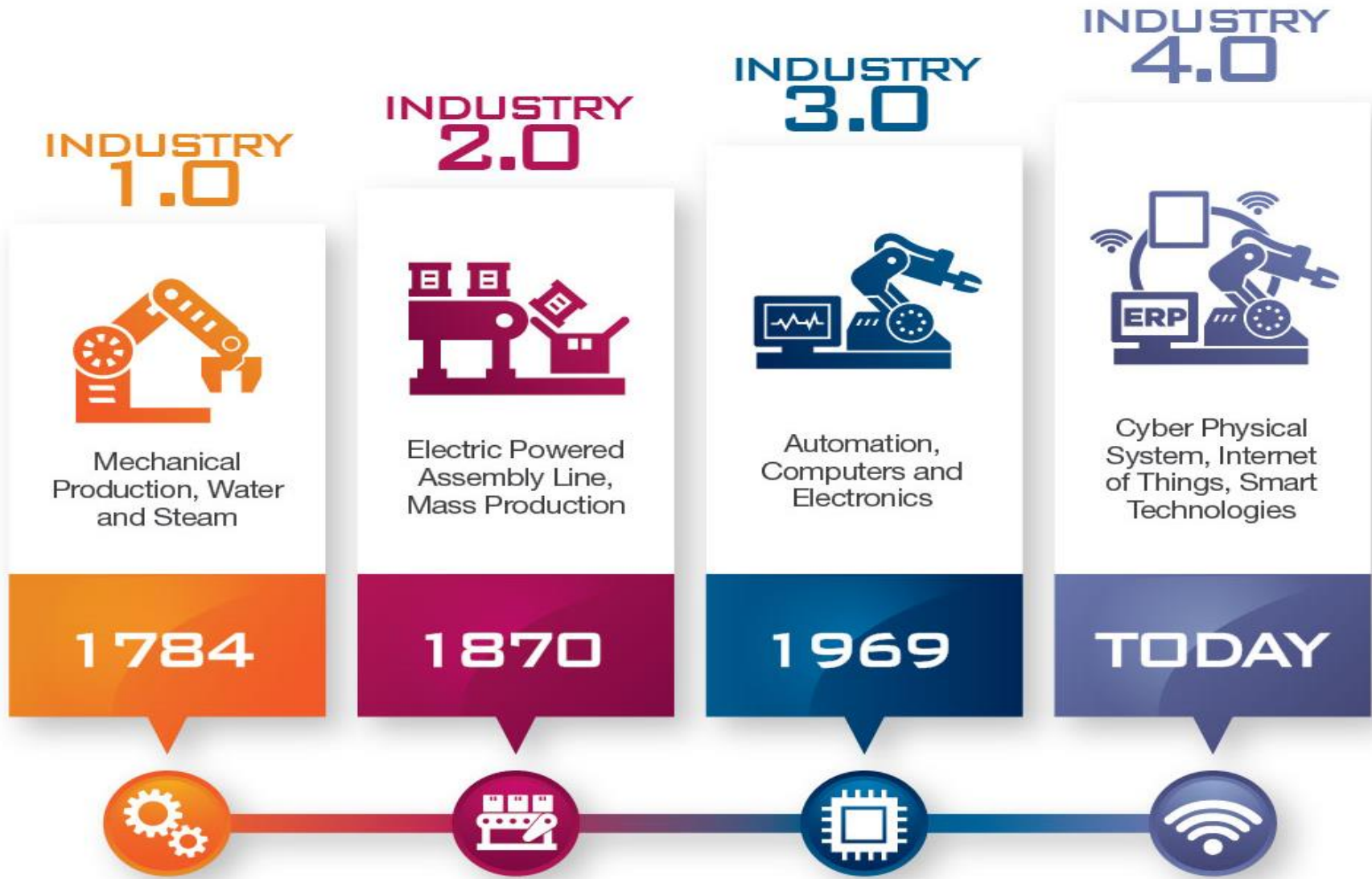
Industrial Revolution 4.0 (IR4.0) – The inevitable transformation
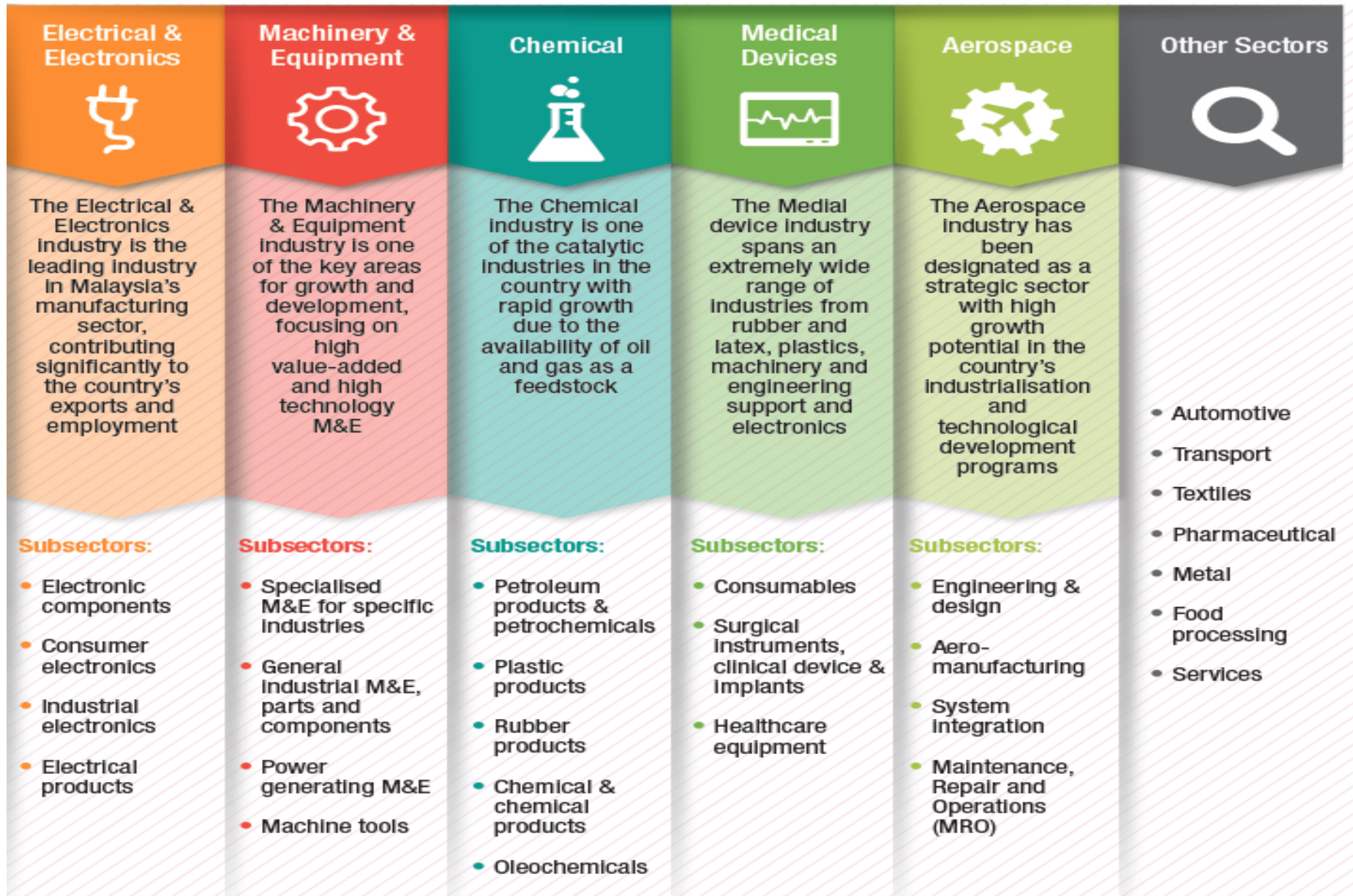
- The era of **digitalisation and technological transformation** has fundamentally changed the way we live and work. Likewise, global manufacturing landscape also witnessed rapid revolution shifts in production and processes through the application of advanced digitalisation, advanced manufacturing technologies and efficient resource utilization.

- The **First Industrial Revolution** started with the advent of steam and water power, enabling mechanisation of production processes, while the **Second Industrial Revolution** was driven by electric power and mass manufacturing techniques. Information technology and automation brought in the **Third Industrial Revolution**.

- The **Fourth Industrial Revolution** is exploding on the back of a range of technologies that are blurring the distinction among **physical, digital and biological spaces**.

- **Industry 4.0** transforms how products are designed, fabricated, used and operated as well as how they are maintained and serviced. It will also transform the operations, processes, supply chain management and energy footprint of factories.

# The different phases of Industrial Revolution

Source: Metaltech

Focus sectors of IR 4.0

Electrical & Electronics

The Electrical & Electronics industry is the leading industry in Malaysia's manufacturing sector, contributing significantly to the country's exports and employment

Subsectors:

- Electronic components
- Consumer electronics
- Industrial electronics
- Electrical products

Machinery & Equipment

The Machinery & Equipment industry is one of the key areas for growth and development, focusing on high value-added and high technology M&E

Subsectors:

- Specialised M&E for specific industries
- General industrial M&E, parts and components
- Power generating M&E
- Machine tools

Chemical

The Chemical industry is one of the catalytic industries in the country with rapid growth due to the availability of oil and gas as a feedstock

Subsectors:

- Petroleum products & petrochemicals
- Plastic products
- Rubber products
- Chemical & chemical products
- Oleochemicals

Medical Devices

The Medial device industry spans an extremely wide range of industries from rubber and latex, plastics, machinery and engineering support and electronics

Subsectors:

- Consumables
- Surgical instruments, clinical device & implants
- Healthcare equipment

Aerospace

The Aerospace industry has been designated as a strategic sector with high growth potential in the country's industrialisation and technological development programs

Subsectors:

- Engineering & design
- Aero-manufacturing
- System integration
- Maintenance, Repair and Operations (MRO)

Other Sectors

- Automotive
- Transport
- Textiles
- Pharmaceutical
- Metal
- Food processing
- Services

IR 4.0 transformation drivers

To produce more technologically-complex products, Malaysia's manufacturing sector have to **"making better things while making things better"**. This is driven by:

* MiGHT Malaysian Technology Strategic Outlook (MTSO) Interview
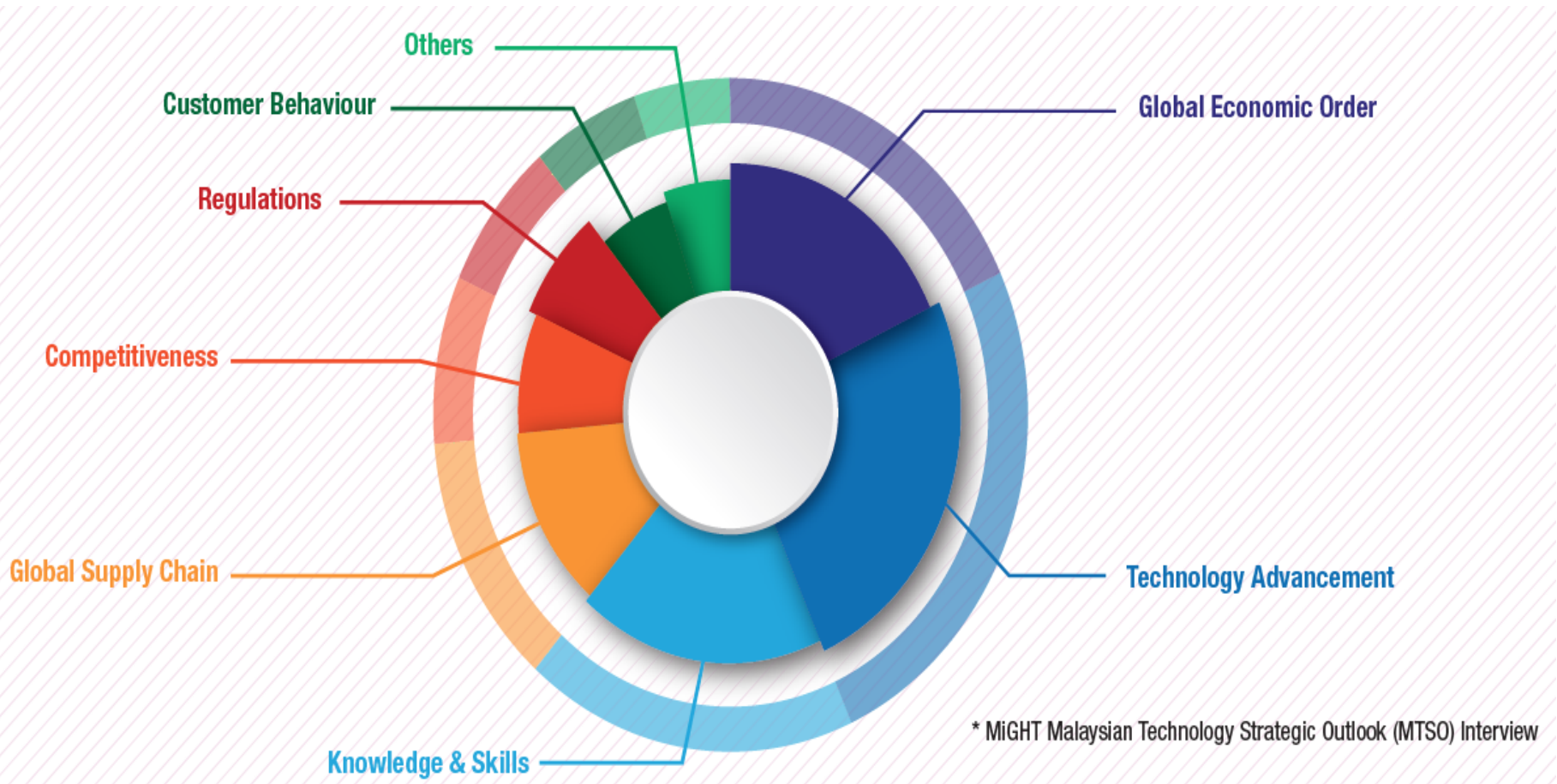
IR 4.0 transformation drivers (cont.)

- **Shifts in the global economic order** - the rise of China, economic realignment due to changes in the developed world, and the rise of fast-growth emerging economies;

- **Rate of technology advancement and its convergence** - technological changes driven by applications of these technologies in the manufacturing industry such as big data, the Internet of Things and cloud computing;

- **Knowledge and skills for the future** - retaining talent and producing future workforce by taking advantage of the opportunities of this transformation;

- **Global supply chain dynamics** – increasing complexity in the supply chain networks caused by distributed sourcing, engineering and production as manufacturing firms now manage partners in a borderless world not bound by geographical locations;

- **Competitiveness of nations and firms** - greater global competition as firms must defend their domestic markets while simultaneously tapping into new market segments for long-term growth;

- **Increased regulations** - environmental concerns and standards-based factors like ISO compliance that apply across an increasingly interconnected world; and

- **Changing customer behaviour** – influenced by values, personalisation and customisation, and the emergence of new products and services attributes that are forcing firms to reassess their manufacturing systems.

Advancement and convergence of technologies

- At the heart of IR 4.0 is a set of **rapidly evolving and converging technologies**. These are pushing the boundaries of what can be manufactured through additive manufacturing and advanced materials. They are blurring the lines between physical and digital realms through rich simulations and augmented reality.
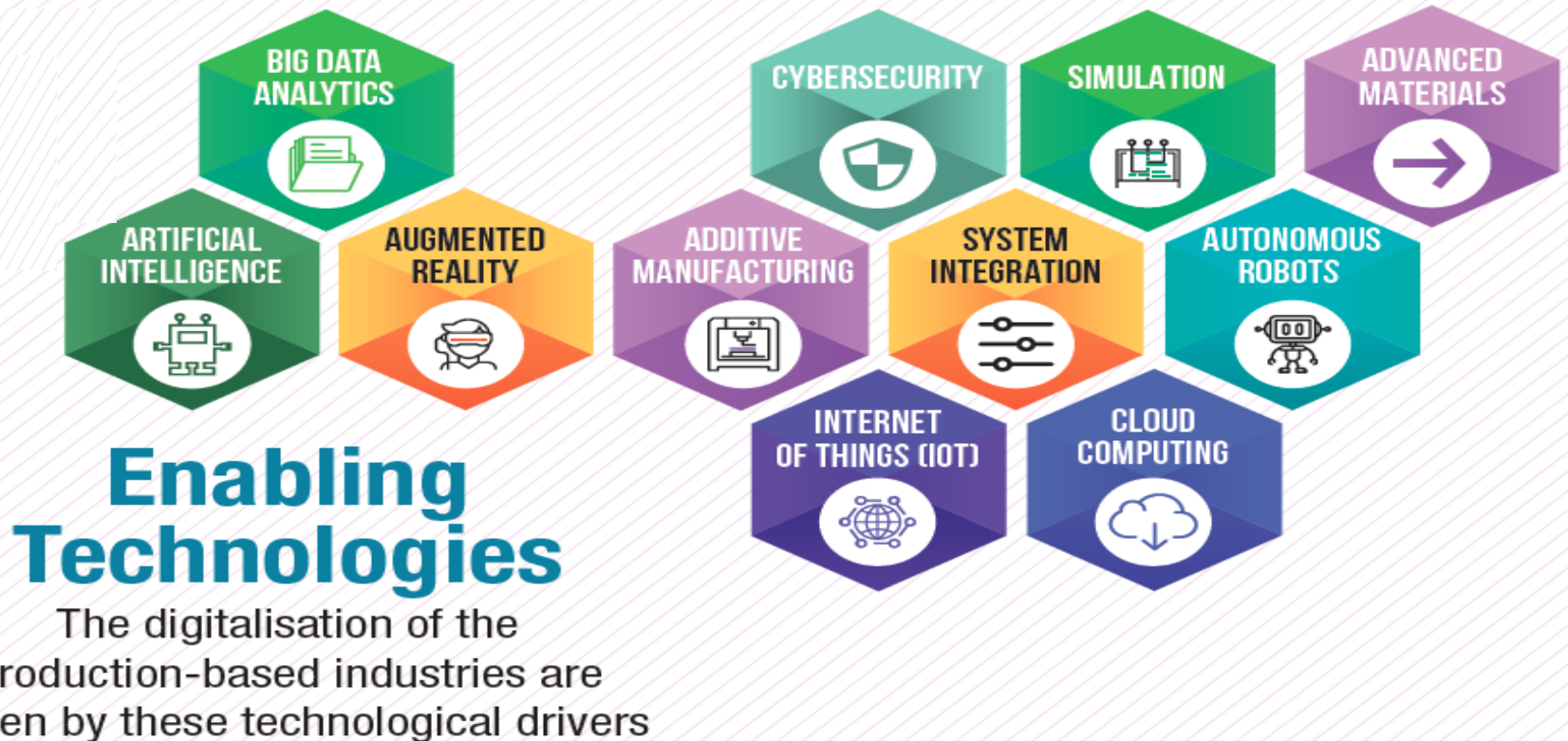
Advancement and convergence of technologies (cont.)

Additive Manufacturing

Additive manufacturing is advancing with the use of new materials, opening completely new possibilities. For example, 3D printing of organic tissues has created opportunities for growing live organs. It is revolutionising traditional production, aided by a recent surge in metal additive printing.

Artificial Intelligence (AI)

AI is a concept that is made up of numerous subfields such as machine learning, which focuses on the development of programs that can teach themselves to learn, understand, reason, plan and act when exposed to new data in the right quantities. AI technology will supplement the smart factory towards networked factory, in which data from supply chains, design teams, production lines and quality control are linked to form a highly integrated and intelligent engines.

Big Data Analytics

Increasingly big data techniques are being applied in manufacturing industry to improve customer experience and product quality, realise energy efficiency and conduct predictive maintenance. It is now possible to collect masses of data from several different sources to direct decisions that anticipate product or equipment failure.

Advanced Materials

New materials and nano-structures are being developed, allowing for beneficial material properties, e.g. shape retention and thermoelectric efficiency. Together with additive manufacturing technologies, it will allow for massive customisation and development of products that were not possible until now.

Cybersecurity

The industrial communication is expanding and strongly connected, as such, digital security becomes a critical aspect that must not be overlooked in the industrial environment. It has now become more complex as it consists of connected devices and environments that cannot be protected by traditional cybersecurity approaches. Current cybersecurity has largely been developed for IT-centric devices and environments.

Advancement and convergence of technologies (cont.)

| Simulation	Cloud Computing	Augmented Reality	Internet of Things (IoT)	Autonomous Robots	System Integration
While many engineers are already familiar with simulations in the field of product design, the advent of augmented reality, AI and big data is expected to take simulations to the next level. It will be possible to simulate manufacturing processes using different production settings to find the optimal way to manufacture a product. Simulations can also be used to test product usage under different operating environment using different types of materials.	Past industrial revolutions required significant capital as a ticket for entry. With cloud computing, many of the Industry 4.0 technologies can be made available to even smaller companies as a utility with minimal upfront capital investment. Companies can leverage cloud-based product design, simulation, AI and big data solutions to improve their production processes and build products better suited for their customers.	While the initial augmented reality technologies are still in nascent stages, they are advancing at a rapid pace. Some of the first applications can be found in the delivery of information and training, e.g. augmented reality can be used to deliver part replacement instructions to maintenance staff in the field.	Industry 3.0 brought in an era of computing and interconnectedness but it often relied on humans to make even the most trivial decisions. Industry 4.0 technologies embody an unprecedented proliferation of sensors and connectedness among these sensors. Combined with other technologies such as AI and big data, it is now possible to envisage entirely autonomous systems that revolutionise manufacturing.	Machinery and robots are transformed towards their next generation. Robots can do more on their own, including learning on the job and teaming up with other robots and humans. This technology allows systems to think, act and react autonomously as well as conduct remote decision making. This can help contribute to a company's competitiveness, productivity and profitability.	System integration occurs in vertical (within the industry value chain) and in horizontal systems (across multiple value chains), eventually achieving end-to-end digital integration across the entire value chain.

Why Malaysia needs to embrace IR 4.0?

The following three major factors are impacting the future of manufacturing in Malaysia, offering opportunities for growth, but also challenging its competitive position:

- **Global value chains and geographies of production** are continuing to shift, especially China and other Northeast Asian countries are relocating production to ASEAN. This is opening up new opportunities for Malaysia. However, Malaysia will need to transform itself fast as other countries in the region are catching up.

- **Quality of labour and higher productivity**, and not low labour cost, will be the **new source of competitive advantage**. Although Malaysia's labour productivity has grown at 3-4% over the last few years, its relative global position and use of high-skilled labour have stagnated. Malaysia's labour productivity was ranked only at 44th position in 2016, a position that has remained unchanged since 2009. The relative share of high-skilled labour declined from 19% in 2010 to 18% in 2017.

- **New technologies are disrupting and fostering a technology-based model of production**. Barriers of adoption have come down with key Industry 4.0 technologies maturing and costs declining. Application of technologies to improve efficiency and product quality is becoming the new normal, requiring Malaysian manufacturing firms to innovate and invest in new technologies to remain competitive.

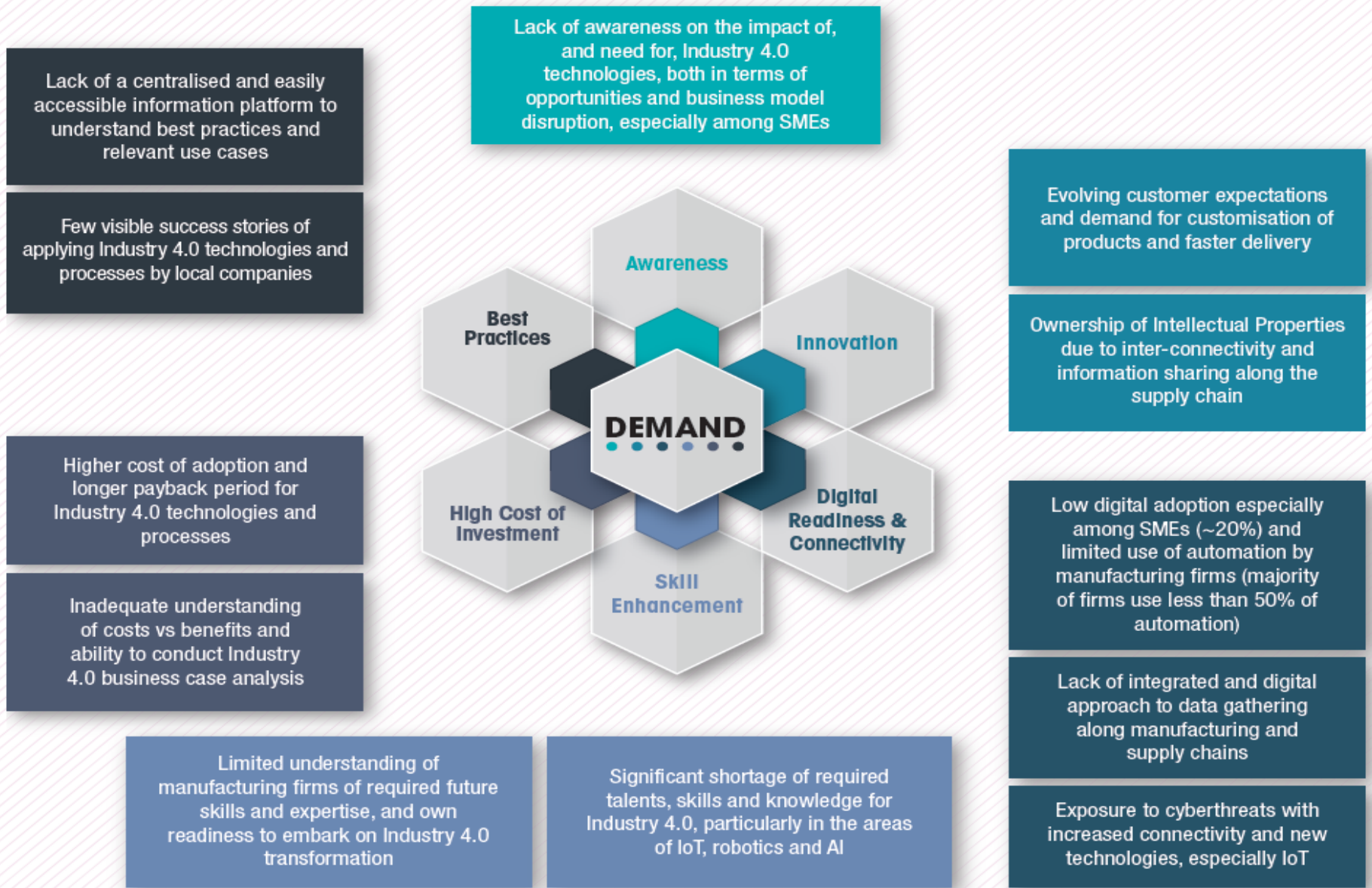# Malaysia's readiness for Industry 4.0

- **A key question is how ready Malaysia is for Industry 4.0**. The report on the Readiness for the Future of Production Report 2018, jointly published by the World Economic Forum (WEF) and A.T. Kearney, places **Malaysia in the "Leader" quadrant** with a "strong current production base" and who are "positioned well for the future". Nevertheless, the gap to global leaders like Japan, Republic of Korea, Germany, Switzerland and China is still significant and other countries in the region have aggressive plans and are moving fast in their implementation.
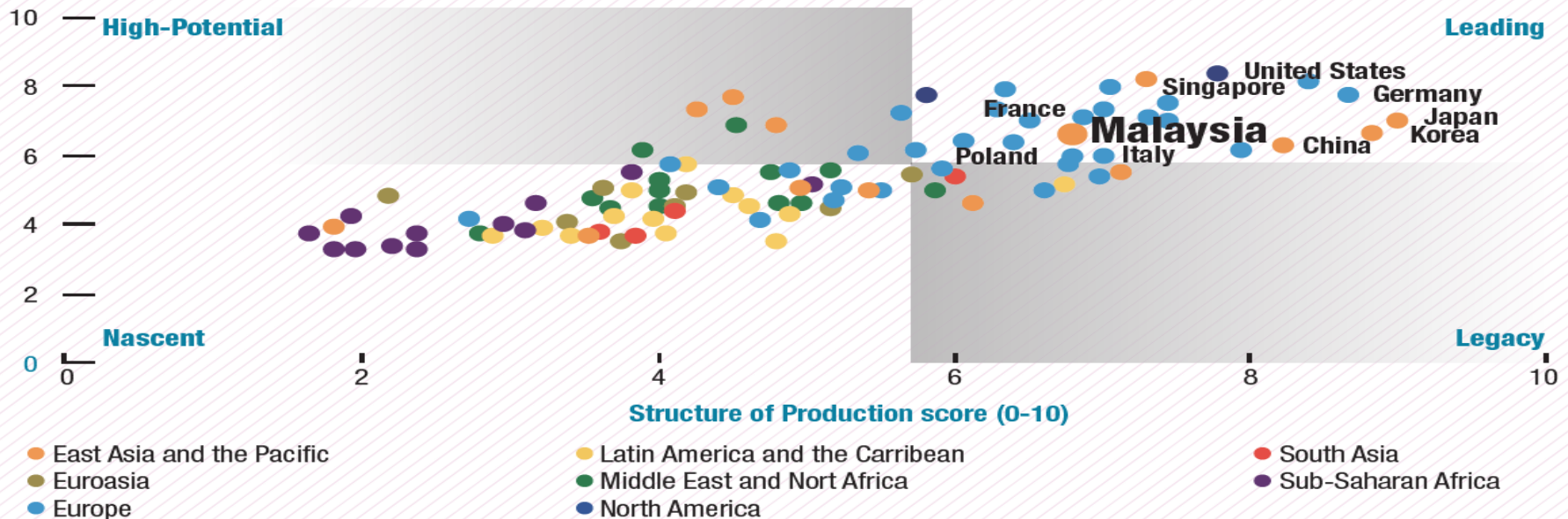
Note: Average performance of the top 75 countries is at the intersection of the four quadrants
Source: Readiness for the Future of Production Report, World Economic Forum, 2018

Addressing Malaysia's issues and challenges (Demand)

Lack of awareness on the impact of, and need for, Industry 4.0 technologies, both in terms of opportunities and business model disruption, especially among SMEs

Lack of a centralised and easily accessible information platform to understand best practices and relevant use cases

Few visible success stories of applying Industry 4.0 technologies and processes by local companies

Evolving customer expectations and demand for customisation of products and faster delivery

Ownership of Intellectual Properties due to inter-connectivity and information sharing along the supply chain

DEMAND

- Awareness
- Best Practices
- Innovation
- High Cost of Investment
- Digital Readiness & Connectivity
- Skill Enhancement

Higher cost of adoption and longer payback period for Industry 4.0 technologies and processes

Inadequate understanding of costs vs benefits and ability to conduct Industry 4.0 business case analysis

Low digital adoption especially among SMEs (~20%) and limited use of automation by manufacturing firms (majority of firms use less than 50% of automation)

Lack of integrated and digital approach to data gathering along manufacturing and supply chains

Limited understanding of manufacturing firms of required future skills and expertise, and own readiness to embark on Industry 4.0 transformation

Significant shortage of required talents, skills and knowledge for Industry 4.0, particularly in the areas of IoT, robotics and AI

Exposure to cyberthreats with increased connectivity and new technologies, especially IoT

Addressing Malaysia's issues and challenges (Supply)

Multiple, but isolated efforts and limited coordination among all stakeholders in moving towards a common vision for Industry 4.0

No national platform and mechanism to coordinate programmes and structure collaborative and aligned approaches for Industry 4.0 requirements

Gaps in deployment of high speed broadband infrastructure in key industrial and training locations and not always able to support Industry 4.0 technology needs

Existing, but underutilised funds for training and development, and need for higher allocation for STEM education (e.g. scholarships)

Limited digitalisation and digital integration of key Government agencies and processes into manufacturing and supply chain (e.g. some certifications, licensing, custom clearances, approvals, etc.)

No specific financial support and incentives for Industry 4.0 technology development, ranging from R&D, prototyping, testing, scaling up to upgrading facilities

Lack of clear standards for equipment or systems that support local and global interoperability of Industry 4.0 technologies and processes

SUPPLY

- Governance
- Infrastructure
- Funding & Incentive
- Standards & Digital Integration
- Ecosystem Support
- Training Providers

Limited number of local players providing Industry 4.0 solutions across key technologies and not cost competitive vis-à-vis international players

Limited collaboration and industry take-up of Industry 4.0 outputs from universities and research institutes

Education syllabus and pedagogy for STEM-related subjects are not attractive and do not match with industry needs

Limited attractiveness of manufacturing as career destination for top talent

Existing training programmes are not sufficiently geared towards Industry 4.0 and current pool of trainers are unable to keep up with the advancement of technology

Shortage of experts in the industry, universities and research institutes across most Industry 4.0 technologies

Insufficient local capabilities and capacities in providing cybersecurity solutions that protect Industry 4.0 applications

Malaysia's National Policy on Industry 4.0

- The Ministry of International Trade and Industry has developed **the National Policy on Industry 4.0** aims at **transforming the Malaysian manufacturing industry** and its **related services to be smart, systematic and resilient**.

- The goal for the future of manufacturing industry is not only to "make better things" by creating innovative products and services, but also to "make things better" by improving design, engineering, service planning and execution, management and production processes.

- The overarching philosophy behind this Policy is **A-C-T - Attract, Create and Transform**.

  - ❑ **Attract stakeholders** to Industry 4.0 technologies & processes;

  - ❑ **Create the right ecosystem** for Industry 4.0 technologies to be adopted and to nurture   innovations; and

  - ❑ **Transform capabilities** of the manufacturing industry to be Industry 4.0-ready.

Policy: Objectives – A-C-T

Attract stakeholders
- Adoption of industry 4.0
- SME inclusion
- Preferred manufacturing location

Create the right ecosystem
- Talent supply & skill levels
- Collaborative platforms
- Digital infrastructure
- Funding support
- Data availability & sharing
- Innovation capacity

Transform industry capabilities
- Labour productivity
- Cost efficiency
- Share of high-skilled jobs
- Technology & innovation capabilities
- Local technology development

Targeted outcomes
- Higher manufacturing sector contribution
- More high value-added products
- Continuing FDIs

National Goals

• To increase the level of productivity in the manufacturing sector
• To elevate the contribution of the manufacturing sector to the economy
• To strengthen our innovation capacity and capability, reflected in global innovation rankings
• To increase the number of high-skilled workers in the manufacturing sector

National Targets

• The targets for 2025, developed from 2016 baseline figures:

Productivity of the manufacturing industry per person
From **RM106,647**
To increase by
30%

Absolute **contribution in Ringgit Malaysia (RM) term** from the manufacturing sector to the national economy
From **RM254** billion
To **RM392** billion

Global Innovation Index ranking
From **#35**
To top **30** nations

Numbers of **high-skilled workers** in the manufacturing sector
From **18%**
to **35%**
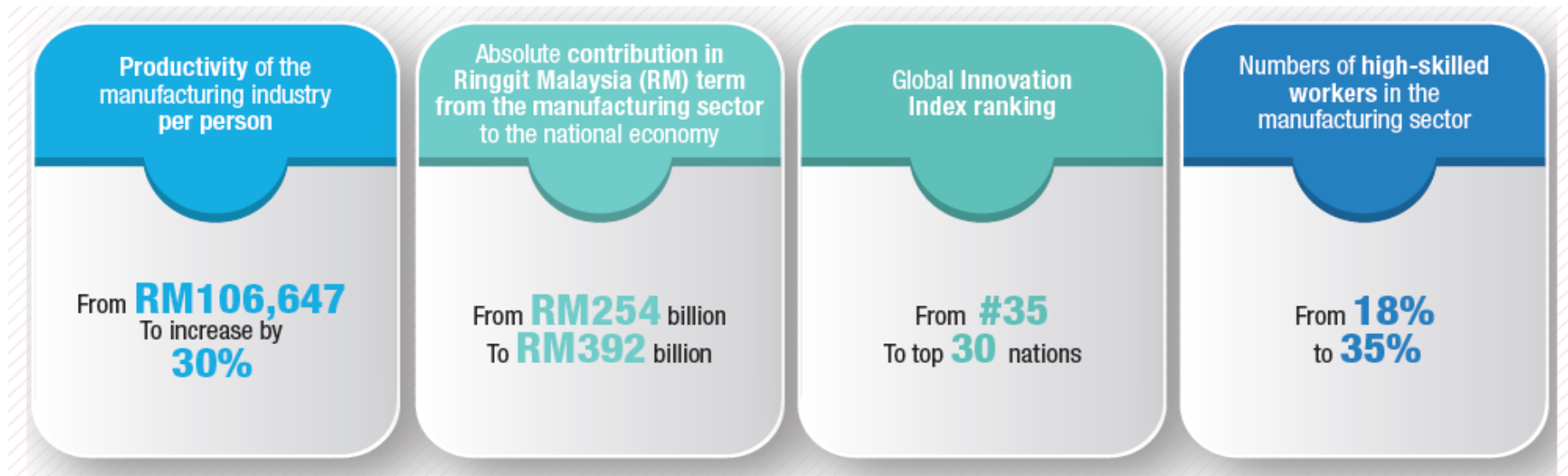
The National Policy on Industry 4.0 – Manufacturing the future

• The Policy outlines 13 broad strategies for Malaysia to embark on a journey towards Industry 4.0 adoption, which is anchored on **three shift factors: People, Process and Technology**.

   i. **People**: putting people and the entire organisation as a priority. This focuses on creating differentiated talent acquisition, developing human capital and retaining our existing talents.

   ii. **Process:** improving the manufacturing and whole business processes by encouraging smart and strategic public-private partnerships. This entails improving the business environment via reforming overly-bureaucratic policies, attracting high value investments, strengthening infrastructure for the manufacturing sector and seeking greater partnerships with the industry.

   iii. **Technology**: advancement and convergence of technologies are increasingly underpinning global manufacturing competitiveness. The Government will play an enabler role to ensure that the adoption of Industry 4.0 technologies is done as seamless as possible, and that those technologies are equally accessible to SMEs.

Five strategic enablers : F.I.R.S.T

F Funding	**I** Infrastructure	**R** Regulations	**S** Skills & Talent	**T** Technology
Funding & Outcome-based Incentives	*Enabling Ecosystem & Efficient Digital Infrastructure*	*Regulatory Framework & Industry Adoption*	*Upskilling Existing & Producing Future Talents*	*Access to Smart Technologies & Standards*
STRATEGY F1 Provide Outcome-based Incentives	**STRATEGY I1** Strengthen Digital Connectivity	**STRATEGY R1** Increase Awareness	**STRATEGY S1** Enhance the Capabilities of Existing Workforce	**STRATEGY T1** Establish Digital Or Technology Labs And Collaborative Platforms
STRATEGY F2 Introduce Dynamic and Innovative Financial Products	**STRATEGY I2** Enhance The Digitalisation and Integration of Government Processes and Infrastructure	**STRATEGY R2** Create a Mechanism to Assess the Readiness of Manufacturing and Related Services Firms	**STRATEGY S2** Ensure the Availability of Future Talent	**STRATEGY T2** Establish and Implement Standards for Interoperability, Quality And Safety
	STRATEGY I3 Involve Services Providers	**STRATEGY R3** Improve Data Integrity, Standards, Sharing and Security		**STRATEGY T3** Intensify Research, Innovation, Commercialisation and Entrepreneurship (RICE) Programs and Activities

F.I.R.S.T – Governance & Oversight
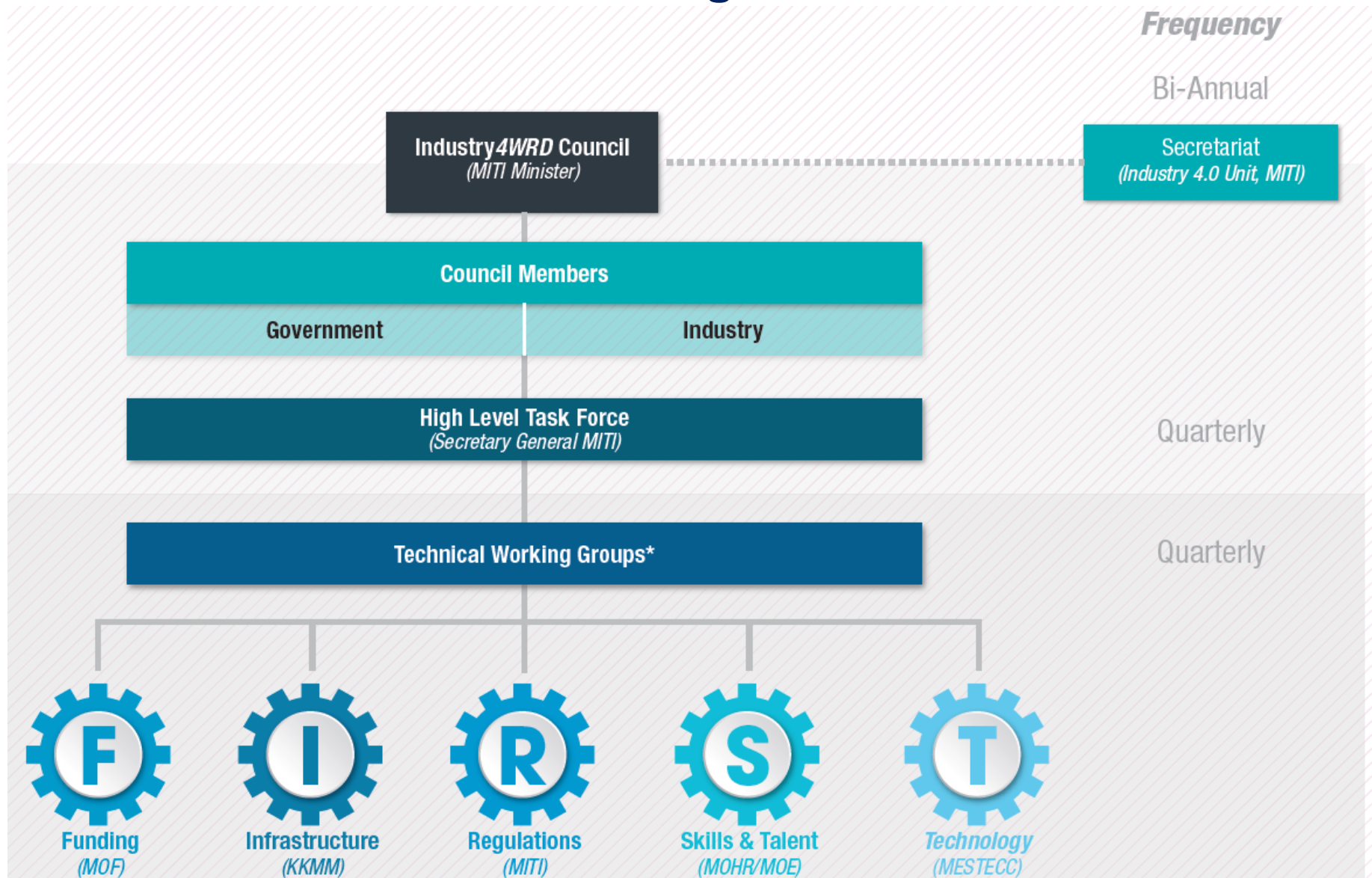
Note: * Each Technical Working Group will be co-chaired by an Industry Lead

Funding & Outcome-Based Incentives

Strategy F1: Provide outcome-based incentives, including tax incentives to encourage investments in, and adoption of, Industry 4.0 technologies & processes

RATIONALE

To support industry transformation and develop local technologies by providing and aligning incentives with targeted outcomes to manufacturing firms and solution providers

STRATEGIC OUTCOMES

- Fiscal and non-fiscal incentives for local firms, SMEs and start-ups as well as multinational corporations (MNCs) that deploy or develop Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- Explore the realigning and leveraging of incentive packages to encourage the adoption of Industry 4.0 among local firms, especially SMEs

- Explore the provision of incentive packages to MNCs partnering with local firms, especially SMEs, to expedite the adoption and implementation of Industry 4.0

Funding & Outcome-Based Incentives (cont.)

Strategy F2: Introduce dynamic and innovative financial products to encourage the adoption of Industry 4.0 technologies & processes

RATIONALE

The Government and private sector will spur the implementation of Industry 4.0 through dynamic and innovative funding options for local firms, SMEs and start-ups as well as MNCs

STRATEGIC OUTCOMES

- A suite of comprehensive financial products that local firms, SMEs and start-ups as well as MNCs can leverage on in line with their needs in implementing and adopting Industry 4.0 technologies and processes, across all stages of business lifecycle
- Development funds for adoption, development or deployment of Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- Explore the creation of Government-led development funds for Industry 4.0
- Create an enabling ecosystem to encourage financial service providers to provide various financing options for Industry 4.0
- Explore and align new and existing alternative financing including venture capital, crowd funding and other intermediaries to expedite the adoption and implementation of IR 4.0

Ⓘ Enabling Ecosystem $ Efficient Digital Infrastructure

Strategy I1: Strengthen the digital connectivity in and between industrial, education and training hubs to remove connectivity bottlenecks in adopting Industry 4.0 technologies

RATIONALE

Fast and secure data connection is a basic requirement for the realisation of Industry 4.0. technologies and services. Malaysia has already deployed High Speed Broadband (HSBB) and 4G technologies on a widespread basis. However, there are still some gaps in key industrial and training locations that could impact the adoption and development of Industry 4.0 technologies and processes. This strategy aims to systematically address and remove key connectivity bottlenecks in priority locations.

STRATEGIC OUTCOMES

- High speed, reliable and affordable connectivity for industrial, education and training hubs
- Adoption of digital and Industry 4.0 technologies and processes among manufacturing firms and related services providers

ACTION PLANS/PROGRAMMES

- Prioritise and expedite the implementation of HSBB at key industrial areas and training centres
- Encourage the deployment of converged networks that are essential for Industry 4.0 technologies

Strategy I2: Enhance the digitalisation and integration of Government processes and infrastructure along supply and manufacturing value chains

RATIONALE

Digitalising and integrating Government processes and infrastructure elements along value chains will be key to enable secure data flow, assure seamless movement of goods, and drive improvements in efficiency and productivity. A number of Government processes are not yet digitalised and will need to be optimised, digitalised and integrated to support Malaysia's Industry 4.0 transformation. These include certain approvals, licensing, certification, clearance of goods and other processes.

STRATEGIC OUTCOMES

- End-to-end digitalisation of Government processes along the manufacturing and supply value chains

- Seamless movement of goods and services among manufacturers, suppliers and supporting agencies with improved visibility and optimised resourcing

ACTION PLANS/PROGRAMMES

- Assess priority Government-related processes and elements that impact manufacturing and supply chains and Industry 4.0 transformation

- Support the accelerated digitalisation and integration of these processes, led by the respective Government agencies

Strategy I3: Involve service providers for Industry 4.0 and link them to manufacturing firms to help implement technologies, processes and skills development

RATIONALE

Services related to Industry 4.0 are important to help Malaysian companies accelerate their transition, especially in developing people, transforming processes and adopting technologies. Hence, Industry 4.0 service providers need to be involved as an integral part of the ecosystem and be connected to manufacturing firms, especially SMEs, who often have limited visibility.

STRATEGIC OUTCOMES

- End-to-end ecosystem support and service provider visibility for manufacturing firms
- Improved performance of service providers in helping manufacturing firms adopt and transform to Industry 4.0

ACTION PLANS/PROGRAMMES

- Develop and disseminate a catalogue of service providers
- Link service providers to manufacturing firms and SMEs through collaborative platforms
- Support digital adoption within the manufacturing value chain with a structured approach and measurable outcomes

Regulatory Framework & Industry Adoption

Strategy R1: Increase awareness of the need, benefits and opportunities of Industry 4.0 technologies and business processes among manufacturing firms

RATIONALE

Lack of awareness in digitalisation and Industry 4.0 is one of the main barriers to embark on smart manufacturing transformation. A greater understanding of Industry 4.0 is crucial for manufacturing firms to make informed decisions on investments, especially on assessing impact, determining costs and benefits of automation, and capitalising on data. Structured awareness programmes are needed to educate and promote the understanding and need for action to local firms, particularly SMEs.

STRATEGIC OUTCOMES

- Increased understanding of the need, benefits and opportunities of Industry 4.0

- More manufacturing firms adopting Industry 4.0 technologies and processes

ACTION PLANS/PROGRAMMES

- Undertake a comprehensive Industry 4.0 awareness program across all stakeholders with particular focus on SMEs

- Create a regulatory sandbox that enables firms to manage regulatory risks during testing stage

Strategy R2: Create a platform and mechanism to help manufacturing and related services firms, especially SMEs, assess and develop their Industry 4.0 capabilities

RATIONALE

For many companies, Industry 4.0 will be a major transformation, not only in terms of investment in technologies but also changes in business processes and culture. The experiences of other countries show that assessment tools and platforms for learning and sharing of best practices help companies, especially SMEs, pinpoint priorities of what to address and how to transform. Implementing this strategy will require a close collaboration with different industry associations to ensure focus on the priorities. This strategy will also help the Government better assess the broader needs, challenges and priorities of Malaysian manufacturing firms.

STRATEGIC OUTCOMES

- Better understanding of best practices, own capabilities and transformation requirements by manufacturing firms

- Profile of the state of readiness of local manufacturing industry in adopting Industry 4.0 for targeted technological improvement and support prioritisation

Regulatory Framework & Industry Adoption (cont.)

ACTION PLANS/PROGRAMMES

- Create tools and processes to help manufacturing and related services firms, assess their capabilities and readiness to adopt Industry 4.0 technologies and processes

- Establish a national Readiness Assessment Programme as a tool for conducting assessment, sharing global and local best practices, supporting the development of local firms and identifying national Industry 4.0 priorities

- Establish collaborative programmes with other countries that are leading in the Industry 4.0 transformation to share best practices and help guide Malaysia's programmes for optimal impact

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Strategy R3: Improve data integrity, standards, sharing and security to facilitate seamless integration of manufacturing value chains and to support intra-ministerial coordination for effective Industry 4.0 programmes

RATIONALE

A significant barrier to enable seamless digital flow along manufacturing and supply chains is the lack of standards, interoperability and governance for both data and intellectual properties. Issues with data integrity and interoperability can also affect intra-ministerial and industry coordination and effective analysis in identifying programme and regulatory priorities. This will require both the development of standards and security protocols and integration especially across ministries and agencies. This strategy supports strategy I2, the digitalisation and integration of Government processes into manufacturing supply chains.

STRATEGIC OUTCOMES

- Integrated, standardised, secure and trusted data ecosystem that enables seamless data flow throughout major manufacturing and supply chains
- Better understanding and analysis of priority issues across initiatives, ministries and agencies, driving more effective programmes and regulatory support

Regulatory Framework & Industry Adoption (cont.)

ACTION PLANS/PROGRAMMES

- Identify and implement effective, streamlined and standardised data, laws, regulations and compliance protocols within and between ministries and agencies

- Collaborate with businesses to ensure suitable standards are in place for data privacy, including appropriate handling, ownership and storage

- Create a manufacturing industry data depository that will enable sharing and analyses across all ministries and agencies

- Establish a set of cybersecurity and IoT security guidelines for Industry 4.0 as part of Malaysia's broader development of cybersecurity capabilities

Upskilling Existing & Producing Future Talent

Strategy S1: Enhance the capabilities of the existing workforce through national development programmes specially designed for specific manufacturing sectors and support reskilling and upskilling

RATIONALE

The transition to smart manufacturing business models, technologies and processes is rapidly changing the required skill sets for the existing workforce. Many firms, especially SMEs, will require more structured and up-to-date training and skills development avenues for developing and maintaining world-class practices and capabilities within their workforce, including experts with advanced Industry 4.0 knowledge. This strategy aims to both upskill the existing workforce and mitigate the potential impact on jobs.

STRATEGIC OUTCOMES

- Increase in overall labour productivity due to upskilling and reskilling of the existing workforce

- Increase in number of high-skilled and multi-skilled workers with high wages in the manufacturing industry, particularly in high value-added activities

- Mitigation of potential job losses as a result of automation and technology adoption

Upskilling Existing & Producing Future Talent (cont.)

ACTION PLANS/PROGRAMMES

- Create an Industry 4.0 Talent Competency & Technology Mentoring programmes to drive broader workforce development initiatives in line with specific sector requirements

- Establish Skills Certification programmes in Industry 4.0 areas

- Develop tailored training courses for the reskilling of transitioning employees

- Enhance classroom modules for intensive upskilling programmes by using augmented or virtual reality (AR/VR)

- Enable the availability of data on Industry 4.0 talent and labour pools for the Government, academia and industry (in order to chart future action plans)

Strategy S2: Ensure the availability of future talent by equipping students with the necessary skillsets to work in the Industry 4.0 environment

RATIONALE

Ensuring the pipeline of future talent in the manufacturing sector is important as advances in manufacturing techniques and processes require a higher skilled and more educated workforce. The focus on technical and vocational education and training (TVET), and science, technology, engineering and mathematics (STEM) education will be of priority to ensure a continuous supply of highly qualified talent. Structured industrial training programmes between industry and academia are able to close the gap between classroom modules and skills required in the working environment. There is also a need to raise the profile of high-tech manufacturing industry as an attractive workplace and career option. This will be key to attracting more students to STEM subjects

STRATEGIC OUTCOMES

- Continuous availability of Industry 4.0 talent for the manufacturing industry

- Increased number of TVET and STEM students

- Graduates equipped with relevant and practical Industry 4.0 skills

- Increased industry-academia collaboration

ACTION PLANS/PROGRAMMES

- Boost support for TVET and STEM education programmes, in part by increasing funding for vocational education and training programmes

- Integrate theory and practical Industry 4.0 applications into tertiary education curricula, including structuring industry placement opportunities

- Promote manufacturing as a preferred option for high-skilled jobs to overcome public perception and attract both skilled labour and university graduates

- Enhance and increase the capacity and capability of educators, trainers and instructors in the manufacturing-related education sectors

ACCESS TO SMART TECHNOLOGIES & STANDARDS

Strategy T1: Establish digital/technology labs and collaborative platforms, especially public-private partnerships (PPPs), to create awareness and understanding, foster the adoption of new technologies, and facilitate the transfer of knowledge

RATIONALE

Digital and technology labs by manufacturing leaders create showcase for local companies, especially SMEs, to understand available and best-in-class technologies and practical use cases, and engage in collaborative deployment efforts. PPPs is a proven concept to help expedite the adoption of new technologies in priority areas. The Government intends to work with local and global leaders to establish more digital and technology labs and collaborative platforms through PPPs.

STRATEGIC OUTCOMES

- Access for local companies, especially SMEs, to key enabling Industry 4.0 technologies and partners

- Stronger collaboration in deploying new technologies across value chains

- PPPs for industry, academia, Government and other stakeholders to work for a targeted outcome in Industry 4.0

ACTION PLANS/PROGRAMMES

- Support leading global and local industry leaders to establish digital and technology labs that showcase the potential applications, benefits and proof of concept of new technologies for industry adoption

- Create PPPs and collaborative programmes for manufacturing activities that foster digital adoption, collaborative deployment and development of local capabilities, especially in priority sectors and technologies

- Provide local firms, especially SMEs, with open access to smart manufacturing research, tools and technologies and help them understand what can be applied in the early stages of adoption

Strategy T2: Establish and implement standards for interoperability, quality and safety for smart manufacturing and Industry 4.0 technologies

RATIONALE

Standards and interoperability of systems are important to facilitate extensive adoption of Industry 4.0 technologies and processes, given the need for collaboration and integration along manufacturing and supply chains. These standards need to be clear, well documented and accessible, and allow Malaysian-based manufacturing firms to integrate both within local and global production networks and supply chains.

STRATEGIC OUTCOMES

- Standardisation for interoperability of Industry 4.0 technologies and processes
- Seamless integration and interoperability in local and global manufacturing and supply value chains

ACTION PLANS/PROGRAMMES

- Establish an inventory of, and develop Industry 4.0-related standards – consolidate, harmonise and align with global standards
- Address interoperability barriers by implementing appropriate and advanced industry standards, in close consultation with the industry

Strategy T3: Intensify Research, Innovation, Commercialisation and Entrepreneurship (RICE) programs and activities in specific Industry 4.0 technologies and processes that support and advance priority sectors

RATIONALE

Growth opportunities in the manufacturing sector will need to be supported by technological innovation from both private and public research communities. Sustained growth in the manufacturing sector will require proactive investments in advancing and enabling Industry 4.0 technologies and processes. A further step up in Malaysia's innovation capabilities will be important to propel priority sectors and technologies and reinforce Malaysia's position as preferred high-tech manufacturing destination

STRATEGIC OUTCOMES

- Increase in capacity and capability of Malaysian firms, start-ups, universities and research institutes in Industry 4.0 technologies

- Production and commercialisation of high value and innovative products and services

- Position as primary destination for high-tech industry

ACCESS TO SMART TECHNOLOGIES & STANDARDS (cont.)

ACTION PLANS/PROGRAMMES

- Prioritise technology development programmes on Industry 4.0 that strengthen the overall research, innovation, commercialisation and entrepreneurship (RICE) capacity and provide solutions for priority sectors

- Improve understanding by and access for manufacturing firms of existing Industry 4.0 research facilities and ongoing R&D

- Create technology development and experimentation labs for collaborative Industry 4.0 technology and solutions development

SERC's comments

- *Manufacturing the future is here to stay. Malaysia cannot afford to lag in IR 4.0, an exponential change in sheer size and magnitude driven by technological innovation impacting industries, consumers and workforce.*

- *The fear of change or slow adoption of the Industry 4.0 would place Malaysia in a far less competitive advantage against her regional peers. Currently, Malaysia is regarded as stuck at the level of Industry 2.0-3.0 in terms of manufacturing technology and has been rather slow to embrace it, compared with Vietnam or Thailand which already have Industry 4.0 policy frameworks.*

- *We view positively the launching of National Policy on Industry 4.0 aims at preparing and facilitating Malaysian companies and employees to join the global wave of the fourth major upheaval in modern and smart manufacturing utilizing digitalisation and technology.*

- *A systematic roadmap with adequate policies and institutions support, technological as well as human capital development is pivotal to make Malaysian companies and industries ICT ready to handle new technologies and embrace IR4.0.*

SERC's comments

- *With 98.5% of total manufacturing establishment are SMEs, they must have great interest and put great hope on the digital operation to improve competitiveness, raise income and reduce costs. The cost of adopting Industry 4.0 is the main reason for small and medium industries' hesitance. Therefore, SMEs must make full use of the various incentives and programs that were put in place to support the digitalisation transformation, automation and technological advancement.*

- *The biggest challenges for us are the lagging productivity growth, lack of skillset as well as the low adoption of ICT. Hence, there must be skill, mindset and behavior changes at the organization structure, management talent and workforce level.*

- *Newer and higher level skills required for IR4.0 requires a good foundation in science, technology, engineering and mathematics (STEM). Skills development, retraining, learning agilities as well as the right mindset are important to handle the fast developing technologies.*

- *Hence, we need to make sure our education system and skill training institutions are marked by quality, credibility and innovation. Education and training are the key to keep our people and workforce in pace with the digitalized world.*

SERC's comments

- *In terms of technical and vocational skill-related jobs, the Government must review Technical and Vocational Education and Training (TVET) program offerings, implement harmonized accreditation system and strengthen TVET as preferred education pathway. Particular attention also needs to be given to reskilling and upskilling lesser-skilled workers to other sectors and activities digital technology.*

- *In addition, employers must also change their mindset to invest in human capital development, and constantly innovate business models with the support of advanced digitalisation so as to have a competitive advantage over their competitors. Both the government and industries should invest in a smart manufacturing lab in partnership with academia and research institutions, enabling workers to gain first-hand experience in smart manufacturing technologies.*

- *Fast and secure data connection is a basic requirement for the realisation of Industry 4.0. technologies and services. In Malaysia, internet service providers are still monopolized by selected companies either GLCs or local private ones, in which the products' pricing are determined by them. The Government needs to allow the entry of foreign internet service providers into domestic market as they can provide competitive prices as well as efficient services, compelling domestic service providers to enhance their services.*
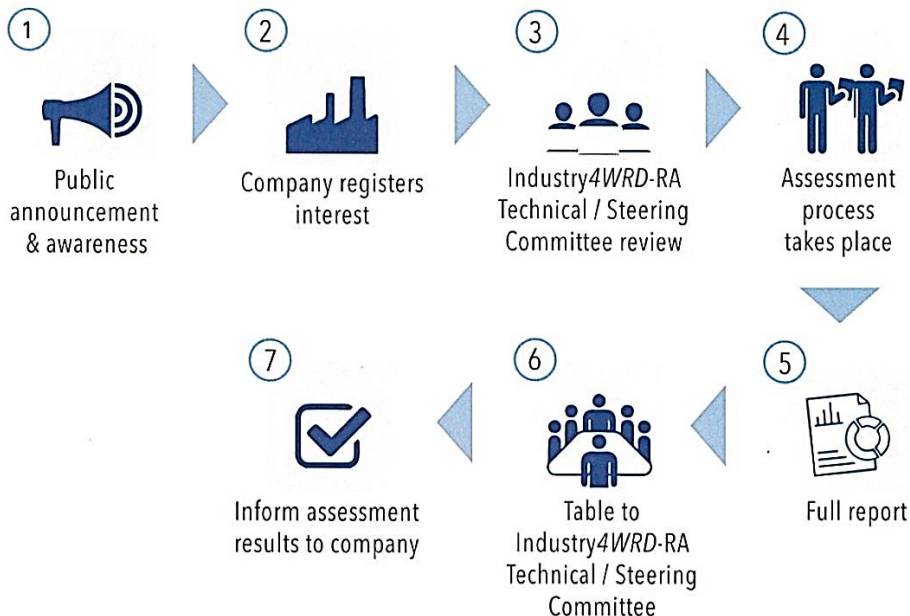
SERC's comments

- *The "Industry4WRD Readiness Assessment" (refer to Appendix) programme to identify the level of companies' adoption in Industry 4.0 is deemed as a good pre-assessment program. It is a comprehensive assessment which creates manufacturers' awareness of their SWOT analysis under the current automation landscape.*

- *The manufacturers who have no confidence or unsure whether they are ready to embrace Industry 4.0 should come forward to participate in this readiness assessment program. Through this program, the Government is able to define what would be the appropriate approaches to assist the manufacturers. There is no a "one-size-fits-all" solution to digital and technological transformation.*
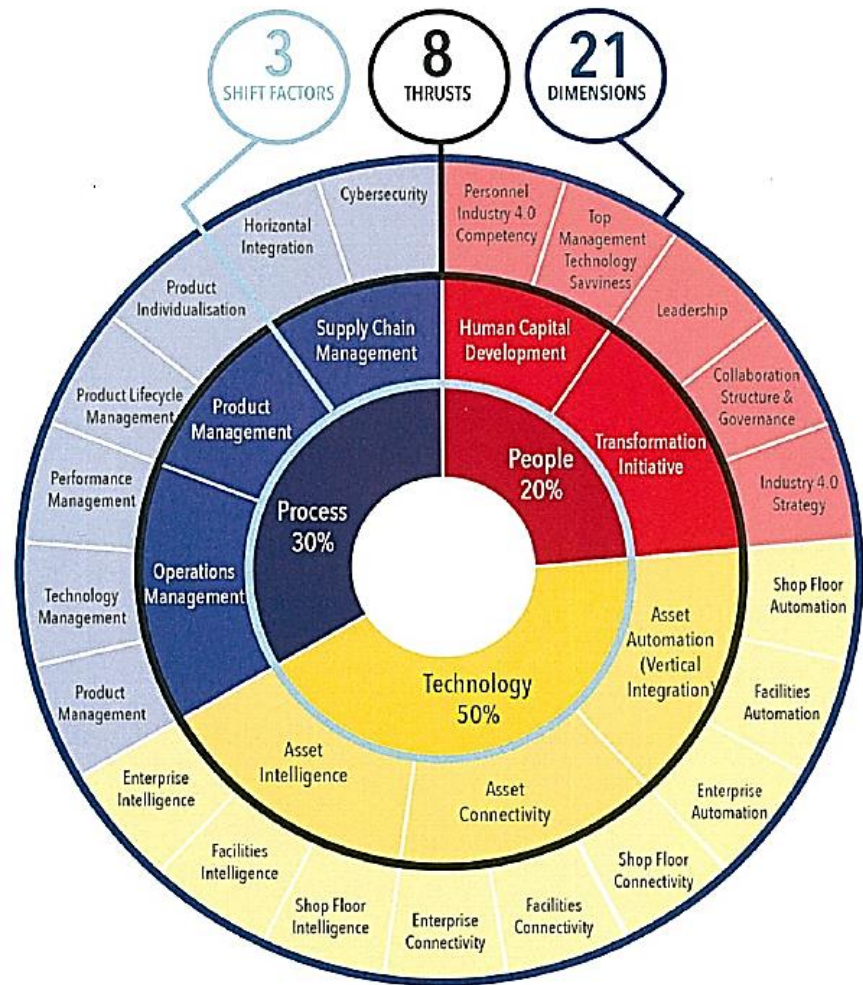
Appendix: Industry4WRD Readiness Assessment

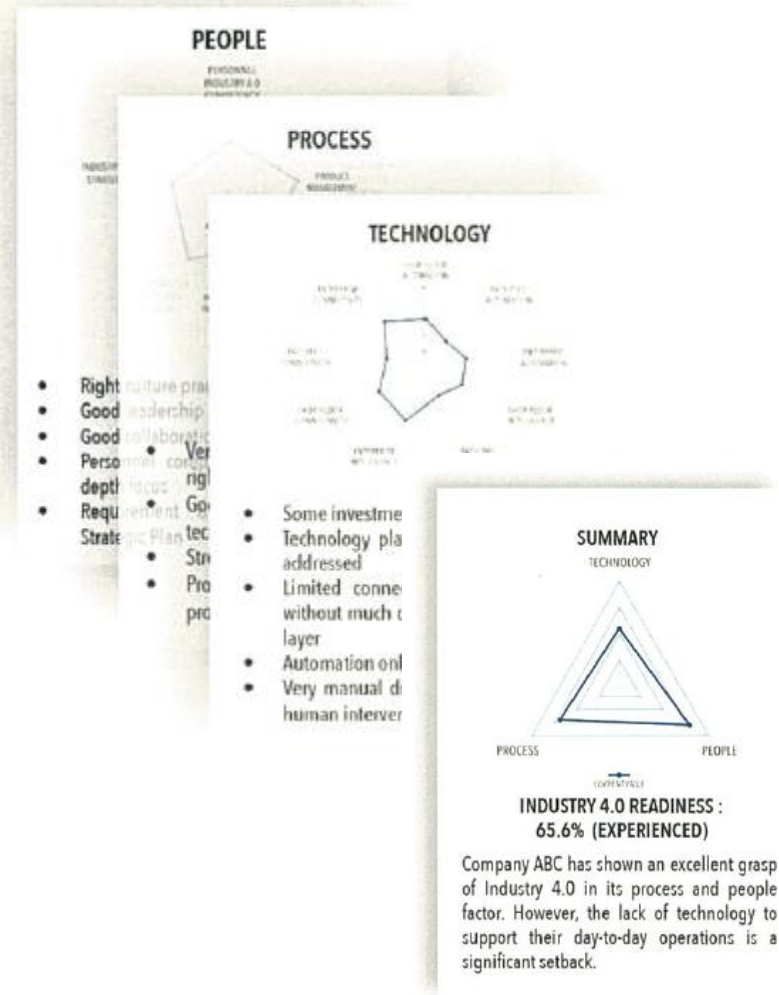## Target Audience
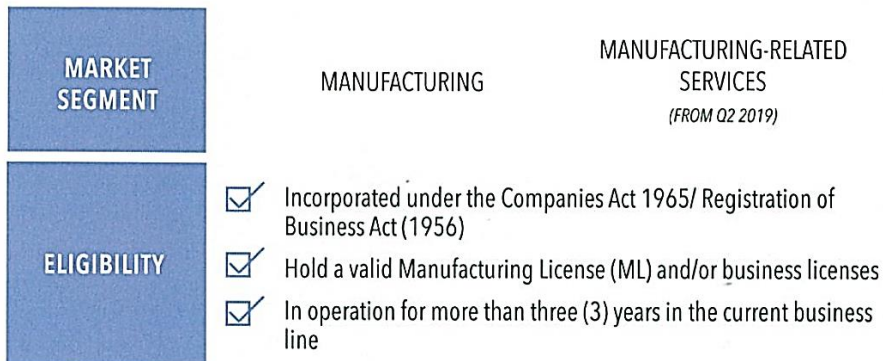
Assessment Process

Assessment Criteria

Readiness Profile and Scoring

READINESS PROFILE	PERCENTAGE SCORED	GENERAL DESCRIPTION
Conventional	0 % to 20 %	Operation remains "as is" with no intention or initiative to move into Industry 4.0 adoption.
Newcomer	21 % to 40 %	Has interest to pursue Industry 4.0 but with none or very minimal efforts or initiatives.
Learner	41 % to 60 %	Has interest to pursue pilot line Industry 4.0 adoption in operation, with existence of planning and strategies, efforts or simple and patches of initiatives being implemented. Ready for some system adoption.
Experienced	61 % to 90 %	Has pursued small to medium scale Industry 4.0 adoption initiatives in operation, horizontal integration and ready for large scale system adoption.
Leader	91 % to 100 %	Has implemented large scale Industry 4.0 adoption initiatives (company-wide) and system integration.

Example of Assessment Report

PEOPLE

PROCESS

TECHNOLOGY

- Right culture pra
- Good leadership
- Good collaboratic
- Perso depth ocus
- Requ ment
  Strate ic Plan

- Ver
  rigl
- Go
  tec
- Stro
- Pro
  pro

- Some investme
- Technology pla addressed
- Limited conne without much layer
- Automation onl
- Very manual d human interver

SUMMARY

TECHNOLOGY

PROCESS   PEOPLE

INDUSTRY 4.0 READINESS :
65.6% (EXPERIENCED)

Company ABC has shown an excellent grasp of Industry 4.0 in its process and people factor. However, the lack of technology to support their day-to-day operations is a significant setback.

谢 谢
THANK YOU

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