National Internet of Things (IoT) Strategic Roadmap: A Summary

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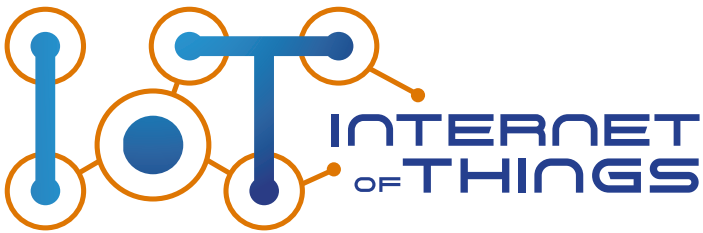

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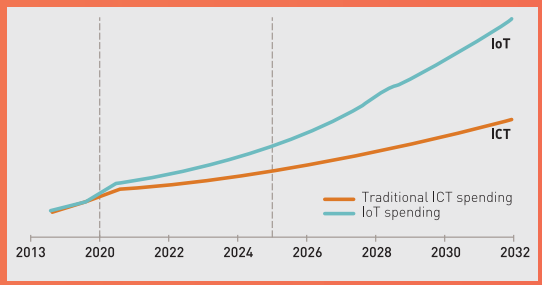
NATIONAL IOT STRATEGIC ROADMAP: A SUMMARY

NATIONAL IoT STRATEGIC ROADMAP an overview

IMPACT OF IoT

	MOBILE DEVICE PENETRATION	INTERNET USERS	MOBILE BROADBAND PENETRATION	SOCIAL NETWORK PENETRATION	MOBILE SERVICES (US$)
2025	↑280%	↑195%	↑167%	↑135%	↑US$16B
TODAY	143.7%	65.8%	13.34%	45%	US$8B

IoT SPENDING



SHORT-TERM STRATEGIES

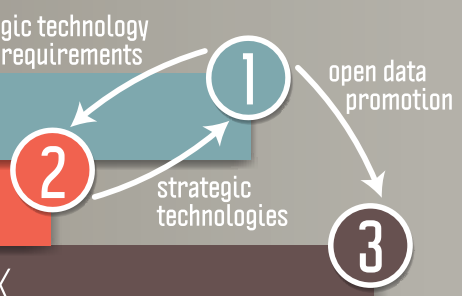
1: Transformation of SMEs
2: Alignment with existing initiatives

3 GOALS

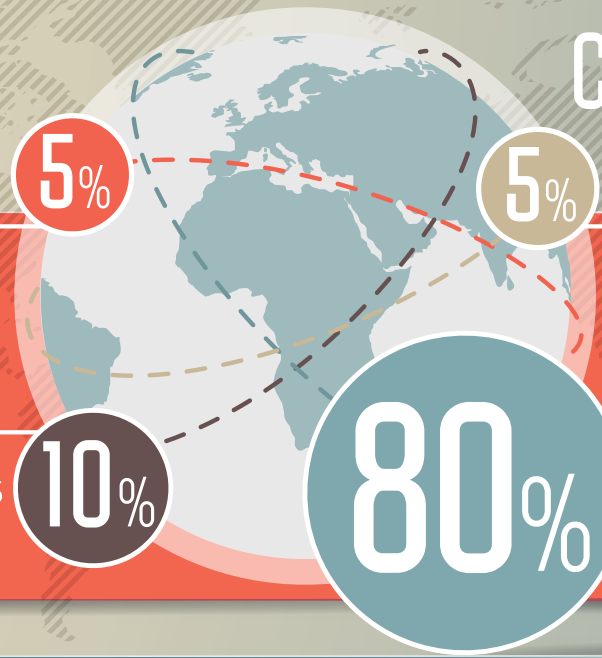
1. Create a conducive IoT industry ecosystem
2. Strengthen technopreneur capabilities in Apps & Services layer
3. Malaysia as the Regional Development Hub for IoT

LONG-TERM STRATEGIES

1: IoT MALAYSIA
2: OPEN INNOVATION FRAMEWORK
3: OPEN COMMUNITY DATA FRAMEWORK



COMPONENTS of IoT



5% COMMUNICATIONS & NETWORKING

5% COMPUTING & STORAGE

10% THINGS: HARDWARE, POWER & PROTOCOLS

80% APPS, SERVICES & ANALYTICS

MISSION

To create a national ecosystem to enable the proliferation of use & industrialisation of IoT as a new source of economic growth

VISION

Malaysia to be the Premier Regional IoT Development Hub

ECONOMIC IMPACT

ECONOMY: 2020 GNI GLOBAL: RM7.8B | MY: RM1.7B

EMPLOYMENT: JOB CREATION 14,270

EDGE: INTELLECTUAL PROP ERTY 146 PATENTS FROM MALAYSIA INVENTORS

1. Why Internet of Things (IoT)?

A. INTERNET OF THINGS

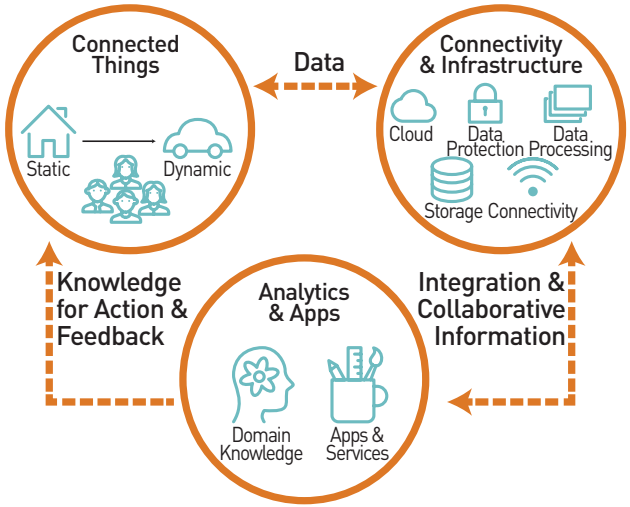


Figure 1: Components of IoT

The Internet of Things (IoT) is a convergence of smart devices that generate data through sensors to create new information and knowledge to boost human intelligence, efficacy and productivity to enhance the quality of life.

IoT is defined as "Intelligent interactivity between human and things to exchange information and knowledge for new value creation". It is a complex yet complete solution encompassing three main technology components namely connected things with embedded sensors, connectivity and infrastructure, and most importantly analytics and applications (refer to Figure 1).

B. MEGATRENDS

IoT technology is resultant from major megatrends: (i) Market and (ii) Technology as depicted in Figure 2.

As a result, the implication of these two megatrends will force global society to implement new technology in order to enhance productivity, optimise resources and increase sharing efficiency while maintaining individual needs.

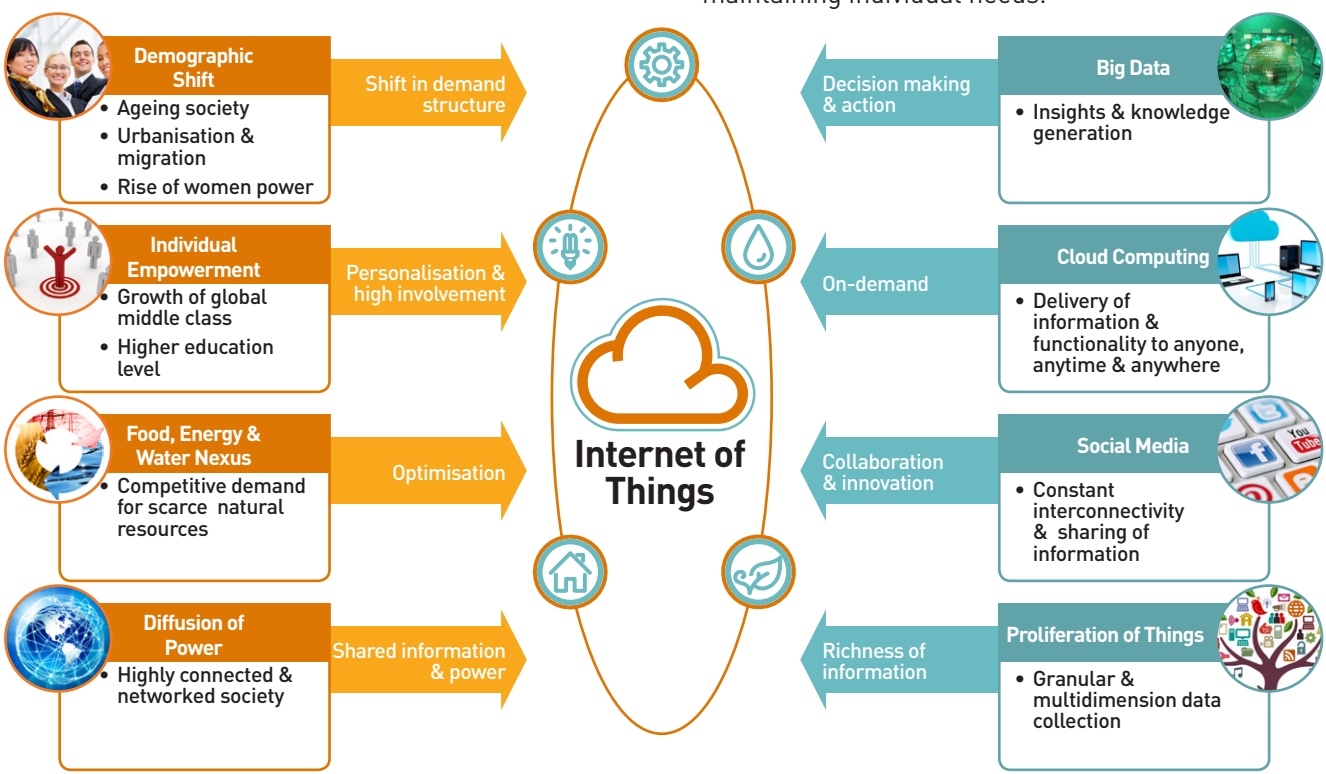


Figure 2: Megatrends resulting in IoT

2. Where We Are

A. GLOBAL MARKET POTENTIAL

IoT opportunities are enormous with a global economic value projection ranging from US$1.9 trillion to US$7.1 trillion by 2020. There is strong momentum for the prevalence of IoT solution implementation across the world where several countries started to embark on IoT projects that focus on energy, water, transport, building management, and government service delivery (refer to Figure 3).

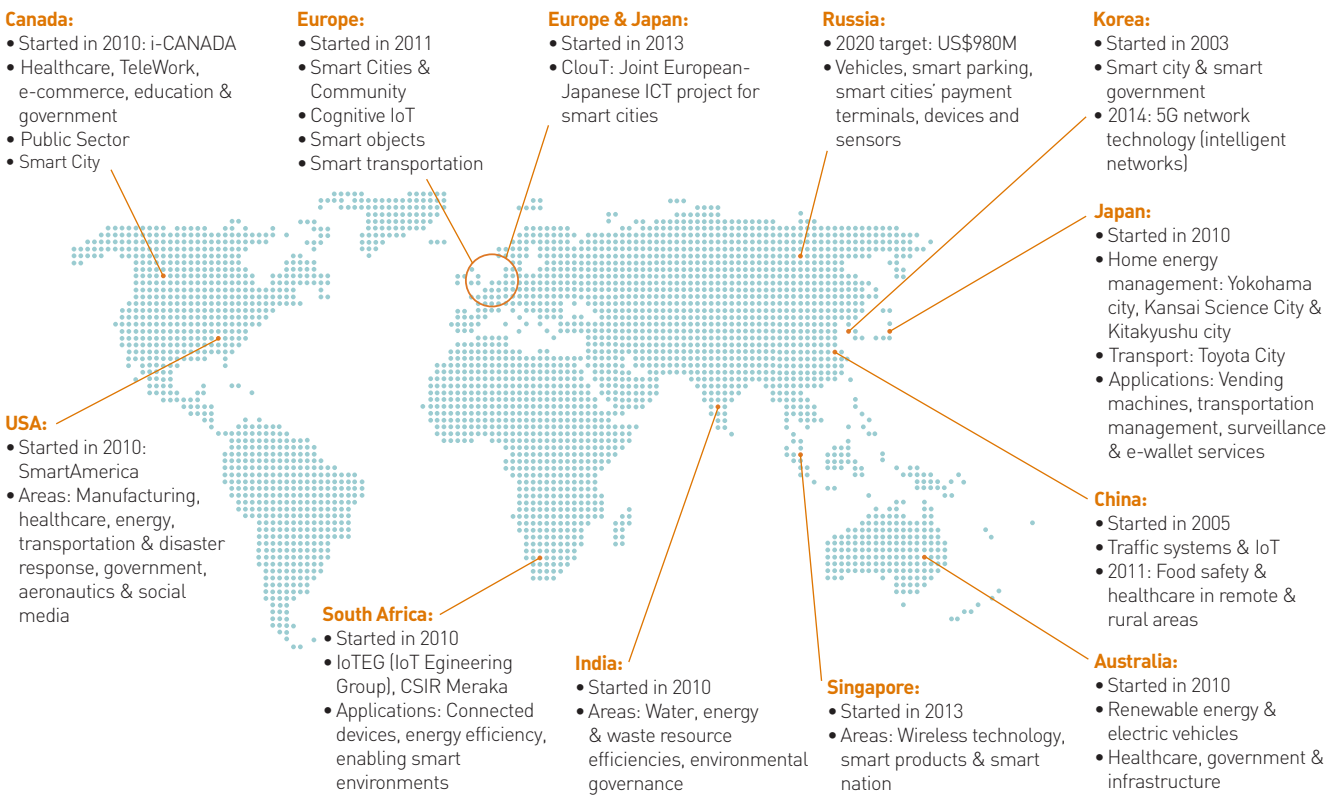


Figure 3 : Global IoT implementations

B. MALAYSIA MARKET POTENTIAL

The initial IoT economic potential for Malaysia will be RM9.5 billion GNI creation by 2020 and it is expected to experience exponential growth beyond 2020 and reach RM42.5 billion (refer to Figure 4). Technology opportunities can be created by IoT in Malaysia with forecast technology opportunities for:

- Application and services amounting to RM34 billion in 2025 compared to RM7.5 billion for 2020
- Device producers at RM1.0 billion and RM4.3 billion for years 2020 and 2025 respectively

		Global Scenario	Malaysia Scenario	
		2020	2020	2025
	**Layer 5:** Analytics **Layer 4:** Apps & Services	RM890 Billion	% of IoT 80%	RM7.5B	RM34.0B
	**Layer 3:** Computing & Storage	RM61 Billion	5%	RM0.5B	RM2.1B
	**Layer 2:** Communications & Networking	RM58 Billion	5%	RM0.5B	RM2.1B
	**Layer 1:** Things: Hardware, Power & Protocols	RM105 Billion	10%	RM1.0B	RM4.3B

Figure 4: IoT technology opportunities

Source: Gartner (2014)

Besides delivering financial impact to the nation, IoT can serve as a good platform for the research community to commercialise R&D outputs. As of 2012, there are 146 potential patents from Malaysia inventors which can be licensed to investors to enhance the competitiveness of their IoT applications and services. Furthermore, the growth of IoT in the Malaysian market is projected to generate a total of 14,270 high-skilled employment opportunities by 2020.

IoT will be the transformative and pervasive driver of change and improvement by potentially adding new dimensions to the industry in the following ways:

- Testing facilities for interoperability, standards compliance and export-related testing
- Software development standardisation to address standard silos and facilitate the creation of niche applications and services
- System integration services to produce experts from entrepreneurs through interaction with various stakeholders in the ecosystem

C. READINESS OF MALAYSIA FOR IOT

Malaysia has an encouraging environment and a strong starting point to foster and spur IoT within the domestic market due to the following:

- High mobile penetration at 143.7 percent and observation of multiple handset ownership
- 65.8 percent of Malaysians are Internet users with 59 percent being active users
- Social media penetration in Malaysia is at 45 percent
- Domestic ICT consumption is projected at RM118.6 billion in 2015 and will register RM117.6 billion by 2020 with a CAGR of 8.32 percent

While acknowledging the advantages of IoT technologies, several challenges must be addressed to unleash the full potential of IoT besides leveraging on existing strengths for IoT (refer to Table 1) to continue to open new markets and drive new applications and opportunities for a wide spectrum of industries.

Factor	Strengths	Weaknesses
Technology	• Well-established mobile operators and five operators licensed to provide 3G services	• Technology complexity • Legacy systems • Security and privacy concerns • Data accessibility and knowledge sharing availability
Resource	• Creation of new MSC cybercities and cybercentres • SMEs as source of endogenous growth and innovation • E&E industry is leading in terms of investment, industrial output, value add, exports and employment	• Fragmented funding instruments unable to generate required impact • Barriers to free market competition exist
Societal	• High phone and Internet penetration rates • Sophisticated consumers are eager to use mobile data and value-added services	• Rural adoption and adaptation fear - technology phobia
Political	• Various incentives like pioneer status, tax exemptions and allowances to promote ICT investment • Intellectual property protection and cyberlaws	• Dedicated performance management entity exists to monitor and drive performance of innovation initiatives • Broken linkages across industry and public RIs • Multiple public agencies working in silos on innovation initiatives

Table1: Readiness of Malaysia in exploring IoT opportunities

3. What We Want to Achieve

A. VISION

Malaysia to be the Premier Regional IoT Development Hub

B. MISSION

To create a national IoT ecosystem to enable the proliferation of use and industrialisation of IoT as a new source of economic growth

C. GOALS

The goals of the National IoT Strategic Roadmap are to integrate all efforts from various stakeholders in Malaysia to focus on areas of identified significant value creation through three strategic goals:

GOAL 1: Create a conducive IoT industry ecosystem to foster the development, diffusion and adoption of IoT technologies with the following strategies:

- To formulate an interoperability framework that harmonises the heterogeneity and complexity of standards and technologies
- To institute a centralised regulatory and certification body to address privacy, security, quality and standardisation concerns
- To establish strategic collaborations between MNCs and local players

GOAL 2: Strengthen technopreneur capabilities and foster the generation of globally-competitive IoT products and services to further strengthen Malaysia's position in the IoT industry

GOAL 3: Malaysia as the Regional Development Hub for IoT; with the establishment of an integrated centre for IoT solutions, equipped with supporting services and facilities such as interoperability testing and development of IoT products and services, Malaysia will be positioned as the preferred location for IoT outsourcing services for the Malaysian industry and the world at large

4. Implementation Strategies

Members of the Technical Working Group (TWG) suggested critical factors required to address the challenges and capitalise on prevailing IoT opportunities which are summarised in Table 2.

Goal	Strategy	Short-Term Initiative (2015-2017)	Mid-Term Initiative (2018-2020)	Long-Term Initiative (Beyond 2020)
1. Create a conducive IoT industry ecosystem	Enhance the regulatory framework to cater for IoT technologies		✓	✓
	Strengthen institutional support in areas of technology and standards development	✓	✓	
	Leverage on existing initiatives and infrastructure to facilitate the creation of the IoT industry		✓	
2. Strengthen technopreneur capabilities in the apps and services layer	Develop SME capabilities to kickstart the IoT industry	✓		✓
	Incubate SME competencies through focused "flagship" projects	✓	✓	✓
	Develop key talents	✓	✓	
3. Malaysia as the Regional Development Hub for IoT	Promote Malaysia as the key "showcase" country		✓	
	Promote Malaysia as the integrator of IoT solutions			✓
	Position Malaysia as the centre of the IoT outsourcing services industry			✓

Note: Refer to the full report on the details of the proposed implementation strategies.

Table 2: Goals and implementation strategies of the National IoT Strategic Roadmap

Short-term and long-term strategies have been proposed to be carried out to bring Malaysia's IoT industry maturity level from the introduction stage to the growth stage while creating a sustainable and significant industry ecosystem that will position Malaysia as the Premier Regional IoT Development Hub.

A. SHORT-TERM STRATEGIES

Short-Term Strategy 1: Transformational steps for the development of IoT as an industry

- Develop SMEs' capabilities to kickstart the IoT industry
- Incubate SMEs' competencies through focused "flagship" projects
- Develop key talents who are able to build better solutions for the future

Short-Term Strategy 2: Alignment with existing initiatives through pilot projects

- Pilot projects will act as catalysts and steer collaborations among industry players to demonstrate IoT contributions to quality of life (refer to Appendix)
- This strategy will enhance awareness on possible applications and implications of IoT

B. LONG-TERM STRATEGIES

Long-Term Strategy 1: Formation of IoT Malaysia

- The objective of this strategy is to establish a Community of Practice (CoP) for IoT in Malaysia which is an entity composed of industry practitioners who share a common interest to build an industry out of IoT technologies
- The partnership will be a self-governed and self-sustained ecosystem and aligned to the value-based roadmap
- Key roles:
    - Manage and promote the ecosystem
    - Be a platform to gather the industry's technological requirements
    - Offer shared services for industry development in Malaysia
    - Act as a nucleus for IoT talent development and as a bureau for IoT industry development

Long-Term Strategy 2: Establishment of the Open Innovation Framework

- The intended Open Innovation Framework is not a standardisation initiative, but rather a framework to harmonise technologies for the development of IoT technologies in Malaysia
- Key roles:
    - Harmonise multiple standards
    - Strengthen local technopreneurs' competitive capability
    - Enable new technology creation
    - Drive heterogeneous and mobile system architecture

Long-Term Strategy 3: Creation of the Open Community Data Framework

- The strategy deliberates on the method of growing the industry to the next level by opening up public data with the intention of expanding the applications of IoT
- Key roles:
    - Establish the definition of Open Community Data
    - Set up the Data Aggregator System to standardise multi-data formats and alleviate concerns of data security, privacy and traceability
    - Manage the commercial aspect of data for new value and revenue stream creation

5. Way Forward

It is imperative that the growth of IoT in Malaysia occurs within an ecosystem driven by three key strategic thrusts to establish a framework for its endeavours. The thrusts comprise: IoT Malaysia to create and sustain the ecosystem, Open Community Data Framework for open data sharing and Open Innovation Framework for a common technology platform. The enablers shall harness the intrinsic values of the three strategic thrusts towards the institutionalisation and recognition of Malaysia as the Premier Regional IoT Development Hub (refer to Figure 5).

Looking ahead, the following are the action plans to drive the National IoT Strategic Roadmap:

i. Form think tank laboratories to formulate the implementation master plans for:
   a. National IoT Strategic Roadmap's short-term and long-term strategies
   b. Pilot projects which include detailed timelines, milestones and government mechanisms
ii. Establish an organisation structure and its members
iii. Establish a governance mechanism and periodic meetings
iv. Define key performance indicators
v. Recommend the budget for strategic initiatives

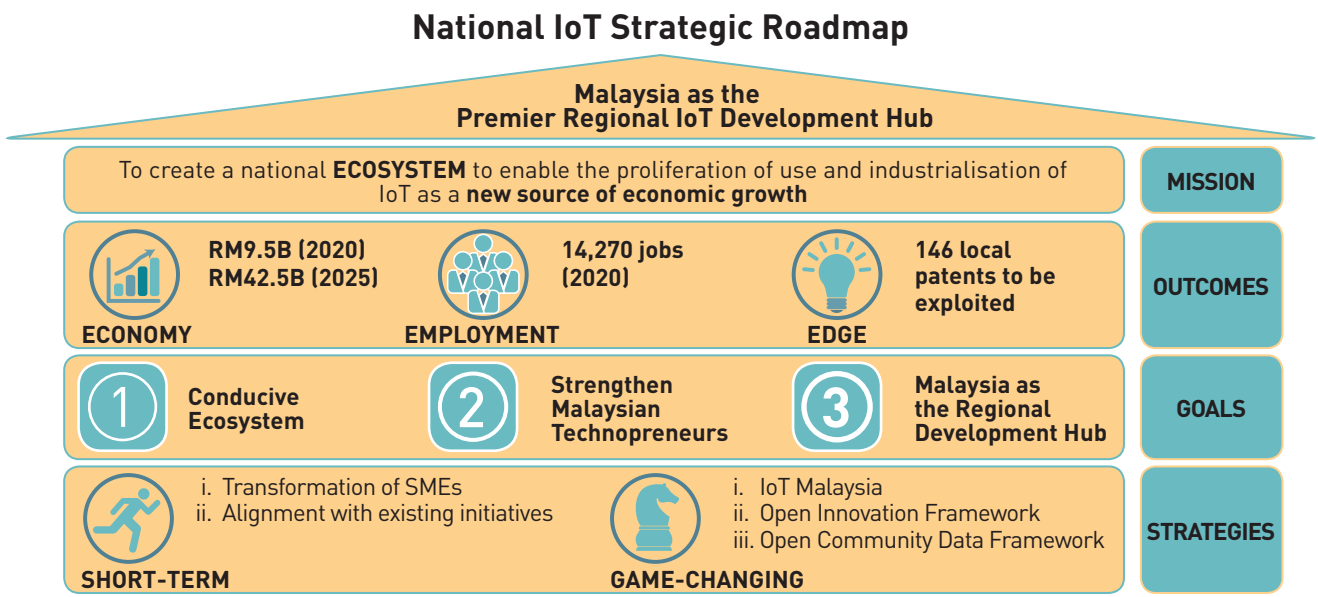


Figure 5: Mission, outcomes and goals with implementation strategies of the National IoT Strategic Roadmap

Appendix: Pilot Projects

Pilot projects act as catalysts for industry players to apply forward-thinking approaches on how IoT applications are built, used and displayed while increasing the industry's participation in economic activities by utilising IoT technologies. The projects flag areas that require further attention from IoT implementation teams and highlight underpinning issues that should receive more attention and countermeasures.

AGRICULTURE AND AQUACULTURE

OBJECTIVE: To increase farming productivity and quality output while maintaining affordability and sustainability in the value chain.

APPLICATION: Aquaculture traceability

HOW: Operators can easily measure air and water quality as well as an animal's well-being and type without the use of chemicals or altering the natural crop life cycle.

The IoT-enabled application and service will enhance the track and trace function of the breeder, and subsequently enhance supply and demand visibility, optimise production and quality control in order to build competitive powers.

Aquaculture traceability system

National Initiative Alignment	**Digital Lifestyle Malaysia (DLM): Traceability**
Pilot Project	Aquaculture Farming: From Pond to Plate
Lead	Aquagrow Corporate Sdn Bhd
Collaborator	MIMOS Berhad
Ministry	1. Ministry of Agriculture and Agro-Based Industry (MoA) 2. Ministry of International Trade and Industry (MITI)

HEALTHCARE

OBJECTIVE: To create continuous diagnostics and precision treatment by medical experts utilising IoT technologies ranging from wearable devices that track daily activities, vital signs and diet habits to further merge, dissect and crunch data for biomarkers or measurable indicators.

APPLICATION: Continuous health monitoring

HOW: Predictive and actionable models of health and disease with holistic biological data and social information are generated for wellness optimisation and disease management.

Continuous health monitoring system

National Initiative Alignment	**Digital Lifestyle Malaysia (DLM): Connected Healthcare**
Pilot Project	Continuous Health Monitoring
Lead	CREST
Collaborator	Kontron
Ministry	Ministry of Health (MoH)

GOVERNMENT

OBJECTIVE: To offer a holistic, services-oriented approach to revitalise cities for sustainable and inclusive growth through:

- Economic development and job creation
- Resource efficiency and climate change mitigation
- Liveable places for life, work and leisure
- Effective city management
- Community support

APPLICATION: Smart Village

HOW: Connectivity through Community Broadband Centres (CBCs) to become a new business model in helping local communities to develop and maintain promotional information, be a channel for local authorities and local governments to disperse information to targeted groups, be a surveillance centre point for security or systematic monitoring, and track visitor or animal movements on real-time basis.

Smart Village deployment and devices

National Initiative Alignment	**Digital Lifestyle Malaysia (DLM): Home & Community Living**
Pilot Project	Smart Village: Lanchang, Pahang
Lead	Archpac Corporation Sdn Bhd
Collaborator	1. Universiti Malaysia Pahang (UMP) 2. MIMOS Berhad 3. Pahang State Government
Ministry	Ministry of Tourism & Culture

ENVIRONMENT

OBJECTIVE: To reduce waste, improve the environment and prevent environmental accidents by enabling sensing strategies featuring real-time data perception, resource concentration and sharing, system integration as well as effective supervision and decision making.

APPLICATION: Intelligent landfill management

HOW: Using IoT, landfill operators will be empowered by the positioning of environmental sensors to monitor environment parameters such as water and air quality to prevent the landfill site from becoming a breeding ground for rodents, flies or other disease vectors.

With surveillance cameras, operators can remotely monitor the site which is properly fenced off to keep people and animals out besides monitoring the types and volume of waste being dumped at the site.

Intelligent landfill management system

National Initiative Alignment	**Digital Lifestyle Malaysia (DLM): Home & Community Living**
Pilot Project	Intelligent Landfill Management
Lead	KUB-Berjaya Enviro Sdn Bhd
Collaborator	To be confirmed
Ministry	Ministry of Energy, Green Technology and Water (KeTTHA)

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