

# **TABLE OF CONTENTS**

Foreword Background Spotlight on DIT	3 5 6	Smart Government Smart Mobility 2.4. FUTURE OPPORTUNITIES &	76 82	3.8. KULIM  City Deep Dive  Project Highlights	141 142 144
Acknowledgments How to Use this Handbook?	8	KEY ENABLERS What's Next? Key Enablers to Future Smart City	88 89	CHAPTER 4 BEST PRACTICE FROM THE UK	145
CHAPTER 1 THE SMART CITY OPPORTUNITY 1.1. UNDERSTANDING SMART CITIES	<b>10</b> 11	Implementation  CHAPTER 3  SMART CITY DEEP DIVE MALAYSIA	93 <b>98</b>	4.1. SMART CITY IN THE UK: AN OVERVIEW  The History of UK Smart Cities The UK Approach to Smart Cities	146 147 148
CHAPTER 2 SMART CITIES IN MALAYSIA	21	Smart City Overview  3.1. NATIONAL LEVEL INITIATIVES	99 101	The Smart City Ecosystem in the UK UK Smart Cities Overview	149 158
2.1. URBAN MALAYSIA'S PRIORITIES Malaysia's Key Urban Priorities Malaysia's Growth Aspirations	21 22 23 26	3.2 KLANG VALLEY  Region Deep Dive  Project Highlights	105 106 108	UK's Approach to Smart City Enablers What Does it Mean for Malaysia?  4.2. UK SMART CITIES SPOTLIGHT London	159 164 167 169
2.2. NATIONAL SMART CITY OVERVIEW Establishing the Smart City Agenda in Malaysia	28 29	3.3. MELAKA  Region Deep Dive  Project Highlights  3.4. KOTA KINABALU	113 114 116 119	Bristol Manchester Oxford West Midlands	171 173 175 177
Smart City Strategies & Policies The Smart City Ecosystem in Malaysia Smart City Projects Key Project Stakeholders	30 33 39 41	City Deep Dive Project Highlights 3.5. PENANG	120 122 124	CONCLUSION  The UK as a leader and partner List of UK Smart City firms	<b>179</b> 180 181
2.3. KEY PILLARS OF MALAYSIA'S SMART CITIES Smart City & Urban Priorities The Seven Smart City Pillars Smart Environment	43 44 45 46	Region Deep Dive Project Highlights  3.6. KUCHING City Deep Dive Project Highlights	125 127 129 130 132	List of Smart City Projects in Malaysia List of Abbreviations List of References	183 188 190
Smart Living Smart People Smart Economy Smart Digital Infrastructure	52 58 64 70	3.7. ISKANDAR MALAYSIA Region Deep Dive Project Highlights	135 136 138		

# **FOREWORD**



### His Excellency Charles Hay MVO British High Commissioner to Malaysia

The world is becoming increasingly urbanised, with cities growing at an unprecedented pace. According to the United Nations, more than half of humanity already lives in urban areas and this is forecast to increase to almost two-thirds by 2050. Within Asia alone, this is equivalent to adding a new city of 3 million people every month for the next 30 years. Against this backdrop, sustainable development depends increasingly on the successful management of urban growth.

Given the increasing speed of urbanisation, the UK Government believes that resolving the challenges of our cities is critical to finding solutions to the major issues of our future, from climate change to health, natural resource depletion and poverty. Integrated strategies and the effective planning and management of cities are essential to ensure that the benefits of urbanisation are fully shared and inclusive. Cities in the UK have been working for decades to tackle these new urban issues and have been recognised across the world for their ground-breaking initiatives. The UK is recognised as a global leader in smart cities. Our strengths lie across the board, from world leading design, engineering and consulting companies to highly innovative SMEs. The British Standards Institution, our national standards body, has been at the forefront of the development of UK and international smart cities standards.

We are keen to share our experiences with, and to learn from, other countries. In Malaysia, we are already working to deliver innovative, citizen-centric, smart mobility projects in close partnership with development authorities in both Iskandar Malaysia and Melaka, under our Global Future Cities Programme.

Our aim is to help both cities to tackle transport and urban challenges, via a smart, sustainable and integrated approach, and support them in building back better, following the COVID-19 pandemic.

Clearly, urbanisation creates challenges, but if carried out sustainably, it also presents significant opportunities to improve people's lives. I am therefore delighted to be introducing this "Smart City Handbook: Malaysia" in partnership with the Honourable Datuk Hjh Zuraida Kamaruddin at the Ministry of Housing and Local Government Malaysia, in the anticipation that these opportunities will lead to increased collaboration between our two countries in this important field.

# **FOREWORD**



# Datuk Hajah Zuraida Binti Kamaruddin

# Minister of Housing and Local Government, Malaysia

The United Nations estimates that between 2018 and 2050, the urban population will increase from 55% to 68%, adding 2.5 billion to the world's urban population by 2050. By 2030, the world is projected to have 43 mega-cities with more than 10 million inhabitants.

Meanwhile, Malaysian urban population is projected to increase from 76% in 2018 to 82% in 2030 and 87% in 2050. As more Malaysians live in urban areas, cities start

to face pain points such as congestion, pollution, vandalism and inefficient deployment of urban services. The growing urban population also strain city infrastructure and limit city capacity to fulfil citizens need such as housing, water and food supply and public amenities. The challenges arising from the urbanisation process are now exacerbated by new challenges arising from the COVID-19 pandemic crisis, including society's high reliance on digital services in their daily life. The Malaysia Government believes that smart city, with emphasis on liveability, sustainability and competitiveness, preparedness and resilience is able to provide to resolve the challenges of our cities such climate change, health, resource depletion, poverty, and waste.

Therefore, sharing ideas, experiences, and best practices, being open to new ideas, and exploring possible collaborations within or outside Malaysia in expediting smart city development will benefit Malaysia and its citizen. We acknowledge that the United Kingdom has vast knowledge and experience in developing and managing smart cities, and Malaysia is keen to learn and share from the UK on utilizing technology and innovation to develop futuristic and forward-thinking cities.

In Malaysia, United Kingdom is currently working closely with UN-Habitat to support innovative smart mobility projects in Iskandar Malaysia and Melaka. This programme is to help tackle transport challenges and support cities in building back better following the COVID-19 pandemic under the Global Future Cities Programme. Urbanisation creates many challenges, but it also presents opportunities to improve people's lives. Besides the current work underway in Global Future Cities Programme, I believe Malaysia and the United Kingdom can work together in various other areas. Moving forward, I hope this handbook will raise awareness of these opportunities and start conversations that lead to more collaboration between our two countries.

# BACKGROUND

This handbook was commissioned by the UK Foreign, Commonwealth and Development Office (FCDO) and Department for International Trade as complementary research to the Global Future Cities Programme (GFCP) under the UK Government, GFCP aims to support partner countries in driving inclusive economic growth and the growth of business and trade relationships. The programme is guided by the UK Aid Strategy with the objective of helping promote growth and prosperity in developing middle-income countries, contributing to the United Nations Sustainable Development Goals (SDGs) and implementation of the New Urban Agenda. In Malaysia, GFCP is supporting

In partnership with the Iskandar Regional Development Authority (IRDA), the programme has worked to develop the Smart Integrated Mobility Management System (SIMMS) for Iskandar Malaysia, in the state of Johor. SIMMS is envisioned as a smart technology-based system that will integrate static and real-time data, gathered from a multitude of sources, to ease traffic congestion and improve the efficiency of road networks through evidence-based urban and transport planning.

In Melaka the GFCP is developing a Green Transport Masterplan consists of a Green Bus Network Implementation Plan and an Integrated Mobility Plan for the Heritage Area which will enable the city to implement an infrastructure and mobility system which promotes sustainable travel.



# SPOTLIGHT ON THE **DEPARTMENT FOR INTERNATIONAL TRADE**



### Department for International Trade

The Department for International Trade (DIT) aims to secure UK and global prosperity by promoting and financing international trade and investment and championing free trade.

DIT is the specialist government department that supports:

- Foreign companies seeking to set up or expand in the UK, and
- UK-based companies to trade internationally.

The Department provides a fully integrated advisory service, delivering the latest business intelligence through a global network of commercial teams worldwide.

DIT works in close partnership with investment and economic development agencies in England, Scotland, Wales and Northern Ireland to help overseas companies to maximise their business objectives in the UK.

# FOR MALAYSIAN COMPANIES INTERESTED IN SMART CITY PRODUCTS AND SERVICES

We can help Malaysian companies to connect to the UK companies through our network of trade specialists from the Technology & Smart Cities Team.

#### This includes:

- Identification of possible business partners
- Information on UK Technology and Smart Cities
- Support during visits to the UK.

# FOR UK COMPANIES INTERESTED IN THE MALAYSIAN MARKET

DIT has trade specialists who can help you commission services from local experts overseas.

#### This includes:

- · Country and sector advice
- Local market research
- Support during overseas visits
- Identification of possible business partners
- Preparation for exhibitions and events.

# FOR MALAYSIAN INVESTORS INTERESTED TO INVEST IN THE UK

DIT will provide you with dedicated, professional assistance on locating and expanding your business in the UK.

DIT and our regional partners offer free, confidential and tailored support across a number of key areas:

- Links with centres of excellence (e.g., universities)
- Information on tax, regulatory and business planning issues
- Information on financial incentives if applicable
- Information on staff recruitment
- Site and Property Search assistance
- Building key contacts—we can provide introductions to service providers; local, regional and national government; and trade organisations
- Aftercare through on-going support
- Maximising your global potential—once you are established in the UK, we can help your company to take advantage of new business opportunities and branch out to new locations both in the UK and overseas.

# **ACKNOWLEDGEMENTS**

Smart City Handbook: Malaysia would not have been possible without the generous contributions from Malaysian and UK stakeholders, including both national and local government, private organisations, academia and associations.

In particular, special thanks go to the Malaysia's Ministry of Housing and Local Government (KPKT) for their time, insights, and kind support in developing this handbook.

Thank you to the public stakeholders in Malaysia that participated in expert interviews, including representatives from the Ministry of Transport, Iskandar Regional Development Authority, PLANMalaysia, Kuala Lumpur City Hall, Penang State Government, Melaka State Government and Sarawak Multimedia Authority.

Thank you to the public stakeholders in the UK that participated in expert interviews, including representatives from the Innovate UK, Connected Places Catapult, Greater London Authority, Bristol City Council, Oxfordshire County Council, UK Export Finance and FCDO. Thank you to the representatives from MiGHT, Urbanice, Intelligent Transport System Association of Malaysia, British Chamber of Commerce Malaysia, Sunway iLabs, UEM Sunrise, Cyberview, YTL Corporation DoctorOnCall, British Standards Institution, Mott MacDonald, Arup, UK Built Environment Advisory Group, Global Future Cities Programme, World Bank and The Grantham Institute for Climate Change.

Thank you to the academics and experts that contributed expert opinions from Sunway University, Universiti Sains Malaysia, Universiti Kebangsaan Malaysia, Penang Skills Development Centre and Universiti Teknologi Malaysia.

The project team expresses its sincere appreciation to everyone mentioned above for their invaluable contributions to the successful development of this handbook.

# ABOUT ARUP AND THINK CITY

Arup and Think City were commissioned by the FCDO for the research and production of this handbook.

Arup is a globally renowned and independent firm of designers, economists, planners, management consultants and technical specialists working across every aspect of today's built environment.

Think City is a city-making impact organisation providing urban policy thinking, management and implementation of urban solutions to make cities more people-friendly, resilient and liveable.

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# **HOW TO USE** THIS HANDBOOK?

### WHO IS THIS HANDBOOK FOR

This handbook is for anyone who is learning to better understand how to approach smart city development in Malaysia. Any actor in the smart ecosystem mentioned on page 18 might do well by simply using it as a starting point. For city leaders and planners, it can augment their decision-making process for digital transformations in cities. For private companies and service providers. it can help identify opportunities by anticipating future needs of city users. For citizens, it can reveal what is possible. shape demands, and inspire ideas. For UK companies and organisations, it can lead to local partnerships that require knowhow in the Malaysia smart city sector.

# WHAT INFORMATION WILL BE FOUND IN THIS HANDBOOK

The first chapter is a primer on smart cities and provides the lens by which the rest of the handbook should be viewed. The second chapter is a summary of the current state of smart city development in Malaysia, the major stakeholders, and mechanisms for building towards smarter cities. The following chapter provides a look into major smart city initiatives that are ongoing or upcoming in Malaysia and seven key urban regions and cities.

This provides a glimpse into the various types of commercial and partnership opportunities that are possible between Malaysian and UK stakeholders.

Finally, the last chapter provides an overview of the UK's own smart city journey and strengths revealing how they can support Malaysia's smart city ambitions.

### THIS HANDBOOK DOES

Provide foundational understanding: While smart city concepts and developments evolve, the pillars on which they are built will most likely withstand the test of time. This handbook provides the reader with a solid base to reach from.

### Encourage critical thinking in planning:

This handbook provides an overview of where Malaysia and the UK are in the smart city development trajectory. This is meant to support critical thinking in the process of strategising and planning for smart city initiatives. Readers can derive the path forward and build a flexible roadmap that is each unique to them.

**Urge exploring connections:** Almost every entity mentioned in this handbook is open to exploring potential partnership

opportunities. The reader is encouraged to use this handbook as a resource to build the vital relationships needed to build a smart city.

### THIS HANDBOOK DOES NOT

Give the be-all and end-all knowledge: This handbook does not provide a finality in smart city concepts or developments. It shows the most current and applicable information that can help the reader support smart cities in Malaysia.

### Prescribe rigid steps and instructions:

Each city must identify their bespoke needs and create a smart city vision and roadmap to meet them. The hope is this handbook will help inspire readers and stakeholders with ideas about smart city approaches and potential partnership opportunities to effectively achieve their own unique vision.

### Contain an exhaustive list of contacts:

While specific entities are highlighted in this handbook, they are not meant to be an exhaustive list of all the actors involved in both Malaysia and the UK.

# HANDBOOK OUTLINE



# CHAPTER 1 THE SMART CITY OPPORTUNITY



CHAPTER 2
SMART CITIES IN
MALAYSIA

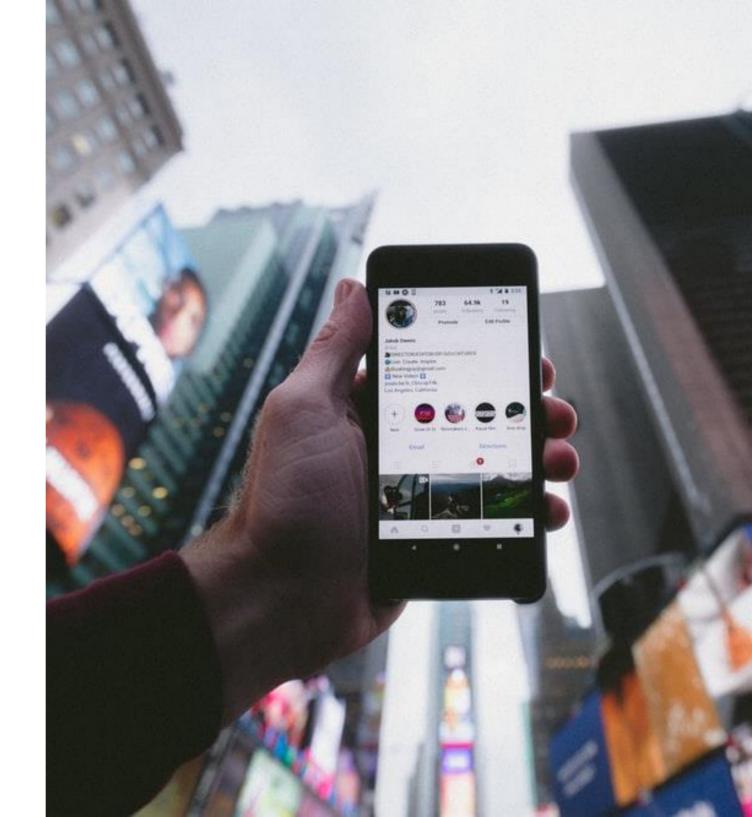


SMART CITY
DEEP DIVE MALAYSIA





While the concept of a Smart City is fundamentally related to technology, the outcomes it achieves can alleviate urban challenges and lead to more sustainable and liveable places. There are a range of Smart City models, actors and technologies and every city customises these to their unique needs.



# WHAT IS A "SMART CITY"?

There are multiple, and sometimes conflicting, definitions of what a Smart City is.

IBM sees a smart city as "one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimise the use of limited resources." 1

McKinsey defines smart cities as those which "add intelligence to the urban world and use it to solve public problems and achieve a higher quality of life."<sup>2</sup>

The most often used definition is put forward by the international industry coalition, the Smart Cities Council, which defines a Smart City as one "that uses information and communication technology (ICT) to enhance liveability, workability, and sustainability." 3

All definitions have one element in common. They agree that Smart Cities, at the core, leverage new and disruptive technologies to address a broad range of urban problems. Yet, what these problems are differ from definition to definition; some believe that Smart City problem statements only encompass public services and public goods, while others believe they encompass all aspects of a citizen's life, including shopping and entertainment for example.

While technology is at the core, the idea of a Smart City is not new. Los Angeles created the first urban big data project in the 1970s. **Amsterdam created a virtual digital city as early as 1994.** However, it is was only when the large companies IBM and Cisco, soon followed by many others, launched distinct Smart City initiatives that the movement accelerated.

In the year that followed IBM's 2008 "Smarter Planet" initiative, multiple cities around the world embarked on digital transformation journeys, and virtually all major technology companies – from Google to Huawei – developed or applied their technologies to the mission of helping cities become smarter.

Whilst it is impossible to quantify how many "smart cities" are under development today, it is reasonable to believe that **there are several hundred cities worldwide with large-scale digital transformation programmes,** and thousands more driving specific initiatives.

A Smart City is "[a city] that uses information and communications technology to enhance liveability, workability, and sustainability"

— Smart Cities Council



# THE SMART CITY OPPORTUNITY UNDERSTANDING SMART CITIES

# WHY THE INTEREST IN SMART CITIES?



RISING URBAN CHALLENGES



RESOURCE LIMITATIONS



TECHNOLOGICAL BREAKTHROUGH Rapid urbanisation is placing increased pressure on limited resources and infrastructure, while climate change and cyber threats add new risks and uncertainties

To address these challenges and provide ever deeper public services, governments and cities are constrained by limited fiscal resources and influence

Meanwhile, a number of breakthroughs have delivered **powerful technologies** that are redefining the ways in which cities operate, and people live, work and socialise

# SMART CITIES AROUND THE WORLD

Not all countries approach Smart Cities the same way. Three main models of Smart City development and implementation prevail from which countries and cities favour, based on their socio-economic development strategies, regime and political landscape.

### SAMPLE OF SMART CITIES WORLDWIDE



### **COMMERCIAL MODEL**

Commercial smart city projects are focused on services and technologies that can be implemented in the near term, at low cost, to help sell property and generate positive financial returns for property developers. This model is particularly prevalent in North America alongside other low to high middle-income countries experiencing rapidly growing premium real estate markets.

### CIVIC MODEL

Civic smart city models rely on civil society, public participation and grassroot innovation. They often involve a myriad of small initiatives that cater to the needs of selected communities and interest groups, and harness deep innovation for the service of public good. This model is particularly prevalent in Western Europe.

### INSTITUTIONAL MODEL

Institutional smart city models are top down driven by national or municipal governments as part of institutionalised smart city strategies. They are usually aligned to well defined political agendas, and involve a high level of government participation. This model is particularly strong in selected Southeast Asian countries and Western Europe.

# KEY SMART CITY **TECHNOLOGIES**

For decades, technology has played an important role in several elements of smart cities. Technologies that automate lighting and HVAC, regulate traffic and public transportation systems, and manage resource delivery, are now commoditised and have become a staple of many buildings, estates, districts and cities.

However, the potential for technology to transform the way cities operate and the citizen experience, has dramatically increased in the past 10 years. Many disruptive technologies have emerged; from mobile technology to broadband, and from cloud computing / loT to social media; digital breakthroughs have placed technologies deeper into the core of everyday life.

Technology is no longer merely about reducing cost and improving efficiency, but also about profoundly transforming the way people live. As a result, new opportunities have arisen for technology to not only help building and estate operators optimise operations, but to also create unique experiences and generate data for decision making.



### INTERNET OF EVERYTHING

Network of sensors and connected machines (e.g., mobile phones, weather sensors, parking sensors) that allow city operators, businesses and users to gain a holistic and real time understanding of how cities operate.



### **AUGMENTED EXPERIENCES**

Technologies that bridge the gap between physical and digital worlds (e.g., interactive displays, augmented reality goggles), and can create unique experiences for citizens. These technologies can revolutionise how users experience public and private spaces and engage with government.



### ADVANCED ANALYTICS

Complex algorithms combined with big data platforms that can rapidly store and process vast volumes of data. Advanced analytics powers the intelligence behind many smart city solutions, from predictive maintenance to real time energy management systems.



### SOCIAL PLATFORMS

Mobile / cloud-based platforms that bring people together and enable real time collaboration. These platforms provide the tools that power bottomup innovation, enhance productivity of workers, but also strengthen social relationships and solve challenges through solidarity.

# MAIN SMART CITY **APPLICATIONS**

Technology now permeates through all potential aspects of a city, transforming it along three main lines:

### OPERATIONAL OPTIMISATION

A wide array of smart operational systems (e.g., smart traffic management, power plant and water treatment plant digitalisation, smart building systems and smart waste management systems) are making cities more efficient and less costly to manage.

### BETTER DECISION MAKING

Sensors and other forms of digital touchpoints provide a deeper real-time understanding of how cities operate, and people behave. The data generated by smart systems now empower decision makers at all levels – facility managers, transport operators, public health workers – with a wealth of data that can inform ever more precise, impactful and real-time decisions.

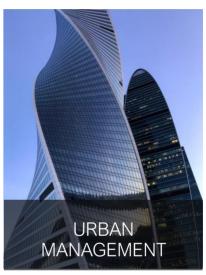
### **DELIGHTFUL & UNIQUE EXPERIENCES**

The combination of mobile technologies, interactive displays and enhanced visualisations (e.g., AR, VR) is creating new avenues for better customer and citizen experiences that not only enhance convenience and service accessibility, but also redefine the way urbanites experience physical spaces.

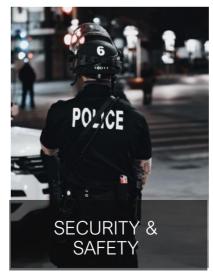
### ALL ASPECTS OF A CITY ARE IMPACTED







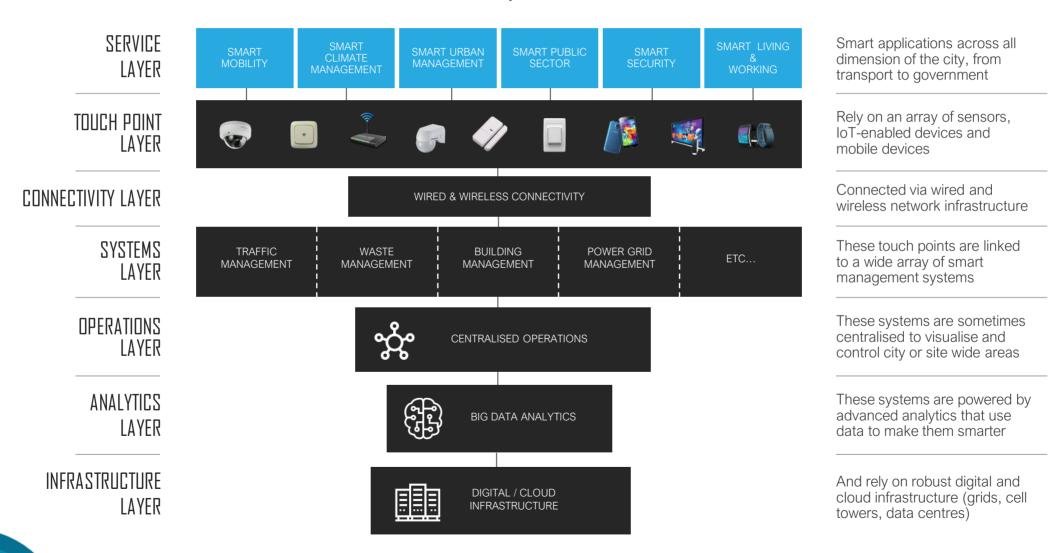






# SMART CITY'S **TECHNOLOGY LAYERS**

The key components of Smart City Technology can be understood as **seven interconnected layers** which, when combined, form the stack that allows smart city initiatives to come to life.



# THE SMART CITY **ECOSYSTEM**

# WHO ARE THE MAIN SMART CITY PLAYERS?

It is tempting to see the Smart City ecosystem as primarily the realm of national governments and large technology firms. However, the reality is far more complex. Smart cities involve a large number of players, from individuals to central ministries, from start-ups to the largest conglomerates. Every single one of these actors play a critical role, and a well-balanced smart city ecosystem must involve actors at all levels.

It is to be noted that, depending on the smart city model adopted (see page 14), certain actors will tend to play a more important role than others. In institutional models, for example, the central government plays a critical role in driving smart city efforts. In commercial models, the private sector tends to lead the way. In civic models, grassroots organisations, start-ups and individuals are at the source of many initiatives.

This does not mean, however, that in each of these cities the other actors do not have a role to play, and increasingly smart city models tend to be hybrids that involve efforts from all stakeholders, big and small, public and private.



## CENTRAL GOVERNMENT

Sets the vision, regulates, facilitates and procures



### NATIONAL REGULATORS

Define the key standards and regulations



## SPECIFIC ORGANISATIONS

Deploy smart systems across their domain of action (e.g., transport)



### LOCAL GOVERNMENT

Set local vision, procure and deploy at a local level

# PRIVATE OR SEMI

PUBLIC

## LARGE TECH VENDORS

Provide hardware, software and services to enable smart city



### UTILITIES & TELCOS

Deploy connectivity networks and smarten utility provision



### PUBLIC & PRIVATE INVESTORS

Provide the financing for development and implementation



#### TECHNOLOGY START UPS

Provide deeper / more specific innovation and services





## ACADEMIC INSTITUTIONS

Conduct fundamental and applied urbanrelated research



### SMART CITY THINK TANK / CENTRES

Conduct research specifically focused on smart cities



### GRASSROOT ORGANISATIONS

NGOs and other associations relevant to smart cities



### PRIVATE INDIVIDUALS

Consumers, but also at the source of smart city initiatives

**CENTRAL / LARGE** 

LOCAL / SMALL

# HOW TO **PAY FOR** SMART CITIES?

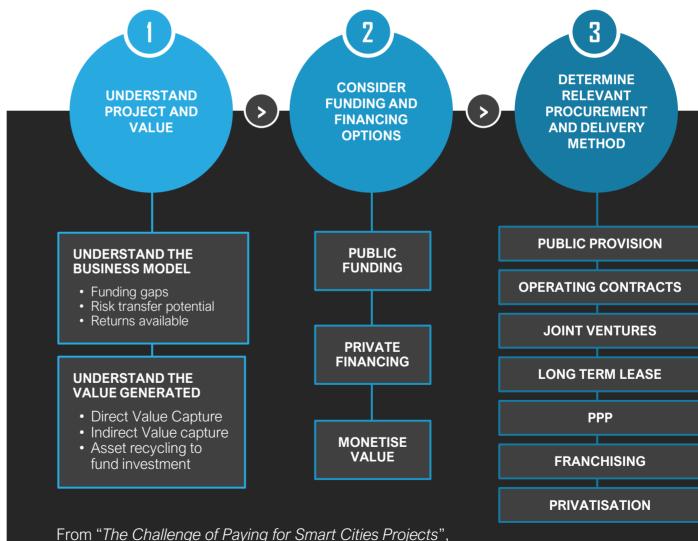
One of the biggest challenges of smart city implementation is to ensure that digital initiatives are financially sustainable in the long run, either through the use of public funds or through revenue channels generated by the developers of smart cities. This equation is often difficult to reconcile as smart city initiatives can be expensive to deploy and maintain and have a public service focus.

Deloitte, 2018

Smart city projects can be capital intensive (as some may require heavy digital and physical infrastructure), but also because the operational expenses of running and updating systems / platforms can be high.

As such, many smart initiatives often struggle to find financing to cover capital expenditure and may not generate sufficient long-term revenues to cover their operational costs. The problem is all the more acute where cities are facing financing gaps that limit their ability to finance smart city projects on their own. Designing business models that ensure financial sustainability is – more often than technology – the real difficulty that holds ambitions back.

In its report "The Challenge of Paying for Smart Cities Projects", Deloitte<sup>4</sup> lays out a simple three-step approach for cities to design and deliver successful smart city models. This approach is summarised in the visual to the right.



# SMART CITIES IN **SOUTHEAST ASIA**

Most of the smart city success stories in the Southeast Asia region tend to be limited to specific public sector initiatives (such as traffic enforcement systems and egovernment transformation), and a flurry of private sector driven real estate development that leverages smart technologies in premium residential and commercial buildings to differentiate their estate.

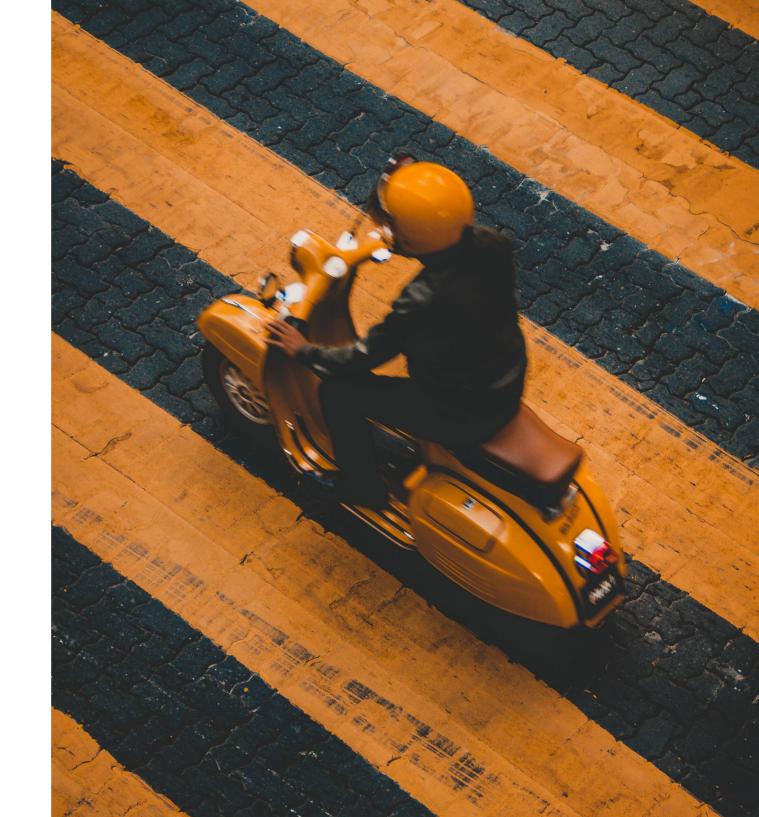
In the region, Singapore is one of the smartest cities in both Asia and globally where the Smart Nation programme has been successful. Outside of Singapore, however, the situation varies. Whilst Jakarta Smart City was established in 2015, to the Philippines that introduced its ICT Roadmap as early as 2006, implementation remains fragmented, and few cities in Southeast Asia have seen their Smart City and ICT plans being fully implemented on the ground.

These efforts aside, the story of Smart Cities in Southeast Asia is still being written.





For decades Malaysia has been growing rapidly, and urbanisation will only continue to increase. Key priority areas have been identified to address urban needs across Malaysia's states and municipalities, and to chart sustainable and prosperous growth over several years.



# MALAYSIA'S KEY URBAN PRIORITIES

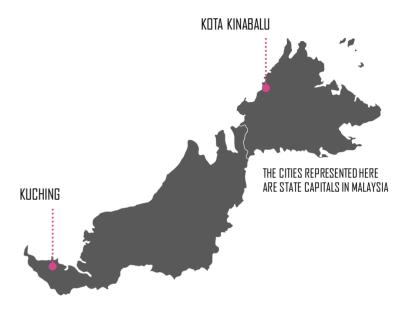
# URBAN MALAYSIA HAS EXPERIENCED RAPID GROWTH IN THE PAST 20 YEARS

Malaysia has 13 states and three federal territories. It is an upper-middle income economy with a projected GDP growth rate of between 6-7.5% as predicted by the Bank Negara Malaysia. Oil and gas, manufacturing, and agriculture represent the largest economic contributors for Malaysia.<sup>5</sup>

According to the World Bank's World Development Indicator (WDI), around 78% of the Malaysian population live in urban areas;<sup>6</sup> concentrated in large cities such as Kuala Lumpur, Penang, Johor Bahru and Melaka. These areas contain major economic activities such as commerce, industry, and services including tourism, finance, and education. These cities are hubs for the digital economy, knowledge-based industries, scientific and technological research, alongside arts and culture.

Opportunities in cities also bring significant migration from rural areas, leading to an increased need for resources, land, infrastructure and essential services provision. The enhanced stress on cities will only exacerbate as the urbanisation rate is expected to increase to up to 88% by 2050.<sup>7</sup> This presents significant challenges to urban planning and



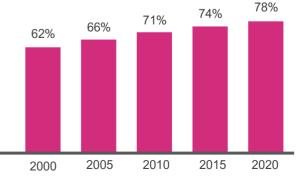


resource management, whilst ensuring Quality of Life for urban citizens.

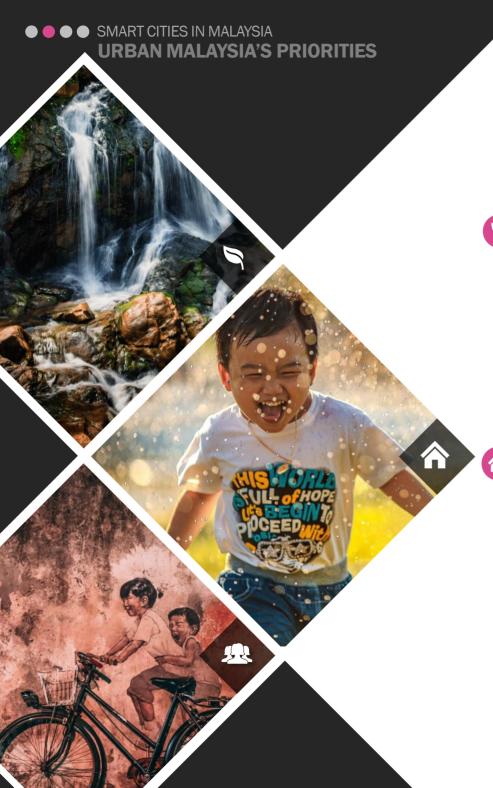
The country is ambitious about growing its economy and successfully addressing its urban challenges. This means finding innovative yet sustainable methods to deliver on key urban priorities, from environmental management to meeting transportation needs that ensures growth and prosperity for its citizens.

MALAYSIA POPULATION<sup>8</sup>
32.7 MILLION IN 2021
36.1 MILLION BY 2030

# As of 2020, nearly **78% of Malaysia's total population** live in urban areas



MALAYSIA'S URBANISATION RATE
(% OF TOTAL POPULATION)
Work Bank's World Development Indicator (WDI)



# THE FUTURE OF URBAN MALAYSIA HINGES ON SEVERAL KEY PRIORITIES

Malaysian cities have started developing responses to urban needs and challenges. These can be understood as the key priority areas described below.



### **ENVIRONMENT**

To strike a balance between urbanisation related sprawl and natural environment, adding and conserving green spaces is an emerging priority. Environmental preservation also supports the management of climate-related risks such as flash floods and landslides.

Addressing issues of air and water pollution resulting from traffic congestion, rapid development and fragmented waste management systems is also an environmental urban priority.



### **LIVEABILITY**

Malaysia has made impressive achievements in poverty reduction and increasing Quality of Life for its citizens. There is no food scarcity, education and healthcare are of a high quality, and there is a growing middle class with disposable incomes – particularly in cities.

The focus of liveability related interventions is now on enhancing inclusivity of vulnerable groups, managing access to affordable housing and streamlining healthcare services. Another related priority is about enhancing security in high density areas.

For example, encouraging social integrity that creates positive influences for crime prevention.

The demographic profile of Malaysia is also changing from a young nation to an aging one. A key priority to increase liveability for the future would be to focus on the healthcare needs of Malaysia's citizens, and to transform urban areas so they adapt with changes in social profile.



#### **PEOPLE**

The wider adoption of digital education and e-learning processes is critically important for the growth of any society and economy as it translates to new ways of working and the readiness for new technologies and industries.

Equipping citizens with future-ready skills, and supporting them to embrace technology, will contribute to a quicker transformation to a digital economy. It is therefore important for Malaysia to ensure that communities have the right educational and awareness tools that will prepare them for a transforming economic landscape.

Also, there is a related priority around ensuring citizen adaptability to new technologies, as well as facilitating widespread adoption of digital solutions. This will ensure that citizens are empowered and have better opportunities to grow and enrich their lives with digitalisation and technology.



### **ECONOMY**

Malaysia is ranked 27th in the Global Competitiveness Index 4.0 (World Economic Forum, 2020)9. It's economy has remained resilient amid the Covid-19 pandemic due to the strength of domestic activities and its exports. While prospects appear positive, with the economy still projected to grow by 7% in 2021 (World Bank, 2020)<sup>10</sup> on the strength of professional services and manufacturing sectors, Malaysia's longterm economic growth will largely depend on the transition to high-value industries. It is also a priority to focus on IT as a catalyst for innovation and social enterprise, and to grow the digital economy – an area which is estimated to be a significant contributor to the country's GDP at 22.6% by 2025.



### **DIGITAL INFRASTRUCTURE**

The digital economy is closely tied to overall economic development. Infrastructure, and implementation of digital infrastructure, has been a central factor in Malaysia's recent fast-paced socio-economic growth, especially in urban areas. It is essential to ensure that quality and quantity of basic digital infrastructure is consistent throughout the country. Building digital resilience, addressing connectivity and penetration issues, as well as tackling cyber security threats, remain high on the digital transformation agenda.



### GOVERNMENT

Developing a solid evidence-based pathway and structure for delivering sustainable actions are some of the focus areas for urban planning and service delivery. To do this, it is essential for Malaysia to set clear frameworks. There are opportunities for federal, state and local governments to coordinate efforts to address urban needs by enabling clear dissemination of data and information. Improving e-government service standards while strengthening public and governmental communication and addressing data fragmentation, are key emerging priorities.



### **MOBILITY**

Malaysia's urban transport systems have seen significant improvements over recent years owing to investments in modern infrastructure and policy changes that have addressed urban accessibility needs.

To address emissions reduction targets and low-carbon transitions, there remains ample opportunity for Malaysia to focus on improving new transport networks and encouraging the use of public transport. For example, Malaysia still has the 2<sup>nd</sup> highest private car ownership according to ASEAN Statistics Division (2020).<sup>11</sup> This presents a pressing need to ease traffic congestion alongside encouraging low-carbon mobility solutions.



# MALAYSIA'S **GROWTH ASPIRATIONS**

In the past decade, Malaysia has taken significant steps in advancing its economy yet doing so sustainably. Malaysia aspires to set a solid foundation for future development whilst addressing urban priorities.

### ► REDUCTION OF CARBON EMISSIONS

Since the submission of nationally determined contributions (NDCs), Malaysia has developed and issued several important policy responses on climate change. A significant number of actions have been taken to reduce Greenhouse Gas (GHG) emissions in the energy, transportation, agriculture and waste sectors, complemented by strengthened education and communication on climate change. Greener behaviour is also having an impact at a community level. Malaysia has also made a commitment to reduce, by 2030, its CO2 emissions per unit of GDP by 45% from the 2005 baseline levels, a target that it hopes to achieve within the next decade. 12

### INVESTMENTS IN RENEWABLE ENERGY

Malaysia has made significant leaps in terms of renewable energy development. The solar capacity of the country has increased despite the pandemic and global supply chain disruptions. The Generative Development Plan (2021– 2039) includes the strategic roadmap to support the government's aspirations in achieving a 31% Renewable Energy target in the national installed capacity mix by 2025 and 40% by 2035<sup>13</sup>. In May 2020 the Malaysian government opened a 1Gigawatt (GW) tender for solar projects under the fourth round of its Large-Scale Solar procurement programme, setting a clear path toward greening its energy mix 14

### RISING ECONOMIC COMPETITIVENESS

Industrial production in Malaysia rose by 1.2% year-on-year in January 2021, well above market consensus of a 0.7% gain. 15 In 2020, it ranked 23rd out of 152 countries in the United Nations Industrial Development Organisation (UNIDO) Competitive Industrial Performance (CIP) Index, illustrating the county's industrial competitiveness. 16 The country has stepped up efforts in digital transformation to improve competitiveness and business efficiency by applying digital and automation technology to production and business activities, including IoT enabled automation, supply chain digitisation and predictive maintenance.



### UK SUPPORTS MALAYSIA'S SUSTAINABLE GROWTH

UK is a strong partner and avid supporter of Malaysia's advancement. Notable collaborations include Global Future Cities Programme partnership with Iskandar Malaysia and Melaka to develop smart sustainable mobility systems, UK Global Better Health Programme and Ministry of Health (MOH) collaboration on disease prevention, UK-Malaysian businesses coming together through the Newton-Ungku Omar Fund to develop green data centres, and UK's Government Digital Service (GDS)'s work with several Malaysian stakeholders on digital standards and digital delivery capability building.

Malaysia has issued specific action plans and agendas to realise the key policy objectives laid out in the 12<sup>th</sup> Malaysia Plan (2021-2025) and other strategic documents. Here are some of the key objectives that the Malaysia government has set for the country's growth.

## ву 2025

- 22.6% of digital economy to Malaysia's GDP, MyDigital<sup>17</sup>
- > 30% of labour productivity growth, IR4WRD<sup>18</sup>
- 100% of civil servants to be digitally literate, MyDigital
- 100% of e-payment service from public sectors, MyDigital
- 80% end-to-end online government services, MyDigital
- 80% of government data on cloud storage, MyDigital
- 50% of machine-readable government data, MyDigital
- 35% of high-skilled workers in labour force, IR4WRD
- > 50% of manufacturing contribution to GDP, IR4WRD
- 100% of 4G coverage in populated areas, JENDELA<sup>19</sup>
- 30% of green manufacturing sector growth, GTMP<sup>20</sup>
- 31% of renewable energy mix, Generative Development Plan<sup>13</sup>

# ву 2030

- End-to-end online government services to 85%, MyDigital
- GHG emissions in energy reduce by 45%, GTMP
- Increase productivity for all sectors by 30% MyDigital
- Cyber security and crime awareness to 70% MyDigital
- Proportion of renewable energy to 40% *GTMP*
- Increase green manufacturing sector by 50% GTMP
- Public transport modal share to 40% NLPTMP<sup>21</sup>
- Increase building sector recycling rate to 28% GTMP

### HOW CAN SMART CITIES HELP ACHIEVE THESE?

The quoted documents- MyDigital, IR4WRD, JENDALA, GTMP, Generative Development Plan and NLPTM are cited in the List of References.

SMART CITY HANDBOOK: MALAYSIA

There is significant opportunity for Malaysia to address urban priorities and to ensure a better quality of life for its urban populations through smart cities. Its Smart City journey has spanned over three decades and is now gaining momentum with its strong push towards digital transformation.



# ESTABLISHING THE **SMART CITY AGENDA** IN MALAYSIA

### MALAYSIA JOURNEY TOWARDS SMART CITIES STARTED IN THE 1990s

The transition of Malaysia towards a digital society goes back as early as the 1990s with the National Information Technology Agenda (NITA).<sup>22</sup> The focus was to develop talent, infrastructure and application to bring about societal and community benefits. The implementation of e-government was subsequently launched with the establishment of the Multimedia Super Corridor in 1996, which aimed to attract the multimedia industry to agglomerate local and international skillsets.<sup>22</sup> Cyberjaya's positioning as a Global Technology Hub was then established to complement these activities.

The foundation for ICT development was strengthened with the establishment of the

Malaysia Information Communication and Multimedia Service 886 Blueprint in 2005.<sup>23</sup>

The National Strategic ICT Roadmap in 2008 introduced a national framework for development of new ICT-based and knowledge-intensive industries, which catalysed Malaysia's smart city journey.<sup>24</sup>

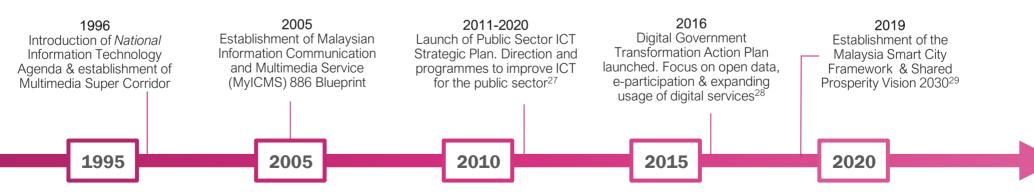
In 2014, Iskandar Malaysia (Economic Corridor) was endorsed as the first smart city model in Malaysia based on 6 indicators: Smart Economy; Smart Governance; Smart Environment, Smart Mobility, Smart People and Smart Living into a Smart City Iskandar Malaysia in line with Giffinger's six Smart City components.<sup>25</sup>

The government acknowledged that the demand for smart city development had

increased significantly over the years with many entities, both public and private, pushing for a targeted development strategy. In 2018, the Ministry of Housing and Local Government conducted a series of engagement for local governments on three levels (district, municipal, city councils) in terms of their understanding of "Smart Cities".

The engagement led to the formulation and launch of the **nationwide Malaysia Smart City Framework (MSCF) in 2019,** with an objective to streamline and coordinate the development of smart cities in Malaysia.<sup>26</sup>

The 2019 MSCF is set to be incorporated into the 12<sup>th</sup> Malaysia Plan for the period 2021-2025.



All documents are cited in the List of References

# SMART CITY **STRATEGIES & POLICIES**

### AMBITIONS ARE EMBODIED WITHIN KEY POLICIES & STRATEGIES

The emergence of smart cities in the national development agenda has positively impacted urban development policy and planning. Recent national strategies identify ICT development, Industry 4.0, technological innovation, e-governance, and digital transformation as key focus areas.

These strategies affect national-level decision-making and are translated into blueprints and action plans at both state and local (city, municipal and district council) levels.

It is worth noting that not all policies relevant to smart cities are technology focused. Many policies involve socioeconomic and sustainable development planning that influence and guide smart city agendas and programmes. Others direct foundational infrastructure to be placed, enabling digital transformation. Some governmental documents facilitate key enablers for transformative growth, such as encouraging innovation or ensuring cybersecurity. In this handbook, several such key documents have been identified.

# STRATEGIC DOCUMENTS FALL IN THESE THEMATIC AREAS



### **SOCIO ECONOMIC DEVELOPMENT**

Existing national plans involve the implementation of major quidelines and policies that lay the socio-economic growth direction, and the key levers which include the achievement of a high quality and effective workforce, natural resource management, boosting infrastructure, and the coordination of ministries. These guidelines, at a high level, define the outcomes that smart city developments seeks to achieve.



### SUSTAINABLE DEVELOPMENT

The government has established strategies in tackling climate change, and in emphasising the importance of green growth. These strategies tackle disaster management, resource management, and greening of industries. These climate-conscious goals are part of the considerations in developing smart city solutions.



### ('A') DIGITAL INFRASTRUCTURE

The government is eager to improve its connectivity infrastructure with initiatives that encompass telecommunications. data sharing, and 5G development. This aims to build a robust foundation for Malaysia's digital economy and support progress towards a technologically advanced society.



### SMART CITY DEVELOPMENT

Smart city development plans put forth the framework where technology can be effectively used to achieve socioeconomic and environmental outcomes Many plans address enablers or specific cases, such as mobility and governance. These mandates generally involve topdown multi-ministry / department decision-making.



### **INNOVATION & INDUSTRY 4.0**

Malaysia has made ambitious plans to transition towards the 4th industrial revolution, through technologicallydriven change. Ministries have outlined concrete infrastructural, human resource and industry-based plans and programmes that will work in synergy with smart city solutions.



### **CYBERSECURITY**

Cybersecurity regulation has been a big focus of the government in recent years. Plans have been put in place to prevent the abuse of personal information, as well as access to illegal content. The government has also developed an emergency response plan in the case of a major cybersecurity breach.

### KEY STRATEGIC DOCUMENTS & PLANS RELEVANT FOR SMART CITIES IN MALAYSIA



- Shared Prosperity Vision 2030
- 12th Malaysia Plan (2021-2025)



- Environmental Quality Act 1974
- The Green Technology Master Plan (2017-2030)
- Communications and Multimedia Act 1998



- Guidelines on Digital Assets 2020
- National Digital Network Plan (2020-2022)
  - Malaysia Digital Economy Blueprint (2021-2030)
  - The Science & Technology Foresight Malaysia 2050 (ESET Study)
  - The National Science, Technology and Innovation Policy (2021-2030)



- National Automotive Policy 2020
  - Industry4WRD: National Policy on Industry 4.0 (2019-2025)
  - MOSTI's 10-10 Malaysian Science, Technology, Innovation and Economic (MySTIE) Framework
  - Malaysia Smart City Framework (2019-2025)
  - MCMC(t)13-tdd/170/001 jld.1 (01) Framework on Smart Cities Standardisation in relation to ICT aspects



- Digital Government Transformation Action Plan (2020-2030)
- Malaysia Intelligent Transport System Blueprint (2019-2023)
- National Transport Policy (2019-2030)



- Personal Data Protection Act 2010
- Cyber Security Strategy (2020-2022)

### UNIDERSTANDING VARIOUS STRATEGIC DOCUMENTS

There are several types of strategic documents that determine national actions, stakeholder roles as well as impact on urban development and planning.

Framework documents provide a structure around which urban issues and aspirations can be systematically addressed by various stakeholders and strategic partners based on their mandates. Notable among these is the MSCF framework in relation to Smart Cities and urban transformation.

Plans and blueprints are formulated as guidelines for positive changes in day-to-day operations in federal, state and local governments to increase efficiency.

Policies represent ratified actions as well as government commitment toward a set of identified outcomes.

Finally, **legislation** is among the most important of instruments for government to transform policies and plans into legally defined obligations for the greater good of the economy, society and environment.

Key documents are described in the following pages.

<sup>\*</sup>Policies and plans presented here are not an exhaustive list

# SPOTLIGHT ON MALAYSIA SMART CITY FRAMEWORK

2019 FRAMEWORK FOR SMART SUSTAINABLE CITIES

### WHY IS IT IMPORTANT?

Developed by the Ministry of Housing and Local Government (KPKT) the Malaysia Smart City Framework is a detailed plan to develop smart cities including forming government structures for smart city project initiatives. The plan will form guidance for Malaysia's pilot cities across states and regions, formulated to address urban challenges arising from rapid urbanisation, meet national and global agendas, adopt new global development trends, promote digital economy and position Malaysian cities to be at par with other cities globally.

The framework will position smart cities as the new approach in urban management and to make Malaysia's cities more sustainable and liveable.

### MSCF's GUIDING PRINCIPLES FOR SUCCESSFUL SMART CITIES

- Comprehensive primary and basic infrastructure should be in place to meet the requirement for smart city development. Basic infrastructure refers to the fundamental physical facilities and systems serving a city, such as electrical grids, telecommunications, water supply, sewers, roads, bridges, and tunnels
- Connected and modern digital infrastructure: a smart city works on the concept of integration, and to help cities correlate data from multiple sources to generate new value and efficiencies
- Initiatives aligned with the needs of the city based on identified urban challenges, e.g., government efficiency, sustainability, health and wellness, mobility, economic development, public safety, and quality of life
- Strong political will with support from different levels of government to have a common vision when it comes to securing budget and prioritisation of smart city projects
- Engage broad community of innovators with combination of top-down and bottom-up approaches to enhance communication between the private and public sectors as well as the community

- Master polices and synergistic partnerships to foster and smoothen the process for public and private partnerships
- Government data sharing (nonpersonal and non-sensitive) between government and citizens through open data platforms
- Data and information protection to boost confidence of stakeholders in using smart solutions with robust projection strategies
- Low carbon city and green lifestyle solutions to reduce carbon emissions within districts and cities
- Gender empowerment and inclusivity of vulnerable groups to balance the decision-making process
- Community empowerment through open data and solutions to ensure room for communication between all levels of government and community.

# THE **SMART CITY ECOSYSTEM** IN MALAYSIA

Malaysia has a rich ecosystem that involves stakeholders across national and local governments, private sector, academia and civil society. The diagram below provides an illustrative – though not exhaustive – representation of that ecosystem.

### NATIONAL GOVERNMENT

National Ministries play a key role in outlining regulations, frameworks and setting the national agenda for smart city development. Includes:



Agencies / Authorities













### PRIVATE SECTOR

Provides Smart City technology and services, while leading key private smart city projects, and digitally transforming entire sectors. Includes:

- Technology Vendors
- Conglomerates
- Real Estate Developers
- Carriers





















Local governments formulate curated smart city strategies and play a key role in sourcing, tendering and implementing smart city projects. Includes:

- City Councils
- Local Departments
- Local Operators
- Local Agencies























Plays a growing role in developing centres of excellence, sharing best practices, fostering coordination and facilitating smart city financing



- Research Centres
- Associations
- Networks











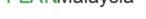














### MALAYSIA'S NATIONAL GOVERNMENT AND ITS KEY MINISTRIES AND ROLES

Like the UK, Malaysia is a constitutional monarchy with government administration divided into three levels: federal, state, and local. Representatives at the federal and state levels are appointed democratically, whereas at the local level, representatives are typically appointed by the state government. Malaysia's federal territories, comprising Kuala Lumpur, Putrajaya, and Labuan, are an exception as they do not have state-level governments. Instead, they are under the ultimate purview of the Ministry of Federal Territories that manages their local government.

In terms of spurring the digital economy, several ministries work in tandem. Among those are the Ministry of Science, Technology and Innovation, the Economic Planning Unit, the Ministry of Finance and the Ministry of International Trade and Industry. There are over 20 ministries in Malaysia at the federal level and of those, two play a leading role in jointly addressing the Smart City agenda. These two ministries are overviewed in the boxes to the right and are also well-placed to act as facilitators to ensure that policies and legislation at the federal level are cascaded to the states and local governments.



KPKT's primary objectives are to assist local authorities in providing municipal services, help provide adequate housing for all citizens, efficient fire and rescue services, and the management of the Town and Country Planning Act 1976.

The ministry oversees federal departments and agencies, and 155 local authorities. Key smart city players under KPKT are:

PLANMalaysia – an agency that plays a key role in managing the ideal use, development, and conservation of land. They are advisors to the federal, state, and local governments on all planning matters relating to the use and development of land. It is also the agency that is assisting KPKT in setting standards for Smart Cities with accreditation and benchmarking processes, while driving the Malaysian Urban Observatory (MUO) which is a national level urban data platform.

Urbanice – a think tank under the ministry's purview acting as a centre of excellence for sustainable cities and community well-being. Its main focus is to support the MSCF and assist local governments on smart city projects.



# MINISTRY OF COMMUNICATIONS AND MULTIMEDIA MALAYSIA (KKMM)

KKMM is the ministry that oversees the regulations established by the Malaysian Communications and Multimedia Act 1998. Two federal agencies of note under the ministry are the Malaysian Communications and Multimedia Commission (MCMC) and the Malaysia Digital Economy Corporation (MDEC)

Many national Smart City initiatives are being spearheaded by MCMC, including the nationwide implementation of 5G Demonstration Projects (5GDP) and the identification of a digital champion in at least one district in every state, known as the Smart Communities project. MDEC manages the nation's digital economy transformation and aspires to establish Malaysia as a regional digital powerhouse.

KKMM is the ministry that manages all ICT and digital economic-related infrastructure and technologies with the two agencies described above serving as are the driving force. They are at the forefront of establishing the national 5G taskforce, the National Fiberisation Connectivity Plan and ensuring that the communications and multimedia industry is competitive, efficient, increasingly self-regulating, and generating growth to meet Malaysia's economic and social needs.

# KEY NATIONAL GOVERNMENT ACTORS IN **SMART CITY DEVELOPMENT**



### MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION (MOSTI)

MOSTI promotes digital innovation. The National Science, Technology and Innovation Policy 2021-2030, launched in December 2019, describes an agenda to advance Malaysia to becoming a more competitive and competent nation by building upon a strong science, technology, and innovation foundation.



### ECONOMIC PLANNING Unit (EPU)

EPU is the government agency responsible for preparing national development plans. It established the Digital Economic Blueprint through a comprehensive study involving stakeholders from ministries, government agencies, civil society organisations, and the private sector to outline the strategies, initiatives, and targets that drive growth in the digital economy.



### MINISTRY OF ENVIRONMENT AND WATER (KASA)

KASA is responsible for ensuring that climate change priorities are incorporated into urban development using technology, relevant legislation and ICT. It also oversees the agency called Malaysian Green Technology Corporation (MGTC) or GreenTech Malaysia mandated to lead the nation in the areas of green growth.



# MINISTRY OF INTERNATIONAL TRADE & INDUSTRY (MITI)

MITI champions Malaysian industries' transformation as well as the development of investment and trade policies. MITI's Industry 4WRD framework established in 2018 emphasises the importance of Industry 4.0 for the manufacturing sector and its related services in Malaysia.



# MINISTRY OF TRANSPORT (MOT)

MOT governs all transport services, including road, civil aviation, and marine. It revealed in September 2020 that it will be regulating the use of micromobility services in Malaysia once the Road Transport (Amendment) Bill 2020 takes effect.



# MINISTRY OF FINANCE (MOF)

MOF's role is to develop economic policy with a focus on government expenditure and revenue raising. Under its purview, the National Bank (Bank Negara) developed the Financial Technology Regulatory Sandbox Framework 2016, which encourages experimentation of financial technology (FinTech) solutions.

# MALAYSIA'S PRIVATE SECTOR IS AN ACTIVE AGENT OF SMART CITY IMPLEMENTATION

Malaysian conglomerates, technology providers and real estate developers have been at the forefront of Smart City implementation for several years now.

They play two main roles:

1 SERVICE PROVIDERS

Smart city service providers primarily comprise technology companies who serve public and private smart city projects. A few large Malaysian companies dominate the market, with a primary focus – for technology vendors – on providing software (with the hardware typically provided by global technology firms).

2 PROJECT LEADERS

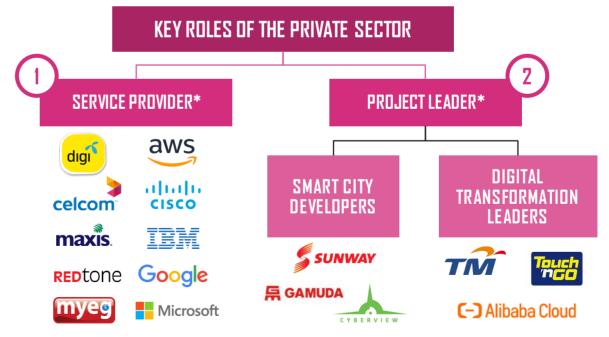
Project leaders encompass an array of private sector companies that initiate, procure, implement and often operate smart city projects as part of large developments or services they provide. These companies are behind some of the biggest smart city projects in Malaysia of late and are likely to remain critical actors of Malaysia's smart city future.

There are mainly two types of smart city project leaders in Malaysia, each with its own specific types of projects and smart city applications.

- Developers who focus on using technology to enhance smart buildings and resident experiences. For example, working in partnership with telecommunications providers to adopt IoT applications.
- Digital Transformation Leaders Several conglomerates have begun to leverage digital technologies to transform a series of public facing services they provide, spanning transportation, educational institutions, and healthcare.

# SNAPSHOT OF PRIVATE SECTOR SMART CITIES ACTIVITIES

- Alibaba Cloud is implementing the 'Malaysia City Brain' pilot project, using Artificial Intelligence (AI) and big data analytics for real-time traffic predictions.
- Cyberview, Cyberjaya's developer, has developed the city using its Cyberview Smart City Action Plan
- Tenaga Nasional Berhad (TNB)'s subsidiary, TNBX, plans to explore smart mobility through EV vehicles and use data analytics for Smart Grids and Smart Buildings. Other TNB subsidiaries include GSparx (Solar Panel/Renewables) and Maevi (Smart Home)



<sup>\*</sup>logos presented here are a sample and not an exhaustive representation of all private stakeholders

#### NATIONAL SMART CITY OVERVIEW

## ACADEMIA AND CIVIL SOCIETY PLAY A KEY ROLE IN KNOWLEDGE SHARING AND GROWING THE ECOSYSTEM

Academia and professional associations have an essential role to play in Malaysia's Smart City development. A Smart City relies on the deployment of technology and the cooperation of key actors, which in-turn requires skilled resources. Universities in Malaysia offer industry relevant courses and degrees to help equip the workforce with necessary skills. Beyond talent development, Smart City initiatives within academia are growing rapidly in four strategic areas: research and development, industry-academia collaboration, consultancy, and product commercialisation.

Professional associations often act as catalysts in the Smart City ecosystem. They facilitate and connect local and international entities to foster growth in their businesses, while assisting policymakers in developing regulation, standards, guidelines, frameworks and roadmaps for smart city-related developments.

Academia and professional associations often conduct workshops and seminars to promote smart city development in Malaysia and offer networking opportunities. Select key examples are described here.



#### MULTIMEDIA UNIVERSITY'S DIGITAL RESEARCH HUB

A multidisciplinary platform for research on digitalisation that serves as a bridge to bring together researchers from various disciplines; sharing their knowledge, experience and research on issues regarding digitalisation.



#### SUNWAY-LANCASTER FUTURE CITIES INSTITUTE

A partnership between Sunway University and Lancaster University to advance the sustainability agenda. They focus on three main research themes: Digital, Sustainable and Liveable cities.



#### MIT-UTM SUSTAINABLE CITIES PROGRAMME

A programme initiated and run by the Massachusetts Institute of Technology and the Universiti Teknologi Malaysia, to study and document sustainable city development efforts in Malaysia.



#### THE NATIONAL TECH ASSOCIATION OF MALAYSIA

An association representing the ICT industry in Malaysia with over 1,000 member companies. They represent 80% of the ICT trade in Malaysia and aim to be the catalyst for the growth of the tech industry in the country.



### INTELLIGENT TRANSPORT SYSTEM ASSOCIATION OF MALAYSIA (ITSM)

ITSM plays a role in facilitating and promoting knowledge and information exchange between market players and assists in developing standards, guidelines and specifications relating to Intelligent Transport Systems (ITS).



### MALAYSIA INTERNET-OF-THINGS ASSOCIATION (MYIoTA)

MyloTA comprises members from the growing loT value chain in Malaysia and beyond. It works together with industry players to develop an ecosystem for companies adopting and providing loT solutions and services.

## UNDERSTANDING KEY ALLIANCES

Multi-stakeholder alliances offer collaborative platforms for networking, knowledge sharing and problem solving. At a national scale, these bring together public and private actors, and at an international scale, these bring city governments together as they share their experiences.



### Malaysia Smart Cities Alliance (MSCA)

A platform established and launched during World Urban Forum 9 in 2018 for members to deliberate on Smart City issues and challenges, alongside encouraging networking among stakeholders. The platform is managed by Malaysia Industry-Government Group for High Technology (MiGHT) to foster cross-sector participation from government agencies, academia and industry players.



#### Malaysia International Centre for Sustainable Cities (MyICSC)

MyICSC creates an environment that encourages and facilitates the active sharing of expertise and new insights across a network of national, regional and international players. It offers opportunity to leverage the knowledge and shared learning of initiatives, support high-performance achievement, and accelerate the broad-based adoption of innovative advances.



### ASEAN Smart Cities Network (ASCN)

ASCN, established in 2018, is a collaboration involving cities from the ASEAN Member States. The 26 ASCN Pilot Cities include four cities in Malaysia: Kuala Lumpur, Johor Bahru, Kuching, and Kota Kinabalu. With the common goal of smart and sustainable urban development, its primary objective is to improve the lives of ASEAN citizens, using technology as an enabler.

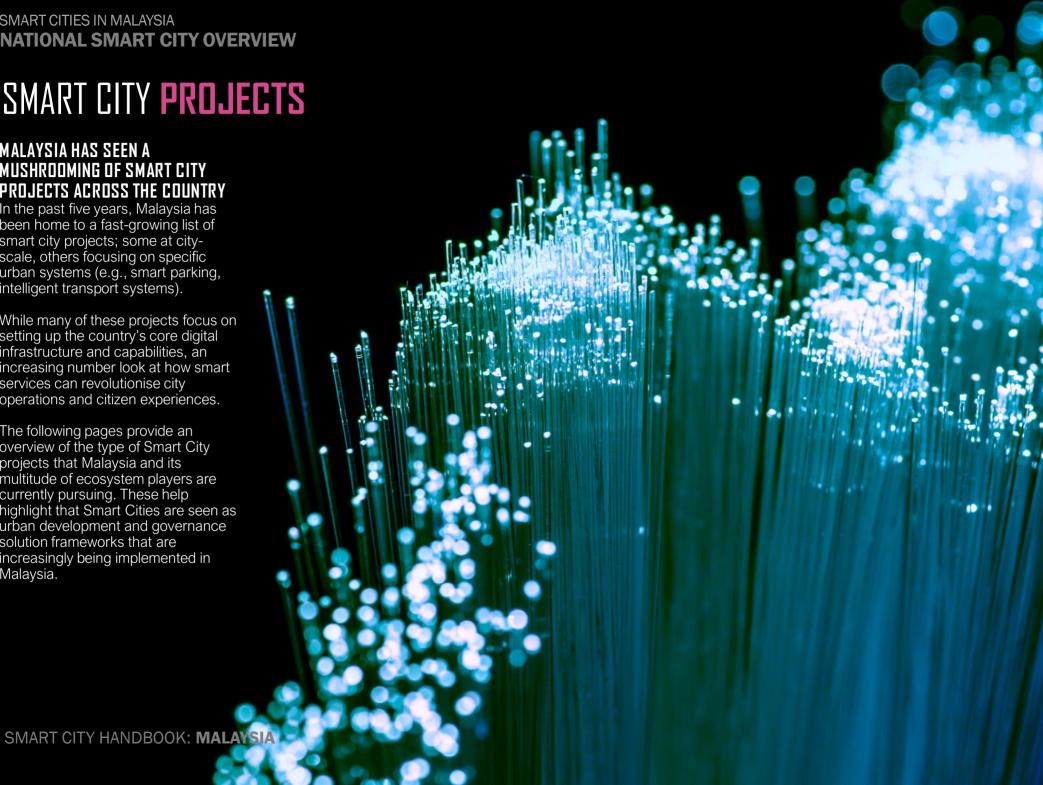
### SMART CITY PROJECTS

#### MALAYSIA HAS SEEN A MUSHROOMING OF SMART CITY PROJECTS ACROSS THE COUNTRY

In the past five years, Malaysia has been home to a fast-growing list of smart city projects; some at city-scale, others focusing on specific urban systems (e.g., smart parking, intelligent transport systems).

While many of these projects focus on setting up the country's core digital infrastructure and capabilities, an increasing number look at how smart services can revolutionise city operations and citizen experiences.

The following pages provide an overview of the type of Smart City projects that Malaysia and its multitude of ecosystem players are currently pursuing. These help highlight that Smart Cities are seen as urban development and governance solution frameworks that are increasingly being implemented in Malaysia.



#### **NATIONAL SMART CITY OVERVIEW**

# For this report, about 100 smart city projects were inventoried which have been implemented, or are in progress, across Malaysia

Displayed here are 34 high profile projects, classified by the urban topics they focus on. Many of these are clustered around cities and urbanised regions that are discussed in Chapter 3.



#### **SMART ENVIRONMENT**

- 1. Green Technology
- 2. Waste to Energy
- 3. Disaster Management System (DMS)
- 4. Integrated Waste Management (IWM)



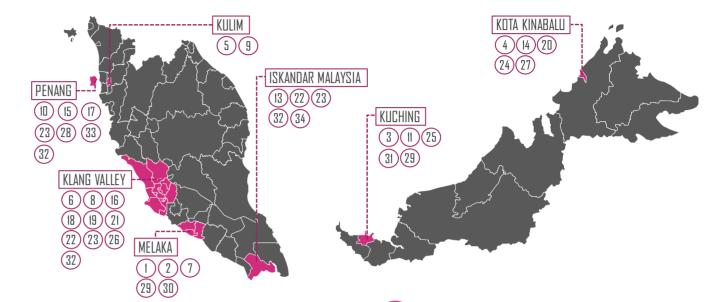
#### **SMART LIVING**

- 5. Community Urban Farming
- 6. Safe City
- 7. Smart Grid
- 8. Digital Healthcare
- 9. Integrated CCTV



#### **SMART PEOPLE**

- 10. Digital Library
- 11. Digital Training Lab
- 12. E-Learning Programme (eKlas)
- 13. Al-powered Innovation City





#### SMART ECONOMY

- 14. Sabah E-payment
- 15. 5G Virtual Tourism Experience
- 16. Touch N Go e-wallet



#### SMART DIGITAL INFRASTRUCTURE

- 17. Penang Connectivity Masterplan
- 18. Al-powered platform (City Brain)
- 19. 5G Infrastructure development
- 20. High Speed (HS) Mobility Solution
- 21. Hyper-scale Data Centre (DC)



#### **SMART GOVERNMENT**

- 22. Urban Observatory
- 23. Open Government Data
- 24. e-planning permission
- 25. Integrated Operation Centre
- 26. Smart City Rap 2020
- 27. Smart City Masterplan Feasibility Study
- 28. Government Cloud Computing



#### **SMART MOBILITY**

- **29.** E-Bus
- **30.** Smart Mobility Management (SMM)
- 31. Smart Traffic Light
- 32. Intelligent Transportation System (ITS)
- 33. Smart Parking system
- 34. Autonomous Vehicle Proof of Concept

#### SEE PAGE 183 FOR THE **FULL LIST** OF SMART CITY PROJECTS

## **KEY PROJECT**













Green Technology Waste-to-Energy DMS IWM

**Urban Farming** 

Smart Surveillance

Smart Grid

Digital Healthcare

Integrated CCTV

Digital Library

Digital Training Lab

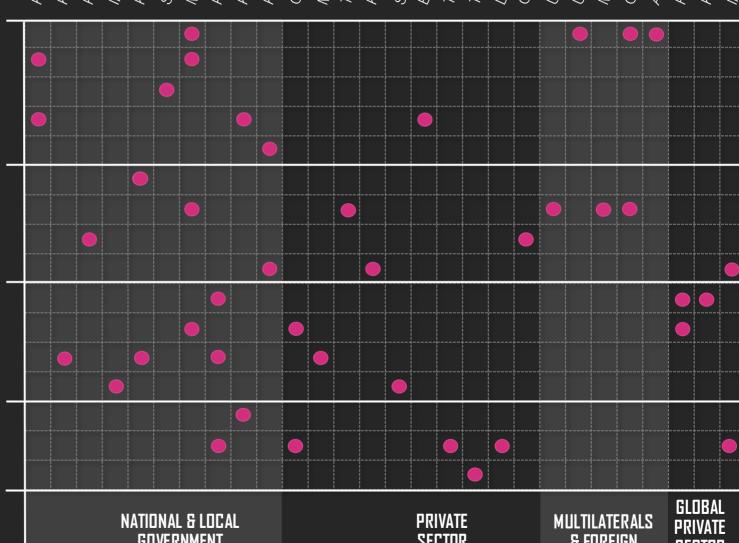
E-Learning

Al Innovation City

Sabah E-payment

5G VR Tourism

Touch n Go e-wallet



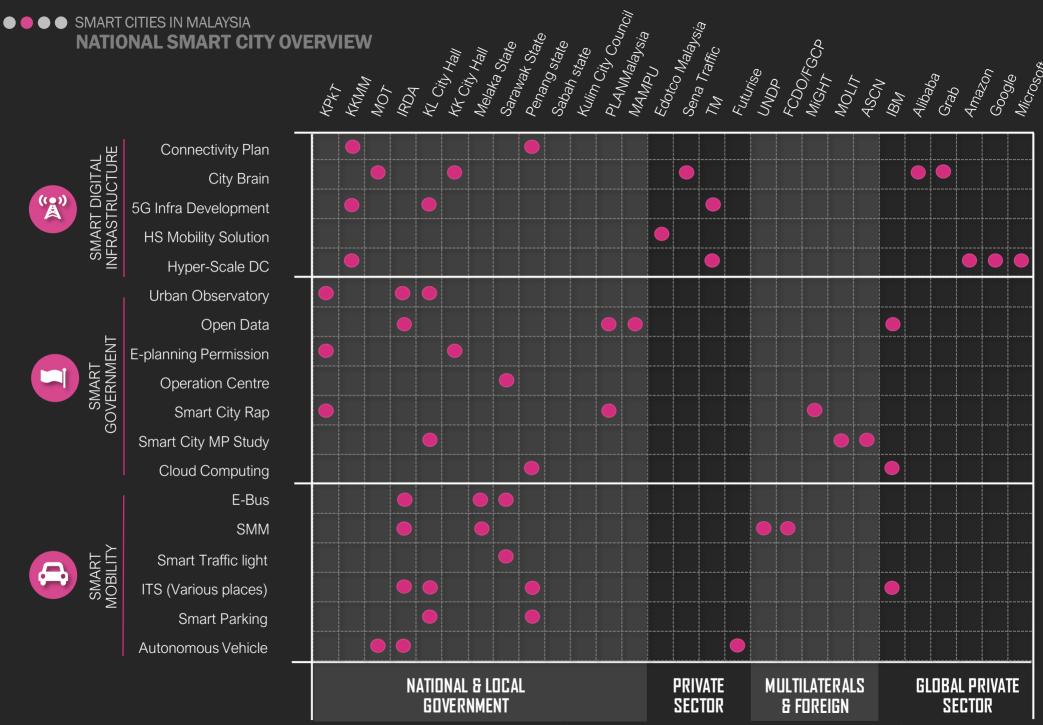
**GOVERNMENT** 

SECTOR

**8 FOREIGN** 

**SECTOR** 

<sup>\*</sup>Projects presented here are a sample and not an exhaustive list of key project stakeholders



# EXAMPLE 2.3 KEY PILLARS OF MALAYSIA'S SMART CITIES

Malaysia is spearheading further development of the smart city market. To achieve this, Malaysia will address its urban priorities around the key smart city pillars framed through the Malaysia Smart City Framework. Exploring these in greater detail will allow us to uncover areas where collaboration and partnership opportunities exist, in particular with the UK.



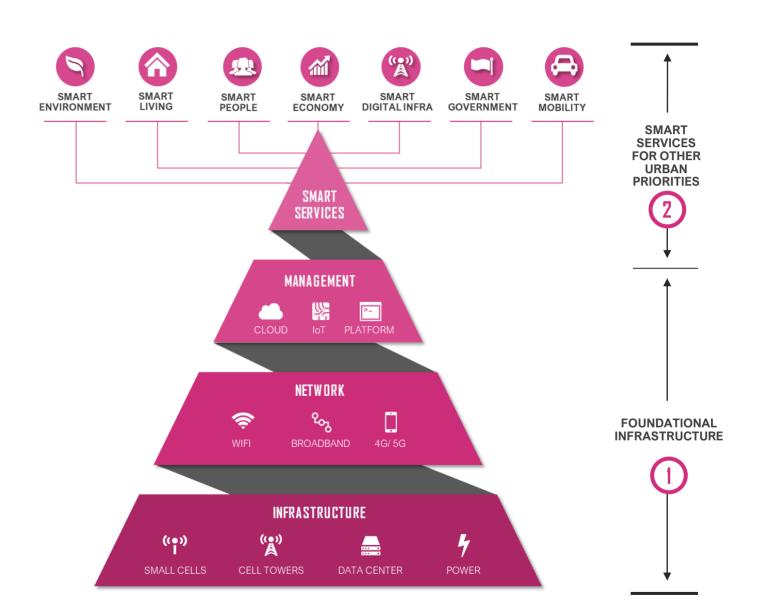
## SMART CITY & URBAN PRIORITIES

### TECHNOLOGIES CAN HELP MALAYSIA ACHIEVE ITS URBAN OBJECTIVES

Smart City technologies have the potential to help address most of Malaysia's key urban priorities, from expanding access to clean water to reducing carbon emissions and easing government services. Smart city potential is realised in two sequential steps:

- Core foundational infrastructure, on which digital technologies and services will need to rely on.
- Developing and implementing a range of "Smart Services" that address urban priorities and ease implementation of digital transformation.

In Malaysia, the areas in which smart cities can address urban needs can be divided into seven key pillars based on smart city components (see next page). In the following pages, we outline how smart city technologies can offer solutions based on these seven pillars.



### THE SEVEN SMART CITY PILLARS

## THE SEVEN SMART CITY PILLARS ARE THE KEY COMPONENTS ARTICULATED IN THE MALAYSIA SMART CITY

**FRAMEWORK.** This handbook is also structured along these pillars to provide a comprehensive overview of Malaysia's development.



#### **SMART ENVIRONMENT**

Digital technologies that can address urban environmental needs such as providing monitoring services for sustainable resource management, building disaster resilient cities and contributing toward cleaner environment.



#### **SMART LIVING**

Urban liveability needs can best be managed through using modern technology to tackle safety and security issues, or to provide access to high quality healthcare or educational needs.



#### **SMART PEOPLE**

Motivating urban residents to adopt low carbon and greener habits, empowering communities and encouraging techsavvy talent and digital upskilling, represent just a few of the urban priorities smart technologies that can be addressed under this pillar.





#### SMART ECONOMY

A high utilisation rate of ICT through the economy will encourage more productivity and innovation across all sectors. Smart Economy refers to a competitive and attractive economic environment.



#### SMART DIGITAL INFRASTRUCTURE

The foundation to technological transformation is to ensure that core digital infrastructure such as comprehensive network coverage, high-speed internet and enhanced data protection, is implemented in smart cities.



#### **SMART GOVERNMENT**

One of the key priority areas where technology can significantly benefit is by ensuring e-government services and sharing of information between the public and government is of high quality and is accessible.



#### SMART MOBILITY

Cities need seamless and efficient connectivity, and safe, integrated and reliable mobility services. Smart technologies address low-carbon transport and mobility needs of people.



## SMART ENVIRONMENT

Malaysia is at an environmental crossroads, balancing the ecological impact of its fast-growing economy with the environmental challenges of a nation with low-lying coastlines vulnerable to climate change.

#### RISING COASTAL LEVELS & FLOOD RISKS

Rising sea levels have been driven by GHG emissions and climate change. The continued activity and development of already densely populated flood plains, encroachment on flood-prone areas, destruction of forests and hill slopes development have contributed to coastal areas suffering from extreme weather events, flooding and loss of biodiversity.

The advent of urban sprawl in Malaysia's most populous areas has also contributed to the loss of green spaces and natural environment. This has precipitated several climate-related risks such as flash floods and landslides that put many of Malaysia's river and coastal communities at risk.

#### AIR POLLUTION RISKS

Traffic congestion and rapid development have also led to higher fossil fuel emissions leading to loss of air quality and water contamination. Risk from open burning and loss of natural forests have also caused heatwaves and forest fires that contribute to haze.

This issue is exacerbated by low fuel prices and reliance on fossil fuels to meet energy demands.

#### RIVER POLLUTION

River pollution caused by construction, industrial and commercial activity has affected water-supply sources. This problem is exacerbated by illegal waste dumping affecting the health of citizens.

#### WASTE

There is also an urgent need to overcome barriers in solid waste management. There has not been enough consideration for waste prevention and reduction. There is a need for more comprehensive databases on waste management.

Lenient regulation on waste management has led to landfill overcrowding. For example, household waste sorting is not yet a mainstream practice in Malaysia. However, this presents opportunities in exploring circular economy for more effective handling of waste. Lack of regulatory stringency on water treatment has led to incidents of water contamination and distribution, while deficiencies in existing infrastructure has led to high losses of non-revenue water.



#### **CLIMATE CHANGE IMPACT**

The Malaysian National Hydraulic Research Institute (NAHRIM) estimates that from the 1970s to 2007, the intensity of rainfall duration has increased approximately 30%.<sup>30</sup>



#### AIR POLLUTION

In 2020 Malaysia ranked 58th place globally for poor air quality, with a PM2.5 rating of 19.36 µg/m³ putting its yearly average into the 'moderately' polluted range.<sup>31</sup>



#### WASTE

Over 30,000 tonnes of waste is produced each day in Malaysia (as of 2020). Of that, only less than 5% of the waste is being recycled.<sup>32</sup>

## SMART ENVIRONMENT

### HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia is already taking proactive steps to improve its quality of air and water, as well as to prevent further environmental deterioration through adaptation and mitigation strategies.

The National Policy on Climate Change outlines key performance indicators aimed at reducing annual GHG emissions and increase the proportion of renewables within the country's power generation mix. Malaysia has a target commitment towards reducing 45% of GHG emissions intensity from energy by 2030.

The country hopes to meet these aims by introducing a range of smart city technologies, including air pollution monitoring and control, flood prevention and management systems, environmental modelling and monitoring systems. In addition, a total of 52 local authorities are now part of the Low Carbon City Framework Programme that encourages strategies and actions to reduce carbon emissions at the local level. 33

A much broader array of relevant technologies can play a role, a sample of which is provided here:

#### HOW SMART SOLUTIONS CAN HELP

Technologies and systems can help address these environmental challenges:



#### **POLLUTION MANAGEMENT**

- Pipeline Waste Collection System
- Air Quality Modelling and Monitoring
- Pollution sourcing detection
- Integrated Environmental Dashboard
- Plastic Waste Management
- Water Quality Management



#### **FLOOD MANAGEMENT**

- Automated Coastal Monitoring Stations
- Flash Flood Prediction Analytics
- Drone-based Coastal Monitoring
- Urban Heat Digital Modelling



#### **CLIMATE CHANGE MITIGATION**

- Solar-powered Assets
- Smart Power Plant Management
- Low Carbon Technologies
- Public Transport Electrification



#### **NATURAL ASSET MANAGEMENT**

- Park Management Systems
- Wildlife / biodiversity tracking
- Urban Nature Management Systems
- Smart Irrigation Systems

#### RECENT DEVELOPMENTS

WASTE TO ENERGY IN SUNGAI UDANG, MELAKA This project aims to transform Sungai Udang's sanitary landfill through a waste-to-energy (WTE) plant for methane avoidance and to free up the need for a large landfill site. There are five other WTE plant projects in the pipeline across Malaysia, funded through the Public Private Partnership (PPP) model.

### INTEGRATED WATER RESOURCES MANAGEMENT,

**SELANGOR** A system monitors and integrates real-time data such as water quality and dam water levels from various sources to an Intelligent Command Centre to detect any unusual activity. Significant river pollution occurs from effluents released from factories, agricultural activities, sewerage and water runoff from urban surfaces.

## SMART ENVIRONMENT

#### **KEY MINISTRIES**



Ministry of Environment and Water (KASA)



Ministry of Energy and Natural Resources (KETSA)



Ministry of Housing and Local Government (KPKT)



Economic Planning Unit (EPU)



Ministry of Science, Technology and Innovation (MOSTI)



Ministry Of Agriculture And Food Industry (MAFI)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories



Department of Environment (DOE) a unit under KASA that is responsible for environmental protection.



Department of Irrigation and Drainage (JPS) is responsible for national water resources management

PLANMalaysia Town and country planning authority responsible for reviewing planning applications



National Solid Waste Management Department (JPSPN) a unit under KPKT that is responsible for solid waste management



Sustainable Energy Development Authority (SEDA) a statutory body formed under the Sustainable **Energy Development Authority** Act 2011

#### OTHER KEY PLAYERS



Global Environment Facility (GEF) support/sponsor government agencies, civil society organisation, private sector, academia to implement projects



H2GO is a water technology company, and H.GO its objective is to bring clean drinking water for those marginalised communities



**Hati.my** a non-profit organisation supports underprivileged communities, and its service includes providing listings, charities and fund-raising programs, supporting CSR programmes and charity projects



Greenbuildingindex (GBI) is a green building accreditation organisation for buildings in Malaysia

Also, several private sector companies such as Cypark and Solarvest, are involved in environmental domains e.g., water, waste, etc.

<sup>\*</sup>Logos or company names presented here are a sample and not an exhaustive representation of all stakeholders

## SMART ENVIRONMENT

### PARTNERSHIP OPPORTUNTIES WITH THE UK

The UK has developed strong expertise in a range of environmental fields, from Green Finance to Green Infrastructure, in order to support its national climate commitments. The UK's 2008 Climate Change Act is the first legally binding country-level climate change mitigation target. In 2019, the UK became the first major economy to commit to a net zero emissions target by 2050.<sup>34</sup>

The UK government, industry, academia and civil society are each doing their part to achieve this target. UK Research and Innovation (UKRI). the national innovation funding body, launches many funding opportunities to develop deeper capabilities. A multitude of climate tech accelerators. such as Third Derivative and The Greenhouse, are supporting the growth of small businesses in these areas. UK partnerships in environmental technologies are already evidenced through the Newton-Ungku Omar Fund, where UK and Malaysian businesses have partnered to develop Tier 4 green data centres which improve energy efficiency by up to 50%, the first of its kind in SEA.35

#### WHAT CAN THE UK OFFER?

- Green Finance current and future financial risks and opportunities from environmental factors are considered in financial decisions.
- Carbon Capture & Storage process management and technologies to capture carbon dioxide and store it permanently.
- Green Infrastructure a resilient approach to spatial planning and urban development that integrates nature and natural processes.
- Environmental Intelligence data and analysis of climate, geography, populations and more. The UK's Centres of Excellence focus on clean air, extreme weather, etc.
- Earth Observation using remote sensing technologies to monitor and assess the state of, and changes to, the natural and urban environment.
- Computational Sustainability using computational approaches to balance environmental, economic, and societal needs for the future.

#### **UK PLAYERS IN THIS PILLAR**

#### REZATEC

#### (www.rezatec.com)

Rezatec's Geospatial Al helps business leaders to manage their ground-based assets and critical infrastructure remotely, at scale using advanced Al analytics with cutting-edge satellite imagery to assess physical and environmental hazards.

#### **EARTHSENSE**

#### (www.earthsense.co.uk)

EarthSense, provides expert environmental monitoring and modelling of air pollution data, delivering products and services that enable the world to better understand and solve air quality issues.

#### CERVEST

#### (cervest.earth)

Cervest is pioneering Earth Science Al to help businesses, governments and growers adapt to climate volatility. Using machine learning, it generates real-time streamed 'signals' to answer climate uncertainty and natural resources questions.

### AMBIENTAL RISK ANALYTICS (www.ambientalrisk.com)

Ambiental is a global specialist in climate change and natural hazard analytics. It produces flood Software as a Service(SaaS) products and environmental reports internationally for better decision-making around flood risk management.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

## SMART ENVIRONMENT



### EXAMPLE OF SMART ENVIRONMENT BEST PRACTICE FLOOD RISK ANALYSIS & FORECASTING, MALAYSIA

Expertise in space-based technology has brought a flurry of innovative solutions to the market. Some examples include flood forecasting and early warning systems that incorporate satellite data to monitor real-time and forecasted rainfall. High precision advanced warnings of where and when a flood will strike may help to reduce risk and economic impact of natural disasters.

Malaysia's annual rainfall is among the highest on the planet. The Malaysian government looked to UK-based technology providers to develop an integrated environment dashboard system to assist planning, prevention and postevent response strategies to address flooding issues.

The **Earth and Sea Observation System (EASOS)**, a consortium of 13 UK-based companies was formed to develop this system. The Malaysian Government was then able to address its urban environment issues through a single platform.

#### OTHER RELEVANT UK PROJECTS

- <u>National Green Infrastructure Facility</u>: making urban centres more resilient & sustainable
- Oxford Flood Network: monitoring river and stream levels throughout the city of Oxford
- **Orange Manitor**: a mobile application to support efficient water management in gardens
- WM Air: an initiative to support the improvement of air quality and associated benefits
- Digital Place: trialing digital air quality monitoring solutions using Air Sensa technology
- Bristol Operations Centre: integrated management with environment and natural assets
- 😯 🥨 🕒 <u>Urban Observatory</u>: public real time urban data including air quality, temperature, etc.
  - URBACT Zero Carbon Cities: establishing science-based carbon reduction targets



#### OPPORTUNITY SPOTLIGHT

## SMART LIVING

This section will look at Malaysia's ambition to improve quality of life, healthcare services, and urban safety and security to create cities that are liveable and sustainable, and how UK partnerships can help.



Malaysia's achievements when it comes to ensuring water and power supply are impressive. Yet, rising demand are calling for new approaches to ensure that decent and suitable living conditions are maintained.

#### PROVIDE AFFORDABLE QUALITY HOUSING

Malaysia has a population of over 32 million and it is estimated that the population will grow to 36 million by 2030 with nearly 80% living in cities. Migration from rural to urban populations has grown from 26.8% in 1970 to 76.6% in 2020, with a projected 88% in 2050.<sup>36</sup>

Over the years, Malaysian cities have managed to enable a pluralistic supply of housing to meet the needs of different income groups. Priorities for several cities are now centred around managing imbalances between the supply and demand of housing and maintaining affordable prices across various housing typologies.

#### ACCESS TO PRIMARY CARE & HOSPITALS

There are about 400 hospitals in Malaysia (some 250 of which are private). Around 60 of them are equipped to provide tertiary care services.<sup>37</sup> The number is set to rise in the next 3-4 years, with Malaysia's Economic Transformation Programme aiming to hasten growth in health infrastructure. Steady growth in healthcare spending is anticipated as the Government hopes to meet the WHO recommended 7% of GDP spent on healthcare. The government hospitals provide universal and affordable healthcare vet enhanced access to healthcare remains a key consideration. Malaysia is also a rapidly aging country which will only increase need for healthcare services and adequate accessibility.

#### STRENGTHEN SAFETY AND SECURITY

Crime and security is one of the major perceived issues within Malaysia especially in urban regions.

For instance, in Kuala Lumpur, the Federal Territories ministry, the police and Kuala Lumpur City Hall are taking steps to make the city safer. Among the factors which contributed to the city's crime rate was a crowded population, negligence and carelessness, as well as lack of security and crime prevention awareness among residents. A rise in unemployment in the country due to the effects of the Covid-19 pandemic is said to have contributed to an increase in crime. <sup>38</sup> To address this, the government has focused on better surveillance and enforcement.



#### AFFORDABLE HOUSING

Average price of new properties launched in Malaysia is 47% higher than what the median household income group can afford.<sup>39</sup>



#### HOSPITAL OCCUPANCY

in public hospitals in Malaysia is over 90% in the 47000 beds available pre-COVID, as of 2019.<sup>38</sup> Waiting time can range from 2-5 hours, to get treatment.<sup>40</sup>



#### **CRIME INDEX RATIO**

is generally low however, there is still much to be done especially at places with high population density, KL has 2.3 times higher crime index ratio than the nation average.<sup>41</sup>



### HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia is increasingly focusing on improving the safety, security, health and living standards of its people. This involves adopting new approaches to providing social services, like education and healthcare, as well as providing spaces that are safe and foster mental and physical wellbeing. In particular, the country's ambition to become a knowledge-based economy will depend on the quality of its education, and affordable and quality housing is a priority in the face of rural-to-urban migration.

Shared Prosperity Vision 2030 is a commitment to make Malaysia a nation that achieves sustainable growth along with fair and equitable distribution, across income groups, ethnicities, regions and supply chains. The commitment is aimed at strengthening political stability, enhancing the nation's prosperity and ensuring that the citizens are united whilst celebrating ethnic and cultural diversity as the foundation of the nation.

#### HOW SMART SOLUTIONS CAN HELP

Technology and systems may be used to improve the quality and accessibility of public services and spaces:



#### **HEALTHCARE MANAGEMENT**

- Primary Care Digitalisation
- Telemedicine
- Patient Health Record Digitisation
- Smart Hospitals / Clinical Workflows



#### **PANDEMIC MANAGEMENT**

- Digitalised Crisis Response Systems
- Smart Security Health Screening
- Smart Personnel Tagging & Tracking
- Smart AIR detection & Treatment



#### **PUBLIC SPACE MANAGEMENT**

- Precinct Digital Social Platform
- Cycling and Pedestrian Priority
- Dynamic Facade
- Integrated CCTV Network



#### **SMART HOME MANAGEMENT**

- Energy Efficiency
- Real Estate Data Analytics
- Automated Defects Management
- Affordable Technology

#### **RECENT DEVELOPMENTS**

## SMART METER IMPLEMENTATION IN GREATER KUALA LUMPUR

The project objective is to allow electricity consumers to have real-time data over their usage to avoid wastage and eliminate the traditional electricity billing process. TNB is aiming to roll this out for some 9 million TNB subscribers by 2026.

### NATIONAL ELECTRONIC MEDICAL RECORDS (EMR)

**SYSTEM** This project aims to fully implement the EMR system in all public hospitals and clinics in Malaysia for efficient patient medical information sharing between government healthcare facilities.

#### SAFE CITY PROGRAMME,

KUALA LUMPUR KL city council has started installing and upgrading smart CCTV cameras across the city, some with video analytics-enabled software. Footages are integrated into the command centre to enhance the monitoring process for crime prevention, traffic, and flash floods.



#### **KEY MINISTRIES**



Ministry of Health (KKM)



Ministry of Housing and Local Government (KPKT)



Ministry of Women, Family and Community Development (KPWKM)



Ministry of Home Affairs (KDN)



Ministry of Federal Territories (KWP)



Ministry of Works (KKR)



Ministry of Rural Development (KPLB)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories.



Medical Device Authority agency under MOH to implement and enforce the Medical Device Act 2012.



Royal Malaysia Police (PDRM) is the national police force in Malaysia.

PLANMalaysia Town and country planning authority responsible for reviewing planning applications.



National Family and Community Development Board (LPPKN) play a key role in the formulation of national development policies and strategies.



Construction Industry Development Board (CIDB) regulates, develops and facilitates the construction industry.

#### OTHER KEY PLAYERS



Real Estate & Housing Developer's Association (REHDA) represents the private REHDA property developers responsible for 80% of the total built real estate.



Urbanice is an urban think tank under the purview of KPKT, it plays an important role in knowledge sharing and foster integrated urban solutions for the nation through publicprivate collaboration.



Malaysian Society of Quality in Health (MSQH) is the national accreditation body for health care facilities and services.



The Malaysian Institute of Planners (MIP) provides professional town planners in Malaysia with training, skills, and knowledge to advance town planning in the nation.



**Think City** is an impact organisation based in Malaysia with the mission of making cities more people-friendly, resilient and liveable.

Also, several private sector companies such as Sunway, Gamuda & Tenaga Nasional Berhad (TNB) are involved in several smart living domain activities e.g., smart home, smart grid, waste management system.

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders



### PARTNERSHIP OPPORTUNTIES WITH THE UK

The UK has witnessed enormous advancements in healthcare, wellbeing, education, and social engagement.

In Malaysia, the UK Global Better Health Programme is collaborating with the MOH Malaysia on an evidence-based, community-informed and community driven approach for non-communicable diseases prevention targeting the urban poor. The programme has developed an app to empower and improve health literacy of community health volunteers and community members while working with local businesses in modifying the obesogenic environment through a gamified community health reward model.

New approaches, tools and platforms have also been developed to support early and higher education and to promote community building. City Councils and community organisations are running innovative smart city cocreation programmes.

#### WHAT CAN THE UK OFFER?

- Digital Health includes peoplecentred telecare and telehealth, medical imaging using AI and wellness monitoring
- Assisted Living technologyenabled care products to make the role of carer more efficient and cost effective
- Active Travel ways to promote, enhance and ensure safe cycling and walking experiences in cities
- Design for well-being- technology and building design focused on monitoring behavioural change and inspiring well being
- Security- biometric integration, incident prevention, technologies for solutions that increase the security, control and accountability within various environments

#### **UK PLAYERS IN THIS PILLAR**

#### **SPACE SYNTAX**

#### (www.spacesyntax.online)

Space syntax is a set of techniques for analysing spatial layouts and human activity patterns in buildings and urban areas. It is also a set of theories linking space and society to study how people move, where they are and how they develop.

#### TUNSTALL

#### (www.tunstall.co.uk)

Tunstall has pioneered the use of technology to enable independent living and supported more than 5 million people across the world. Tunstall has been at the forefront of developments, such as telecare and telehealth, for over 60 years.

#### MYSENSE

#### (www.mysense.ai)

MySense is a wellbeing analytics platform powered by Al. It learns what a 'normal' and 'abnormal' state is for an individual, providing them real time insights. MySense is working with the National Health Service (NHS), local authorities and private companies.

#### DESIGN 4 SOCIAL CHANGE

#### (www.d4sc.io)

D4SC is an urban innovation company specialising in real-time collaborative systems. D4SC's Changify platform is a highly purposed scalable socialnetwork targeting the global £400 billion smart urban systems market.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

## SMART LIVING



#### **EXAMPLE OF SMART LIVING BEST PRACTICES**

#### SPHERE, BRISTOL, UNITED KINGDOM

SPHERE (Sensor Platform for HEalthcare in a Residential Environment) is a project designed to employ new technology to address long-term health issues. These include obesity, depression, diabetes, strokes, respiratory conditions and cardiovascular disease. In an interdisciplinary research collaboration (IRC) led by the University of Bristol and working in partnership with Bristol City Council and Knowle West Media Centre (KWMC), the sensors were deployed in a 100home study in Bristol city.

SPHERE developed a number of different sensors allowing the monitoring of health and wellbeing at home. This information was then used to spot issues that might indicate a medical or wellbeing problem.

The system is general-purpose, low-cost and passive. It is accessible to all citizens including the most vulnerable. The project has advanced eHealth by using IoT to provide generic healthcare services and provided a good solution to urban health needs.

#### OTHER RELEVANT UK PROJECTS

- Liveable Cities: a programme to design UK cities for wellbeing and resource security
- Playable City: putting people and play at the heart of future cities around the world
- Connected Health Cities: a programme to improve health and care services using IT
- Assisted Living Leeds Innovation Lab: driving assistive technology product innovation
- 6 City4Age: activating urban communities to facilitate the role of social/health services
- Edinburgh Living Lab: a data-driven research lab for quality of life and sustainability
  - Glasgow Active Travel: using technology to make cyclist and pedestrian friendly cities
- My Knowle West App: networking, celebrating, raising awareness of community issues



## SMART PEOPLE

The success of any digital transformation effort is determined by the people and the communities interacting with it and, by leveraging its potential for prosperity and equity.

#### HUMAN CAPITAL DEVELOPMENT

Malaysia's education system is divided into preschool, primary, secondary, postsecondary and tertiary education. It is further divided into public and private education. Education may be obtained from the multilingual public school system. which provides free education for all Malaysians, or private schools, or through homeschooling. By law, primary education is compulsory, and standardised tests are a common feature. Currently, there are 43 public universities. 31 private university colleges, nine foreign university branch campuses and 414 private colleges. As the country strives to move towards a knowledge-based economy, the focus is shifting to strengthening participation in higher education.

#### DIGITAL EDUCATION READINESS

In 2017, Fundamentals of Computer Science was made a subject for lower secondary schools in Malaysia, replacing the more rudimentary Information and Communication Technology Literacy. Students are trained to analyse data, use algorithms, and solve complex problems.

In 2017, a private-sector led initiative with the support of the MDEC, founded the Forward School in Penang that aims to build the next generation of tech talent and equip students with industry-ready skills. This is an exemplar initiative preparing new generations to innovate and create value using knowledge about the digital technologies. Currently, it offers courses in applied software engineering, applied deep learning and digital skills.

#### INCLUSIVENESS

Inclusiveness is a key principle of the Shared Prosperity Vision 2030 for Malaysia to ensure that the benefits of economic growth benefit all sections of the society equally, especially the poorest 40% as well as the vulnerable groups such as women, children, people with disabilities and, senior citizens. Digital inclusiveness is necessary to ensure adaptability of technology equally and its application empowers everyone in society.

MDEC and the government have launched several initiatives such as eRezeki, eUsahawan, Pusat Internet etc. to improve wellbeing and facilitate participation in digital economy. However, digital gaps need to be addressed across income, strata and age.



#### **FR% INCRFASE**

in higher education enrollment since 2000.44



#### **DIGITAL READINESS**

**INDEX** overall score of 58% indicating that there are significant gaps to be filled for Malaysia to be ready for digitalisation.<sup>45</sup>



### HOUSEHOLD BROADBAND PENETRATION of 90.1%

in 2019, and fixed broadband penetration nationally is only at 34.5% by H2 2020. Even with high state-level penetration, many areas still lack access to broadband, such as Sabah and Kelantan.<sup>46</sup>

## SMART PEOPLE

### HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

As the lead agency driving digital economy, MDEC is also working on priority areas of Tech Talent Development, Digital Adoption, Digital Entrepreneurship and Innovation, and Digital Inclusivity. The Corporation aims to empower Malaysians both young and old through digital means in order to enhance their productivity.

From a digital infrastructure access perspective, the National Digital Network (JENDELA), a digital communication enhancement platform (2021–2025) will be implemented in phases by to expand 4G mobile broadband coverage in populated areas; increasing mobile broadband speeds and enabling as many as 7.5 million premises to access gigabit speeds with fixed broadband services by 2022.19 As this accelerates Malaysia into digital transformation, other initiatives focused on building digital talent the MyDigitalMaker movement in schools to transform students from digital users to producers as well as Premier Digital Tech Institution (PDTI) initiative at tertiary education level are creating significant impact.47

#### HOW SMART SOLUTIONS CAN HELP

These technologies are some examples of how digitalisation or technology may be used to improve digital competencies:



#### **EDUCATION MANAGEMENT**

- Higher Education Partnerships
- Living Labs
- E-Learning Platforms
- Technology Adoption



#### **INTERGRATED COMMUNITIES**

- Digital Placemaking
- Experimentation and Maker Spaces
- Art and Cultural Events
- Community Based Digital Platform



#### **DIGITAL INCLUSIVITY**

- Digital Literacy
- Talent Development
- Interactive Technologies
- Awareness Programmes

#### RECENT DEVELOPMENTS

#### **SKYMIND INNOVATION CITY,**

JOHOR This project aims to set up an innovation ecosystem, upskill talent for Alpowered innovations. Innovation City will form three innovation hubs: Talent Hub for Al Talent Development, Innovation Hub for enabling technology and Al innovators, and Regional R&D Hub for research and development of Al applications. Skymind Global will develop this project in partnership with Iskandar Investment Berhad.

### DIGITAL EDUCATIONAL LEARNING INITIATIVE

MALAYSIA (DELIMA) is a digital learning platform with a primary focus on preparing students for life-long learning and future skills to be employable in the job market. It offers various digital tools to promote interactive session between educators and students. Big tech companies such as Google, Microsoft and Apple are on board to ensure the application of learning platforms continuously match rapid technology shifts. It is not limited to the educational system; and can be used as a platform to foster community engagement with government departments.

## SMART PEOPLE

#### **KEY MINISTRIES**



Ministry of Human Resources (MOHŘ)



Ministry of Higher Education (KPT)



Ministry of Education (KPM)



Ministry of Women, Family and Community Development (KPWKM)



Ministry of Science, Technology and Innovation (MOSTI)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories.



Malaysia Global Innovation and Creativity Center (MaGIC)) facilitates entrepreneurial ecosystem through creativity, innovation and technology adoption.



Malaysia Digital Economy Corporation (MDEC) is part of KKMM that focuses on accelerating an inclusive digital economy and society.



Department of Social Welfare (JKM) is part of KPWKM that focuses on empowering community in need towards social well-being.

TalentCorp TalentCorp is a government agency under the MOHR) aims to drive Malaysia's talent strategy towards becoming a dynamic talent hub.

#### OTHER KEY PLAYERS



Penang Science Cluster is a non-profit organisation that builds a talent pool in Penang and Malaysia.



Urban Hijau is a sustainable social enterprise that promotes sustainable farming in cities by running various events to increase awareness and share practical knowledge with the community.



Malaysia Technology Development Corporation (MTDC) is a key player in technology commercialisation in Malaysia and promote the adoption of technologies by local companies.



Cradle Supports Malaysian tech start-ups and holds the highest commercialisation rate amongst government grants in the country.

Also, several private sector companies such as Telekom Malaysia, Maxis, Skymind Innovation are involved in several smart people domain activities. e.g., developing integrated communities, upskilling for innovation and VR learning.

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders

## SMART PEOPLE

### PARTNERSHIP OPPORTUNITIES WITH THE UK

The UK education technology sector is among the fastest growing in Europe and has attracted over 41% of all investment funding in Europe in 2019.<sup>48</sup> Digital learning has led to pioneering larger participation in education and paved a new way for future generations to access knowledge. The UK is also making headway in encouraging a low-carbon lifestyle through education and creating digital transformation through community participation and knowledge sharing.

Among the challenges to Malaysia's digital transformation is a lack of awareness. Once this is overcome, masses can fully embrace digital transformation. Technologies can be used for education, training and capacity building to address this.

The UK has integrated education and technology through a series of innovative platforms that not only encourage community participation but also build knowledge base. Equipping citizens with future-ready skills will contribute to better talent entering the job market.

#### WHAT CAN THE UK OFFER?

- EdTech a platform and network that provides ideas, approaches and support for the use of education technology. Edtech companies offer technology platforms and apps for education and learning.
- Living Labs a methodology to support co-creation and user innovation, empowering users to design, explore and improve the development of new services.
- Citizen Sensing citizens use lightweight and accessible sensor technologies to collectively monitor the environment, enhancing community awareness.
- Playable City a community that capture creatives from around the world to produce an idea that puts people and play at the heart of the city.

#### **UK PLAYERS IN THIS PILLAR**

#### RM RESULTS

#### (www.rmresults.com)

RM Results has developed solutions to enable the improvement of educational outcomes around the world, through the innovative use of digital assessments.

#### DIGITAL SKILLS UK

#### (www.digitalskillsuk.com)

Digital Skills UK is a specialist provider of transformative digital training. Accredited by the world's industry key-players, such as Microsoft, CompTIA and BCS, it uses technology and cloud-based systems to provide a modern learning experience.

#### MATHSWIZZ

#### (www.mathswizz.co.uk)

A digital solution that comes with a complete set of resources that cover the range of math topics that children struggle with. The sheets have been designed to cover each topic at a basic level and then increase in difficulty as the child improves.

#### INVOLVE

#### (www.involvepeople.org)

Involve is a global network and consultancy championing diversity and inclusion in business. Through the delivery of events, programmes, thought leadership and advisory solutions, Involve helps firms drive cultural change and create inclusive workplaces where any individual can succeed.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

## SMART PEOPLE





#### PEOPLE AT THE HEART OF FUTURE CITIES, GLOBAL

Envisioned by **Watershed**, a British creative technology centre in Bristol, Playable City is a platform that has evolved into a global network that engages citizens with public spaces through urban play. This involves reusing city infrastructure and new ways of using smart city technologies to create connections—person to person, person to city. In each city it has created a connected innovative community exploring their city's opportunities. One of its projects was Make Your Rhythm.

It explored ways to make the bus journey more enjoyable. A Playable City can strengthen our connections to our city and community by drawing on a fresh mix of creative technologies, public art and urban design. Creative installations helped to unlock social dialogue, bringing citizens into city development conversations. From Bristol, Lagos, São Paulo, Austin to Seoul, Playable City is a truly global network, active across five continents.

#### OTHER RELEVANT UK PROJECTS

- London Grid for Learning (LGfL): providing refurbished laptops for disadvantaged people
- (iii) Action Foundation: empowering refugees and asylum seekers with computers and training
- 🔁 🚳 Lifetime Skills Guarantee: a program to upskill adults without A-levels through a free course
- Beskilling Revolution Platform: an online resource that collates job opportunities and education
- **1** DIGIT lab: a research lab for corporations' digitisation processes and workforce upgrading
- Social Integration Design Lab: testing and moulding projects to better social cohesive principles
  - Super Connected City: building up accessible broadband services to SMEs and public
  - My Knowle West App: networking, celebrating, raising awareness of community issues



## SMART ECONOMY

Malaysia is on track to achieve high income status within the next ten years.

#### MOVING TO HIGH VALUE INDUSTRIES (IR4.0)

Malaysia is now in the process of shifting its economic structure towards higher skill, value-added industries, such as smart manufacturing and its related service industries. While Malaysia formulated a comprehensive Industry 4.0 plan to grow through its Industry4WRD policies, attracting investment and developing the right capabilities in an array of strategic industries will not be easy. Malaysia must indeed convince the right companies to set up shop and the right investors to invest in the country with the objective of strengthening the country's manufacturing sector as well as streamlining a cohesive national agenda to accelerate the nation's transformation into a smart manufacturing and higher value add industries.

#### UNLEASHING INNOVATION & ACTIVITY

While Malaysia has made substantial progress in innovation and transforming the business climate over the past few decades, there is still room for improvement. When it comes to innovation, Malaysia ranks at an impressive 33 out of 133 economies and is 8th in Southeast Asia in the Global Innovation Index (GII) report, due to high achievement in five of the seven pillars of GII, namely Market Sophistication, Human Capital and Research. Business Diversity. Knowledge and Technology Output, and Creative Output.<sup>51</sup> Although Malaysia has a very strong enabling environment it could do with strengthening its level of readiness to transition to high-value industries and using IT as a catalyst for innovation.

#### POST COVID ECONOMIC RECOVERY

Malaysia's successful management of the pandemic during 2020 allowed the country to re-open the economy and take steps towards recovery. <sup>49</sup> The Malaysian government's swift move to implement initiatives under its four economic stimulus packages amounting to RM305 billion — or 20% of its GDP — is estimated to have contributed four percentage points to the economic growth for 2020. As a result, Malaysia's GDP's contraction was much lower than predictions by the International Monetary Fund and the World Bank. <sup>50</sup>

Nevertheless, the pandemic is likely to have long lasting impact on key sectors, such as tourism, and affect long term growth and employment prospects.



MALAYSIA MAINTAINS A
GDP GROWTH TARGET OF
BETWEEN 6.5% AND 7.5%
FOR 2021 according to the
Finance Minister.



INCREASE FROM 18% to 35% BY 2025 the number of high-skilled workers in the manufacturing sector<sup>52</sup>



### MALAYSIA RANKS 8th IN ASIA ON INNOVATION

and ranks 33 out of 133 global economies according to the 2020 Global Innovation Index (GII) report.



### HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia continues to push towards Industry 4.0, steering its manufacturing-based industries into embracing digitalisation. As a high-value economy, Malaysia can leverage on disruptive technologies to expand its workforce, strengthen its innovative capabilities, and digitally transform key sectors.

The Government has deployed several strategies towards strengthening digital transformation and increasing capacity to access the 4th Industrial Revolution. Policies to improve the country's productivity and competitiveness such as the Malaysian Productivity Blueprint sets a minimum labour productivity growth so that industry does not remain stagnant.

Other strategies place emphasis on Green Growth, encouraging the greening of sectors. In all aspects, smart city technologies can play a crucial role in fostering innovation and collaboration, training the workforce and creating the workplaces for the jobs of tomorrow.

#### HOW SMART SOLUTIONS CAN HELP

Smart solutions will be key to allowing Malaysia to capitalise on its existing resources, and innovate further:



#### **INDUSTRY 4.0 & SMART TOURISM**

- City Data Analysis and Sharing
- Smart Manufacturing Technology
- Integrated Tourism Platforms
- Augmented Tourism Experience



#### **SMART OFFICE BUILDINGS**

- Smart BMS, lighting, HVAC, etc.
- Predictive Maintenance
- Digital Twins
- Indoor Environmental Quality Tech



#### **RESEARCH & INNOVATION**

- Dedicated pilots / Test Beds (e.g., 5G)
- Living Labs Sandbox Frameworks
- Incubators & Accelerators
- Triple Helix Collaboration Platforms



#### **FINTECH & INSURETECH**

- Mobile Payments
- Mobile / Digital Banking
- Mobile / Digital Insurance
- Blockchain enabled credit check

#### RECENT DEVELOPMENTS

**GO-ECOMMERCE** initiatives aim to assist small and medium local businesses (SMEs) to tackle economic changes due to the pandemic by assisting them to adopt eCommerce technologies to reach a wider spectrum of audiences to drive higher sales.

**SMART AGRICULTURE** projects aim to utilise 5G network and IoT technology to manage farms remotely for better work and yield efficiency, transforming traditional agricultural businesses. Malaysian Agricultural Research And Development Institute (MARDI) and Maxis are working in collaboration to be pioneers in the agritech industry.

#### **MALAYSIA SMART TOURISM**

**4.0** The recently published National Tourism Policy 2020-2030 has emphasised a digitalisation journey to move Malaysia's tourism towards smart tourism. Adopting digital technologies and leveraging Big Data analytics to create data-driven decision-making and future planning were some of the key action plans identified to boost tourism.

## SMART ECONOMY

#### **KEY MINISTRIES**



Ministry of International Trade and Industry (MITI)



Ministry of Entrepreneurship **Development and Cooperative** (MEDAC)



Ministry of Domestic Trade and Consumer Affairs (KPDNHEP)



Economic Planning Unit (EPU)



Ministry of Science, Technology and Innovation (MOSTI)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories.



Malaysia Global Innovation and Creativity Center (MaGIC)) facilitates entrepreneurial ecosystem through creativity, innovation and technology adoption.



Malaysia Digital Economy Corporation (MDEC) is part of KKMM that focuses on accelerating inclusive digital economy and society.



Malaysian Investment Malaysian investment

Development Authority (MIDA) oversees and drives investment into the manufacturing and services sector.



SME Corporation Malaysia (SME Corp) provides business advisory services for small and medium enterprises and entrepreneurs in Malaysia.

#### OTHER KEY PLAYERS



The Malaysian Economic Association (MEA) organises forums for economists to network, exchange ideas, new insights and findings on local economics, and organises lectures and seminars.



The Central Bank of Malaysia (BNM) promotes monetary and financial stability conducive to the sustainable growth of the Malaysian economy.

Also several private sector FInTech and eCommerce companies such as Grab. Touch n Go, are involved in several smart economy domain activities e.g., ePayment, digital banking, smart tourism

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders

## SMART ECONOMY

### PARTNERSHIP OPPORTUNITIES WITH THE UK

The UK has been successfully driving digital transformation to support economic growth. It is a global champion of smart city applications in several key economic sectors, ranging from financial services, media, manufacturing and construction.

For one, the UK has grown into a FinTech powerhouse, building on the global strength of its finance sector. Job creation, better wages, and more accessible financial services are some of the benefits that the UK's FinTech developments have helped to unlock.

Robotics, advanced materials, VR/AR, and 3D modelling are just a handful of the cutting-edge technologies that it has been applying to these sectors to increase productivity and efficiency. Several accelerators, such as Level39, are helping to further develop UK expertise. Level39 is an accelerator and a tech community, consisting of 1,250 leaders in cybersecurity, Fintech and retail tech.

#### WHAT CAN THE UK OFFER?

- **Process Automation** particularly robotic process automation solutions that are being deployed in Government and the National Health Service, among others.
- Compounded Semiconductors some applications include power electronics, photonics, ultra-high frequency operations, and advanced packaging.
- High Value Manufacturing such as composite, additive and integrated manufacturing for a range of high-tech applications like printed electronics.
- Immersive Media around 1,000 immersive-specialist companies in areas such as video games, interactive art shows, tourism etc.
- FinTech many players offering online international money transfer, currency exchange, virtual cards, stock trading and more.
- Smart Property Management from building management systems, digital twins to BIM.



#### HZA

#### (ash.tech)

ASH helps people and businesses extract data and analytics from brick-and-mortar spaces and is an expert in location analytics and digital twin technology. This can help clients design margin-boosting spaces, increase conversion, and more.

#### **CAPITA SOFTWARE**

#### (www.capita.com)

Capita Software supports a range of sectors providing modern applications and delivering intuitive enterprise software solutions. From business management software and automation to data analytics and customer engagement apps.

#### CHECKOUT.COM

#### (www.checkout.com)

Checkout.com empowers businesses to adapt, innovate, and thrive with Connected Payments™ technology that makes payments seamless. It provides fast and reliable payments in more than 150 currencies, through one API.

#### DELOITTE

#### (www2.deloitte.com)

Deloitte is a leading global provider of a range of professional services. Its Smart Factory Fabric, a cloud-enabled smart manufacturing solution, developed with AWS simplifies the process of synchronising talent, assets, and operations.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

## SMART ECONOMY



#### **EXAMPLE OF SMART ECONOMY BEST PRACTICE**

#### ENHANCING BUILDING MODELS, SINGAPORE

Ordnance Survey, a UK-based mapping agency leading in geospatial expertise, took on the challenge of extracting information from building information models (BIM) to make it available to wider stakeholders. BIM contains a lot of information on buildings that is used during construction and maintenance. Ordnance Survey engaged with potential users of the BIM data to find out which data could be used, and the best format and application of such data.

In Singapore, Ordnance Survey provided expertise to a project by the University of Singapore and the Singaporean government in which it championed the use of BIM data and its potential to transform urban planning. The project successfully developed a conversion engine and rule set that is able to convert BIM IFC models into CityGML format. This information comes at a vital time for Singapore - being densely populated, it needs solutions for more efficient city planning.

#### OTHER RELEVANT UK PROJECTS

- **GBSLEP Growth Hub**: hub for business funding, advice and entrepreneurial guidance
- (I) iHUB: the innovation hub of Oxfordshire County Council links business and academia
- MediaCityUK: launching a smart city accelerator programme for business opportunities
- Connected Places Catapult and Igloo Vision: showcasing the potential of immersive VR
- Manufacturing Made Smarter: a hub to accelerate digital innovation in manufacturing
- National Digital Twin Programme: in support of the Centre for Digital Built Britain
- Smart Factory Testbed: facility helping UK manufacturing develop digital solutions
- Velocity Birmingham: a hub for FinTech innovation and development in West Midlands



#### **OPPORTUNITY SPOTLIGHT**

# "A" DIGITAL INFRASTRUCTURE

This section will look at Malaysia's ambition to increase network connectivity, quality and cybersecurity, creating the foundation for smart cities, and how UK partnerships can help.



## SMART DIGITAL INFRASTRUCTURE

Infrastructure and implementation of digital infrastructure has been a central factor in Malaysia's fast-paced socio-economic growth, especially in urban areas.

#### INTERNET PENETRATION HAS ROOM TO GROW

Malaysia has made huge progress in Internet penetration, with a penetration rate of over 94% as of 2020.<sup>53</sup> And 93% of populated areas reportedly received 4G coverage, and basic data plans are generally affordable.<sup>54</sup>

Despite these successes, there is still room to grow in broadening internet penetration. Malaysia faces challenges expand broadband access to address unequal access between urban and rural areas (and even within cities). Some areas where opportunities to improve lie are internet speed and connectivity, the quicker rollout of 5G networks, addressing cybersecurity threats, and smoothening access to mobile network coverage.

#### DATA SHARING AND OPEN DATA WILL BE KEY

Bank Negara's 2017 Annual Report states that digital transformation could provide a boost of between US\$100 billion to US\$136 billion to the country's GDP by 2025.55 For digital transformation to succeed, data sharing and access across all levels of public sector will be key to address complexities in implementing national vision at the city level. Data sharing challenges are compounded by issues with data fragmentation, where data is collected and managed in silos. Some great emerging examples are Iskandar Malaysia Urban Observatory (IMUO) and Malaysia Urban Observatory (MUO) however these data hubs will also need to be integrated to ensure comprehensive evidence-based planning and implementation.

#### DIGITAL RESILIENCE & SECURITY

Building resilience is key in addressing cybersecurity issues. In 2020, the number of reported cybersecurity incidents in Malaysia experienced an 82.5% increase compared to the same timeframe in 2019.<sup>56</sup> To address digital resilience issues, there is opportunity for the government to enhance focus on capacity building and to explore technologies that improve productivity and efficiency across industries.

Malaysia's second tier cities and hinterland areas may need even greater support in this regard to build their digital skillsets and digital awareness in areas of cybersecurity, threats, appropriate use/ dissemination of data. This will be key to ensure equitable digital growth and prosperity.





86% OF MALAYSIA'S POPULATION ARE SOCIAL MEDIA USERS in 2021 - an increase of

**in 2021** - an increase of 24% since 2016.<sup>57</sup>



**40.69 MILLION MOBILE CONNECTIONS** in Malaysia as of January 2020 - an equivalent of 127% of the population.<sup>58</sup>

## SMART DIGITAL INFRASTRUCTURE

#### HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia has been making significant investments to develop its digital infrastructure and is now leading the way regionally on 5G. The National Fiberisation and Connectivity Plan targeted average download speeds of 30 Mbps in 98% of populated areas by 2023.<sup>59</sup>

Alongside ICT development, Malaysia is prioritising Cyber Security Strategy 2020-2024, a comprehensive strategy to mitigate evolving cyber threats through an integrated approach and is an effective model of public-private partnership. This strategy is based on five pillars that will govern all aspects of cyber security planning and implementation in Malaysia until 2024, which includes improving Malaysia's critical ICT infrastructure and boosting international cooperation by leveraging regional and international cooperation. As of October 2020, RM1.8 billion has been allocated to execute the initiatives under this strategy.<sup>60</sup>

The country is also pushing forward with AI research and investments on building data observatories to complement its existing infrastructure.

#### HOW SMART SOLUTIONS CAN HELP

Smart solutions capitalising on investments and partnerships can build digital infrastructure:



#### **CONNECTIVITY INFRASTRUCTURE**

- 5G Network Infrastructure
- · Broadband Infrastructure
- Smart Fibre infrastructure
- Low Power Wide Area Wireless tech



#### **DIGITAL INFRASTRUCTURE**

- Tier III/IV Data centres
- Large Scale Sensor Networks
- City wide Command & Control Center
- Virtual Digital Infrastructure



#### **CYBERSECURITY & PERSONAL DATA**

- Real Time Network Monitoring
- Integrated Centralised Security System
- Integrated Cybersecurity Policies
- Digital Infrastructure Resilience



#### **DIGITAL CAPABILITIES**

- Smart classrooms
- Digital Learning Platforms
- Early Digital Education Programs
- Mid Career Transition Programs



#### RECENT DEVELOPMENTS

#### **NATIONAL DIGITAL POLICY**

**(NDP)** With new economic drivers such as the digital and green economy and 5G network in the pipeline, the government has taken a lead on development of the NDP to fill any potential gaps.

#### MALAYSIA CYBER SECURITY STRATEGY (MCSS) 2020-2024

The government established MCSS to ensure that it is equipped with the technology and expertise to prevent cyberattacks. Malaysia is open to bilateral and multilateral relationships in cybersecurity to overcome all challenges.

## COMMUNICATIONS INFRASTRUCTURE MANAGEMENT SYSTEM (CIMS) ENHANCEMENTS As

part of the Jendala initiative, the CIMS will be upgraded into a one-stop digital infrastructure databank. This will provide information on the current state of infrastructure coverage and availability of digital connectivity, which can be used to coordinate actions to fix gaps and optimise use of resources through infrastructure sharing and reducing duplication.

# SMART DIGITAL INFRASTRUCTURE



#### **KEY MINISTRIES**



Ministry of Communications and Multimedia (KKMM)



Ministry of Housing and Local Government (KPKT)



Ministry of Works (KKR)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories



Malaysia Communication and Multimedia Commission (MCMC) part of KKMM that focuses on accelerating inclusive digital economy and society



CyberSecurity Malaysia is part of KKMM that focuses on reducing digital systems' vulnerability and strengthening Malaysia's selfreliance in cyberspace.



Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) modernises the public sector in the areas of administrative reforms



Department of Statistics, Malaysia (DOSM) is responsible for acquiring, interpret and disseminate the latest and realtime statistics data of economic and social development.

#### OTHER KEY PLAYERS



The National Tech association of Malaysia (PIKOM) is an association representing the ICT industry in Malaysia with over 1000 members of companies and commands 80% of the ICT trade in Malaysia.



SSDU Innovation also known as Smart Selangor Delivery Unit has been mandated by the Selangor State Government to implement the state's smart city agenda.



**Digital Penang** was established to enable and orchestrate Penang state's digital strategy – Penang 2030 & Penang Digital Transformation Master Plan

Also, several private sector companies such as Maxis DiGi, Celcom, TIME dotcom and Telekom Malaysia are involved in several smart digital infrastructure domain activities e.g., Fiberisation connectivity, 5G development, telecommunication services.

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders

# SMART DIGITAL INFRASTRUCTURE

#### PARTNERSHIP OPPORTUNITIES WITH THE UK

The UK has fostered technological advancements in IoT, AI, blockchain, sensors and electronic systems and championed their practical applications to improve digital infrastructure and connectivity.

From Alan Turing, the pioneering mathematician and computer visionary. who launched the field, to DeepMind's AlphaGo, the first computer program to defeat a professional Go player, the UK has been at the cutting edge of Al innovation.

Having set a solid foundation for its digital infrastructure, the UK is now paving the way towards next generation connectivity. It is currently amongst the world's leading countries in the global 5G market.

The UK is home to many pioneering and high-growth businesses and startups in this space. Through accelerator programmes like Sensor City, IoT Tribe and National Cyber Security Centre's Cyber Accelerator, the UK continues to enhance its capabilities in this space.

#### WHAT CAN THE UK OFFER?

- Data Infrastructure guiding principles for data curation and management, storage, processing, visualisation, access and security.
- Digital Resilience framework and tools for a range of stakeholders to embed digital resilience into products, education and services.
- Privacy Engineering technical knowhow and process management to integrate privacy into product design, business, legal, etc.
- Sensing, Imaging & IoT an array of companies with IoT platforms, smart materials, machine-tomachine solutions and much more.
- Next Generation Connectivity includes but is not limited to network consultancy, spectrum services, test equipment, testbedas-a-service, and network management tools.
- Al companies offering cuttingedge Al-powered solutions for privacy, health, financial and legal services, etc.



#### **UK PLAYERS IN THIS PILLAR**

#### **PRIVITAR**

#### (www.privitar.com)

Privitar is an enterprise software company with a global client-base across North America, Europe and Asia. It is leading the development and adoption of privacy engineering technology, enabling their customers to leverage data with data privacy.

#### **ATHONET**

#### (www.athonet.com)

Athonet is one of the leading providers of fully softwarised mobile core networks for LTE and 5G for enterprises, public-safety and mobile operators. It offers 5g-SA, 5G-NSA and LTE core networks that can be self-deployed or as a Network-as-a-Service.

#### NCC GROUP

#### (www.nccgroup.com)

NCC Group is a global information assurance firm headquartered in Manchester, UK. It has expertise in cybersecurity and risk mitigation and provides services such as software escrow and verification. cyber security consulting and managed services.

#### INTECHNOLOGY

#### (www.intechnologysmartcities.com)

Intechnology provide a range of products and services that utilise advanced IoT smart sensor technology as part of its Connected City Platform. It is currently live in 10 major UK cities, with 11 more soon to adopt their digital infrastructure solution.

\*These are examples of companies; more such companies can be found in the UK Smart Cities Directory







#### EXAMPLE OF SMART DIGITAL INFRASTRUCTURE BEST PRACTICE INTEGRATED SMART DATA HUB, BANGKOK, THAILAND

An Integrated Data Hub is being built as part of the Global Future Cities Programme, a component of the UK's Prosperity Fund, in Thailand.

The project aims to provide a centralised and trusted data repository that turns open data into a vehicle for sustainable development. This could help encourage interdepartmental coordination, better inform decision making and enhance integrated planning for the Bangkok Metropolitan Administration (BMA).

The first phase of the project focused on the development of a Data Science Platform, which could enable the BMA to develop smart city solutions for urban planning, transport, and a host of other city needs.

A roadmap for implementation was one of the first deliverables of this project. This outlined the critical aspects of managing a city-wide data hub, from data collection and sharing, to reliability and quality.

#### OTHER RELEVANT UK PROJECTS

Better Broadband for Oxfordshire: fibre enabled broadband to homes and businesses Data Mill North: an open data platform for North East England used across 7 councils MK Data Hub: data infrastructure for static and dynamic data from a variety of sources

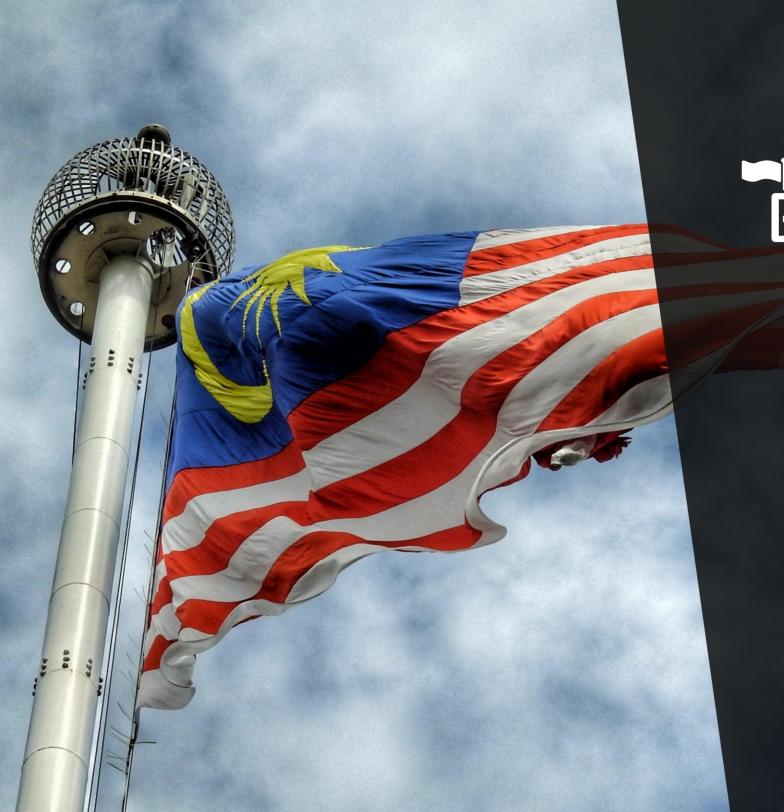
(2) West Midlands 5G: UK's first multi-city 5G testbed trail paving the way for future rollout

Manchester CityVerve: UK's first city to demonstrate the use of IoT technologies scaled

BT and Toshiba Europe: UK's first quantum-secure industrial network between facilities

Things Connected: an initiative supporting UK businesses using LPWAN technologies

Smart Park Queen Elizabeth Park: the largest free public Wi-Fi network of its kind



# OPPORTUNITY SPOTLIGHT SMART GOVERNMENT

This section will explore some of Malaysia's key challenges around municipal governance that digital technologies can help address and, benefits that UK partnerships can bring in this context.

# SMART GOVERNMENT

E-Government is one of Malaysia's main national digital transformation efforts. Already, important systems have been implemented and a national public platform is active. There are opportunities to do more.

#### ENHANCE INTER-AGENCY COORDINATION

There is an opportunity to build "foundational data" to better inform the delivery of public services, national statistics and urban planning. Fusion and accessibility of datasets already collected by Malaysia's Department of Statistics and other similar agencies could shed light on demographic trends, land usage, economic activity and operations of urban systems. This could provide intelligence for critical policy and planning decisions and serve as the data foundation for smart services.

There is also a need for a clearly established regulatory framework defining how this data can be collected and shared across agencies, and how personal data is used and secured.

#### BUILD SMART CITY CAPABILITIES

Through the Digital Government Transformation Action Plan, Malaysia has made e-government transformation a priority. Though many initiatives have been launched, implementation challenges have arisen, and system usage and data sharing remain limited.

Implementation challenges are multi-faceted, and typically involve a lack of prioritisation and resources to help government officers understand and use digital tools more effectively. Malaysia can leverage on collaborations to ensure that there is a robust training of human capital through skill-shares and improve the uptake of digital jobs in the government sector for continuous economic growth.

#### ENHANCE TWO WAY COMMUNICATION

E-government efforts in Malaysia have so far focused on government operational efficiency, notably spreading the use of digital signatures, digitising critical public documents and data, and deploying nationwide government-to-citizen communication. There is a need for strengthening coordination between federal and state governments to ensure better roll-out of e-services and adequate sharing of data between institutions and the public. Currently, avenues for public shaping the governance agenda are also limited. The definition of e-government could be broadened to include more inclusive approaches, such as participatory planning platforms and citizen-to-government communication mechanisms.



#### **85% ONLINE SERVICE**

**INDEX** Majority of government services are widely available online.<sup>61</sup>



#### PUBLIC SERVICES

31 digital services from various agencies are available using Single Sign On (SSO) authentication on the MyGovernment portal.<sup>62</sup>



#### **10 MILLION VISITORS**

have been recorded as part of on the online e-government portals in 2021. 10,000 online services across eight key service areas were provided in the same time period.<sup>62</sup>

# SMART GOVERNMENT

## HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia is committed to its public sector digital transformation agenda to better meet public needs. Further opportunities exist in setting up a standardised framework for digitalisation of documents, improved data security, and an integrated database that supports data-sharing across ministries. The country is also committed to building the necessary human resource IT skills to support e-government transformation.

The Scheme for National Digital Transformation by 2025 outlines the interventions in terms of governmental operations. The government has begun to digitalise administrative procedures, and create more online resources for the population, while at the same time using technology to address public security, crime prevention, and safety.

E-government technologies cover a wide array of public services and may vary based on the agency or ministry involved.

#### HOW SMART SOLUTIONS CAN HELP

Listed are platforms, technologies and systems that can be utilised to improve and streamline government services:



#### **DIGITALISED PUBLIC SERVICES**

- · Digitisation Blueprint
- · Digital Capacity Building
- Robotic Process Automation
- Digital Community Platform



#### **DIGITALISED PUBLIC ASSETS**

- Common Geographic Information System (GIS) Platform
- Digital Customer Support
- Digital Birth Certificates
- Document Management Systems



#### **PUBLIC DATA MANAGEMENT**

- Federated Data System
- Centralised Data Platform
- Public-Private Data Exchange Platform
- Web Analytics Tools



#### **CITIZEN ENGAGEMENT**

- Civic Engagement Platform
- Digital Crowdsourcing
- Local Business Collaboration Platform
- Peer-to-Peer Training

#### **RECENT DEVELOPMENTS**

## ISKANDAR MALAYSIA URBAN OBSERVATORY (IMUO) This

project aims to harvest, update, analyse, manage, and disseminate data and information on Iskandar Malaysia to feed urban information to the regional authority for better city planning and implementation. There are a few other urban observatories and command centres in the pipeline: Malaysia Urban Observatory, KL Urban Observatory, Melaka Data Observatory and Sarawak's Integrated Operation Center.

#### HYPER-SCALE DATA

**CENTRES** by Amazon Web Services,

Microsoft, Google Cloud and Telekom Malaysia. These centres aim to empower cloud computing services and enhance digital adoption within the public sector. 80% of public data will be migrated to the cloud system by 2023, reducing the cost burden on ICT management and administration in the long run.

# SMART GOVERNMENT

#### **KEY MINISTRIES**



Ministry of Communications and Multimedia (KKMM)



Ministry of Housing and Local Government (KPKT)



Ministry of Higher Education (KPT)



Ministry of Education (KPM)

KEMENTERIAN PENDIDIKAN MALAYSIA



Ministry of Human Resources (KSM)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories



Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) modernises the public sector in the areas of administrative reforms



Malaysia Communication and Multimedia Commission (MCMC) part of KKMM that focuses on accelerating inclusive digital economy and society.



National Cyber Security Agency (NACSA) is a national lead agency for cybersecurity matters tasked with developing and implementing national cybersecurity policies.

#### OTHER KEY PLAYERS



Malaysia Computer Emergency Response Team (MyCERT) under CyberSecurity Malaysia provides a point of reference for the internet community in Malaysia to deal with computer security incidents.



Public Service Department (JPA) is responsible for the public service in Malaysia.

Also, several private sector companies such as MyEG Services, Telekom Malaysia and IBM are involved in several smart government domain activities, e.g., digital government transformation initiatives, e-Government projects and cloud computing services.

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders

# SMART GOVERNMENT

# PARTNERSHIP OPPORTUNITIES WITH THE UK

The Government Digital Service (GDS) is a unit of the government of the United Kingdom's Cabinet Office tasked with transforming the provision of online public services and helping government work better for everyone by leading digital transformation.

In Malaysia, GDS is collaborating with Selangor state for institutional capability and capacity building on digital delivery in government, and with Digital Penang for supporting the development of digital and technology standards and guidance. At national level, GDS is working with MAMPU to support digital and data skills, as well as data sharing and API standards.

GDS works with governments around the world to help them tackle issues ranging from corruption, data systems, and citizen engagement. Leading UK management and consulting firms specialise in helping cities develop integrated data platforms for efficient service delivery, better urban planning, and streamlining business registration and citizen payments.

#### WHAT CAN THE UK OFFER?

- Citizen Engagement examples of design approaches, mobile applications, and civic innovation centres to better engage citizens
- Digital Service Standards a guide for creating and providing public services that aligns with policy, user needs, complies with open government standards, etc.
- Data Governance all aspects of data ownership, collection, classification, standardisation, linkage, archiving, disposal, etc.
- Digital Academy a model for training public sector workers with skills for digital government, e.g., the UK's GDS Academy
- Knowledge Sharing GDS's approach to collaboration and exchange with local authorities and international partners
- Service Accessibility adding assistive technologies to make public services accessible to all

#### **UK PLAYERS IN THIS PILLAR**

#### **ANALYTICS ENGINES**

(www.analyticsengines.com)

Analytics Engines is a trusted data analytics partner to local and international customers across industry and the public sector. They are specialists in data integration, data management, ML, AI, advanced analytics and visualisations.

#### BRITISH STANDARDS INSTITUTION

(www.bsigroup.com)

BSI works with international, central and local government and public services to enhance infrastructure, provide innovation and support public policy. It provides standards, consultancy, research and intelligence, and assurance services.

#### **ENGENEUM LIMITED**

(www.engeneum.com)

Engeneum offers a wide variety of solutions to capture, convert, store, share and manage physical and digital data, with ISO27001 assurance. They understand and work with many legacy systems.

#### **SPACEHIVE**

(www.spacehive.com)

Spacehive is a UK-based crowdfunding platform for projects aimed at improving local civic and community spaces. It is used by tens of councils, including the Mayor of London, companies and foundations to fund place-based community projects.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

# SMART GOVERNMENT





#### EXAMPLE OF SMART GOVERNMENT BEST PRACTICE

#### SMART CITY PHASE 2, DUBAI, UAE

#### **Connected Places Catapult**

brought together a network of UK companies and academics, bringing together years of experience in supporting urban ecosystems that nourish entrepreneurship and innovation. The group recommended a range of solutions that could help Dubai achieve its smart city goals. These included a set of practical policy and technology proposals and an overall human-centric, design-led approach. City authorities benefited from having a neutral convener to structure an

actionable smart city plan. To date, many of these actions have been implemented. One of the first was the creation of a new government department – the Smart Dubai Office. As Dubai implements its strategy, the Catapult's Smart District Guidelines also provides a framework for other districts to use. The Catapult also prototyped digital tools, such as a citizen dashboard with new tailored services, like registering a business.

#### OTHER RELEVANT UK PROJECTS

- MyGlasgow App: a mobile app that enables reporting of issues to Glasgow City Council
- Bristol Approach to Citizen Sensing: co-creating smarter cities putting communities first
- Public Services Network: helping public sector organisations share and work together
- **GOV.UK Pay**: a free and secure online payment service for public sector organisations
- GOV.UK Notify: a messaging platform that is used by more than 1,500 public services
- GOV.UK Verify: a secure and easy way to prove identify to access government services
- Mottinghamshire Digital Asset Management: pioneering project to digitalise personnel files
- Data Trusts: researching the role data trusts can play in addressing data governance



# SMART MOBILITY

Malaysia has been making significant investments to improve the quality of its road infrastructure and deploy large scale and improved public transportation systems.

#### TRAFFIC CONGESTION CHALLENGES

Malaysia's main cities have been plagued by traffic congestion. While increase in income levels and fuel affordability contribute to increased demand, the supply side such as roads and associated infrastructure try to keep up. Corridor planning and expansion are complex subjects which need balancing between competing uses for land. Sprawl and urban flooding further exacerbate congestion issues.

It is also important that transportation solutions such as payment systems at toll gates (e.g., SmartTAG, etc) are implemented seamlessly given the dynamic nature and sheer volume of traffic movement on urban roads.

#### PUBLIC TRANSPORTATION CHALLENGES

Over the years, Malaysia has witnessed a rapid development in its urban transport systems. Most of its major cities have well connected bus routes and either have or are in the process of implementing rail systems.

The success in uptake of public transportation in Malaysia would depend on the cities' ability to make public transport a mode of choice by ensuring high accessibility and quality of service. Challenges arise in consolidating transport systems and services when there is fragmentation of transport-related agencies and lack of centralisation on transport governance.

#### URBAN PLANNING EMPOWERMENT

Evidence-based human-centered urban planning is essential to ensure adequate mobility and accessibility. This is also recognised as a key strategy within the National Transport Policy (NTP) 2019-2030 through centralising transport databases and modelling and developing Big Data capabilities.

The NTP aims to take advantage of rapid advancements in technology to help promote a modal shift from private vehicles to public transportation. The NTP maps out initiatives to drive up public transport usage to 40% or more of the population. It will also support technology deployment such as ride-sharing platforms, IoT and other data-based tools to make private vehicle usage more efficient.



#### RM 10 - 20 BILLION

are lost annually in Malaysia due to traffic congestion, according to a report from The World Bank, Malaysia Economic Monitor.<sup>63</sup>



#### 1 CAR FOR EVERY 2.25 PEOPLE

in Malaysia, as of 2019, which totals to 31.2 million vehicles on the road, of which 14.5 million are cars. This also translates to roughly 1 motor vehicle per person in Malaysia.<sup>64</sup>



#### **20% USE PUBLIC TRANSPORT**

in Malaysia, citing inconvenience and lack of coverage as main aversion factors. For e.g., Kuala Lumpur is a city with expensive public transport, where some 10% of a city dweller's average disposable income goes to transport.<sup>65</sup>

# SMART MOBILITY

## HOW MALAYSIA IS ALREADY ADDRESSING THESE CHALLENGES

Malaysia's rapid urbanisation is putting pressure on existing mobility infrastructure, causing congestion and stretching the capacity of existing public transportation networks. These challenges provide an opportunity to improve the efficiency of current public systems while adopting modern solutions to increase the fluidity of traffic and shift commuters towards new ways of moving.

City-level planning is putting a lot of attention and effort towards developing mobility infrastructure. The plans focus on developing the public transportation system, as well as improving efficiency of urban and spatial planning. These plans align with the 12<sup>th</sup> Malaysia Plan and the Shared Prosperity Vision that emphasise integrated infrastructure and encourage the development of core mobility systems.

These ambitions can be supported by a multitude of disruptive digital technologies that use data to transforming the way traffic is being monitored, public transport systems are being operated and the way people move about the city.

#### HOW SMART SOLUTIONS CAN HELP

Smart technologies and systems can be implemented in various aspects of infrastructure development:



#### **RAIL & BUS MANAGEMENT**

- Vehicle & Track Component Monitoring
- Centralised Command & Control
- Smart Signalling
- Passenger Flow Monitoring



#### TRAFFIC MANAGEMENT

- Intelligent Transport Systems
- Smart Public Parking Management
- Automated Traffic Enforcement
- Real Time Traffic Management



#### **URBAN & SPATIAL PLANNING**

- 3D City Digitisation
- Common GIS Platform
- Agent Based Modelling
- Participative Planning



#### **ALTERNATIVE MOBILITY**

- Personal Mobility Devices Network
- Integrated Mobility Platforms
- Public Digital Wayfinding
- Infrastructure for Electric Mobility

#### RECENT DEVELOPMENT

**AUTOMATED RAPID TRANSIT** (ART), KUCHING This project is a government-initiated smart city project. A hydrogen-powered public transport system and runs on a virtual track will cover a total distance of 50km (27km in radius). The project is expected to commence in 2022 and the first pilot ART pilot test by 2023 and be fully completed by 2027.

## ISKANDAR MALAYSIA BUS RAPID TRANSIT (IMBRT) The

project aims to increase public transport coverage up to 90% and public transport modal up to 40% with clean energy mixed fleet of vehicle: high capacity, direct service and feeder service. There will be 39 stations in total, 3 TOD hubs, and numerous integrated transport systems technology to be implemented within the IMBRT corridor.

#### **NATIONAL ELECTRIC BUS**

**ROADMAP** The projects aim to develop a roadmap to a nationwide implementation of 6,000 e-buses by 2030, in line with the National Transport Policy, Low Carbon Mobility Blueprint and RMK-12.

# SMART MOBILITY

#### **KEY MINISTRIES**



Ministry of Transport (MOT)



Ministry of Works (KKR)



Ministry of Finance (MOF)



Ministry of Home Affairs (KDN)



Ministry Of Science, Technology And Innovation (MOSTI)

#### KEY LOCAL AUTHORITIES & **AGENCIES**



155 Local Authorities City, municipal and district councils across 13 states and 3 federal territories



Land Public Transport Agency (APAD) is part of MOT that focuses on regulating rules concerning land-based public and freight transport



prasarana Prasarana Malaysia Berhad is a company owned by MOF, owner and operator of public transport in Malaysia (Rapid bus and Rapid Rail.



Malaysia Public Works Department (JKR) department under MOW responsible for construction and maintenance of public infrastructure

PLANMalaysia Town and Country planning authority responsible for reviewing planning applications

#### OTHER KEY PLAYERS

CREST Collaborative Research in Engineering, Science and Technology Center (CREST) opens city lab programs to develop autonomous vehicles



Intelligent Transport System Association Of Malaysia (ITSM) promotes ITS and assists in standard. quideline and specification development



The Malaysia Automotive, Robotics and IoT Institute (MARii) is an agency under the MITI. It focuses on enhancing the automotive industry's competitiveness and overall mobility through the adoption of robotics & IoT.



Malaysian Institute of Road Safety Research (MIROS) is a government agency under MOT to serve as a central repository of knowledge and information on road safety.

Also, several private sector companies such as Cyberview. Touch 'N Go and Futurise are involved in several smart mobility domain activities, e.g., cashless toll payment, autonomous vehicles and intelligent transport systems.

\*Logos or company names presented here are a sample and not an exhaustive representation of all private stakeholders

# SMART MOBILITY

# PARTNERSHIP OPPORTUNITIES WITH THE UK

The UK is a global leader in mobility with a world-leading motorsport sector, a long-standing history in the automotive industry, and a wide range of specialist engineering consultancies. Its expertise and knowledge has set the stage for the UK to shape the future of mobility. Today it leads developments in connected, autonomous, shared and electric transport. It innovates and collaborates with the industry aligned to the Grand Challenges articulated in the UK's Industrial Strategy, such as Clean Growth and the Future of Mobility. Connected Places Catapult is the UK's innovation accelerator for cities. transport, and places. The Institute for Future Cities is leading future mobility research.

There are a number of UK companies with a deep understanding of the way people move and interact with transport systems. Their expertise includes transit-oriented development and urban data and analytics. The UK can also offer world-class expertise in ITS systems that puts the traveler at the heart of a coordinated transport network.

#### WHAT CAN THE UK OFFER?

- Transit Oriented Development a mixed-use development approach to regional planning, urban design, transit and landscape architecture.
- Connected Autonomous Vehicles (CAV) - large-scale, safe and secure testing of CAV, alongside world leading regulations, and an influence on international standards for vehicle cyber security.
- Shared Mobility a solid base of car clubs, peer-to-peer car sharing, ride hailing, electric bike sharing, and Mobility-as-a-Service schemes.
- Electric Vehicles (EV) various aspects of the EV value chain including charging infrastructure, energy demand scenarios, regulatory options and incentives.
- Advanced Spatial Analysis application and visualisation of spatial analytic techniques and simulation models of transport.
- Open Urban Data use of data to design tailored mobility solutions, such as data on modal choices.

# UK PLAYERS IN THIS PILLAR

#### MASABI

#### (www.masabi.com)

Masabi makes city transport smarter by simplifying ticketing and streamlining fare collection, validation and management for transport providers across all modes of public transportation. Its solutions have been deployed and are operated in cities globally.

#### CITI LOGIK

#### (www.citylogik.com)

Citi Logik provides insight into the way people move on foot, in a vehicle or by train. They are experts in population movement, transport modelling and data science helping clients make informed decisions on transport and urban planning projects.

#### COSTAIN

#### (www.costain.com)

Costain is a smart infrastructure solutions company. It delivers a broad range of innovative services across sectors, including transportation. It delivers integrated consultancy, asset optimisation, technology and complex delivery services.

#### **BP PULSE**

#### (www.bppulse.co.uk)

BP Pulse is one of the largest EV charging companies in the UK. It provides end-to-end EV charging solutions for homes, businesses, workplaces. It has served over 7,000 public chargers and thousands of customers over 10 years.

\*These are examples of companies for more companies can be found in the UK Smart Cities Directory

# SMART MOBILITY



#### **EXAMPLE OF SMART MOBILITY BEST PRACTICE**

#### INCENTIVES FOR TRAVEL BEHAVIOUR CHANGE, BOLOGNA, ITALY

SRM, the public transport authority of Bologna wished to explore new ways to address congestion and transport related GHG emissions, by incentivising people to use sustainable modes and thus fostering behaviour change.

Under a EU Horizon 2020 programme, UK based **BetterPoints** and SRM entered a partnership to encourage urban dwellers to reduce day-to-day single occupancy trips, using. BetterPoints designed a dataled platform called <u>Bella Mossa</u> which used rewards and

gamification technologies to encourage modal change.
BetterPoints also worked with SRM to build additional tools into the platform for mode validation algorithms, barcode technology and integration with OpenStreetMap.

The programme had more than 22,000 participants and resulted in 58% participants cycling more, 78% walking more versus 63% using cars less which translated to 1.4 Million kg of  $CO_2$ e emissions avoided.

#### OTHER RELEVANT UK PROJECTS

- <u>Live Labs</u>: how data and technology can improve decision-making for future highways
- Optimise Prime: world's largest commercial EV trial for to prepare for the transition
- MK Smart, Shared and Sustainable Mobility: exploring MaaS and CAVs opportunities
  - Glasgow Operations Centre: an integrated system for traffic and safety management
  - City Observatory: using an urban data information system to understand cities better
- UK Autodrive: the UK's first collaborative CAVs trials on open city roads across 4 cities.
  - Birmingham Big Data Corridor: using data to explore new mobility products & services
- Durban Mobility Innovation Index: framework assessed maturity of 30 cities worldwide

Malaysia's recent policies, strategies and drivers make it a fertile ground to enable the growth of smart city projects. This section looks at the type of recent opportunities that are coming up across Malaysia. This section also describes the key enablers that will help determine the success of those opportunities.



## SMART CITIES IN MALAYSIA: WHAT'S NEXT?

#### NEW PROJECTS IN SMART CITIES HAVE BEEN TENDERED CONSISTENTLY IN THE RECENT PAST AND THIS TREND IS LIKELY TO CONTINUE

The increasing need for innovation and sustainability has given a new push to Smart Cities in Malaysia, and this trend is looking to continue into the foreseeable future. From the 100+ projects identified while developing this handbook, 23 smart city projects presented here represent the most recent activities taking place in the Malaysian market between 2020 and the start of 2021.

- Ambitious public projects in line with current national and local smart city solutions and policies described in Section 2.2
- 2 Large private sector driven projects envisioned by Smart City developers and digital transformation leaders within this space.

In addition to the above, there are other multilateral and global programmes that address relevant themes such as the FCDO programmes in Iskandar Malaysia and Melaka, and Global Environment Facility (GEF) funded Global Integrated Approach Pilot on Sustainable Cities Development, also in Melaka.

#### NEW SMART CITY PROJECTS RECENTLY INITIATED

	<ul> <li>Digitalisation Of KPDNHEP Services</li> <li>Integrated Medical Information System</li> <li>Cybercrime Integrated Management System</li> <li>Underground Network Fiber Cable</li> <li>Autonomous Vehicle Test Route 7km</li> <li>Urban Observatory</li> <li>Self-sustaining Urban Farm</li> <li>National Digital Infrastructure Plan (JENDELA)</li> <li>Hyper-Scale Data Centre and Cloud Service</li> </ul>	KPDNHEP KKM MKN MCMC MOT EPU, IRDA, UNDP MBPP KKMM
2	<ul> <li>Mobility and City Planning Solutions (CATCH)</li> <li>Al Innovation City</li> <li>Development of Mobile Apps to Promote Tourism</li> <li>Implementation of Construction with Data Processing</li> <li>Smart Integrated CCTV with Al and WiFi Connectivity</li> <li>eKlas (eClass VR Experience 5G Use Case)</li> <li>Augmented Virtual Reality (AVR) Training Lab 2020</li> <li>Cross-construction Integration &amp; Carbon Neutral home</li> <li>Sunway Smart Township</li> <li>IR4.0 Solutions (Urban and Agricultural sectors)</li> </ul>	TMF Skymind, IRDA MAH, MyBHA LBU SCAC Maxis SDEC, Huawei, Centexs, Sime Darby Huawei, Sunway Bhd Celcom, Aerodyne

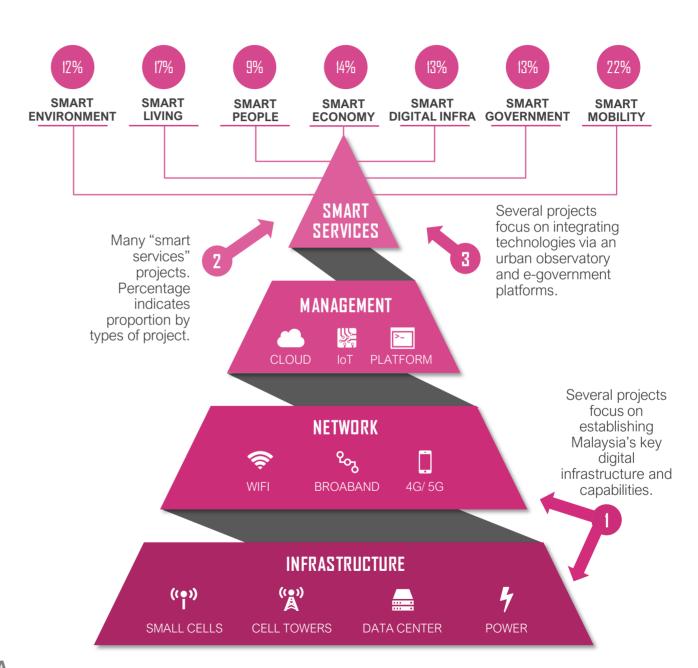
SMART CITY HANDBOOK: MALAYSIA

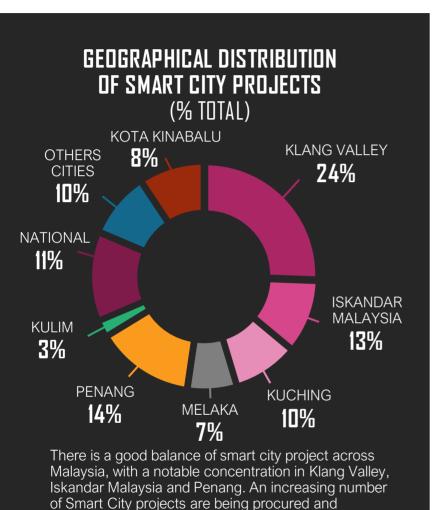
When we combine the over 100+ projects inventoried, including the ones recently tendered, a few trends emerge:

Projects have focused on setting Malaysia's key digital infrastructure and capabilities.

The initial priorities within smart cities in recent years were to widen Malaysia's core digital and connectivity infrastructure, for instance underground fibre optics and telecommunications.

- Many "smart services" projects are concentrated around a few key topics. Projects concerning digital infrastructure are not the only ones being worked on. There have been a number of critical "smart services" to increase efficiency of urban systems and improving the living experience of citizens. Most projects centre around critical keywords such as "digital economy" and "mobility".
- Several projects focus on integration and large software platforms (like centralised controls and urban observatories), although most are looking to integrate various technologies that are being introduced.





deployed in cities such as Melaka, Kuching and Kota

Kinabalu.

## CURRENT PROJECTS INDICATE WHAT NEW OPPORTUNITIES MAY LOOK LIKE

Since many smart city projects are being executed in Klang Valley, Iskandar Malaysia and Penang, other cities like Melaka, Kuching, Kota Kinabalu and Ipoh are following suit. Some key themes that are emerging are as follows:

- Urban Observatories: Integrated data hubs used to harvest, manage and disseminate data for urban service delivery and applications relating to water monitoring and pollution density, etc.
- **E-Government Services:** With the thrust from the federal government to implement e-government services, it is likely that cities too will look into technical solutions for their city e-government solutions.
- Smart Healthcare Solutions: MOH has pushed for the development of medical information technology since 2018. This encompasses electronic health records, health databases, smart devices and telemedicine projects.
- Smart Transport Solutions: The focus is on road, rail and public transport agencies to implement smart technologies. There has been much progress, yet cities are looking for

solutions in respect of automated rail transport systems, Bus Rapid Transport, smart parking, e-ticketing and electric powered buses.

- Cyber Security Services:
  Accessibility to data plays a huge role in helping companies to be ahead of the curve. Government initiatives by bodies like Malaysian National Security Council (MKN) have set out to execute projects to stem cybercrimes.
- Smart Manufacturing: Malaysia is expediting industry IR4.0 programmes. Developers like Skymind Global, a leading industrial AI ecosystem builder, are proposing solutions and models to execute smart manufacturing.
- Digital Infrastructure: While most projects focus on setting up the foundational infrastructure, we see opportunities for technologies, platforms and applications related to cloud, mobile, social data, and IoT.
- Renewable energy: Malaysia has been trying to significantly increase the use of renewable energy, e.g. Johor and Perak are investing in solar power. Demand for smart energy solutions (e.g., energy planning, Al integration, and smart grids) is likely to increase.



## NEW PROJECTS SERVING UNDERSERVED CHALLENGES

We see future opportunities for smart city projects to start exploring and addressing underserved challenges, such as resource management, environmental management and enhancing liveability. They could involve:

- Waste Management and Drainage Systems: Key drivers around resource sustainability and increasing urbanisation will keep the thrust on flood management, waste-to-energy, and waste management.
- Climate Resilience: Malaysia has been initiating programmes for climate change adaptation and mitigation since the 2000s. There is more to be done to strengthen the resilience of national infrastructure.
- Urban Agriculture: KPKT are now looking to develop guidelines for urban farming to ensure they are conducted in accordance with quality standards. This also offers opportunities for community participation and engagement.
- Ed-Tech: Malaysia has been at the forefront of the Ed-Tech industry, which has been gaining momentum during the pandemic. E-learning platforms (e.g. DELIMa) were successfully launched by KPM together with major tech companies.

We also see opportunities for new smart city projects in different areas of egovernment, infrastructure and economy. Projects on systems integration and growing the digital economy are likely to shine. Here are some examples:

- Open Data Systems: Interoperability has recently emerged as a key priority for the national e-government agenda. The many departments are now looking to build shared databases and open data ecosystems.
- IR4.0: MITI launched the Industry 4WRD policy to transform the manufacturing sector and related services to become high value-based sectors. Industry players are now looking to upskill existing resources and to invest in higher technologies.
- E-commerce: Malaysia wholly embraced e-commerce amid the pandemic and continues to see rapid developments in this space. The primary sectors and SMEs (brick-andmortar retails, startups) are all adopting e-commerce technologies.
- Smart Infrastructure Management:
  Numerous smart urban development
  projects are underway. Developing
  integrated asset management and
  building management systems will be
  a key aspect of these projects.
  Currently there is high demand for
  service providers with such expertise.

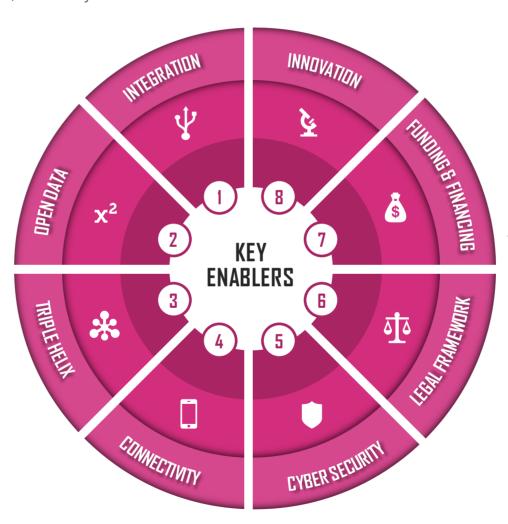
## KEY ENABLERS TO **FUTURE SMART CITY IMPLEMENTATION**

Successful smart city implementation requires a set of critical enablers to exist. While Malaysia has already made great progress developing many of them, more can be done around eight domains in order to ensure future smart city projects are impactful, financially sustainable and inclusive.

- TECHNOLOGY INTEGRATION By putting in place guiding national strategies, backed by strong standards and integrated
  - technology approaches to facilitate interoperability
- **TPEN AND CENTRALISED DATA** By investing in the collection, centralisation and sharing of meaningful data to power the intelligence of smart city initiatives nationwide
- TRIPLE HELIX By setting clear roles and responsibilities and creating platforms to foster collaborations between government, industry,

academia and civil society

CONNECTIVITY By putting in place the fundamental infrastructure needed to ensure fast, reliable and inclusive internet access. and deepen fixed broadband penetration



#### CYBER SECURITY

By building in measures and standards, such as data encryption, security monitoring and ensuring these serve the full range of Smart City environments and devices

#### LEGAL FRAMEWORK

By harmonising national and local level smart city strategies and plans, and connecting them to on-the-ground implementation

#### FUNDING & FINANCING

By empowering the private sector and creating platforms to foster collaborations

#### RESEARCH & INNOVATION

By promoting integrated approaches that are impact driven and multidisciplinary, as opposed to technology focused and siloed



### TECHNOLOGY INTEGRATION

# AS TECHNOLOGY ADVANCES RAPIDLY, THE MALAYSIAN GOVERNMENT HAS BEGUN TO ADDRESS STANDARDISATION AND TECHNOLOGY INTEGRATION.

In 2017, MCMC along with Malaysian Technical Standards Forum initiated a working standardisation reference for stakeholders to consider, especially to provide an information and communications frame of reference for smart cities.

More recently, PLANMalaysia and the Department of Standards Malaysia (DOSM) have embarked on developing Smart Cities standards and establishing common benchmarks to compare Smart Cities' performance. This body of work will continue for the next couple of years.

To propel these actions further, available global best practices can be contextualised to suit the needs of regional and local governments. This would need to consider key aspects around interoperability, data services, technical specifications of IoT, security guidelines and maintainability of technologies.

### **x**<sup>2</sup> Open & Centralised Data

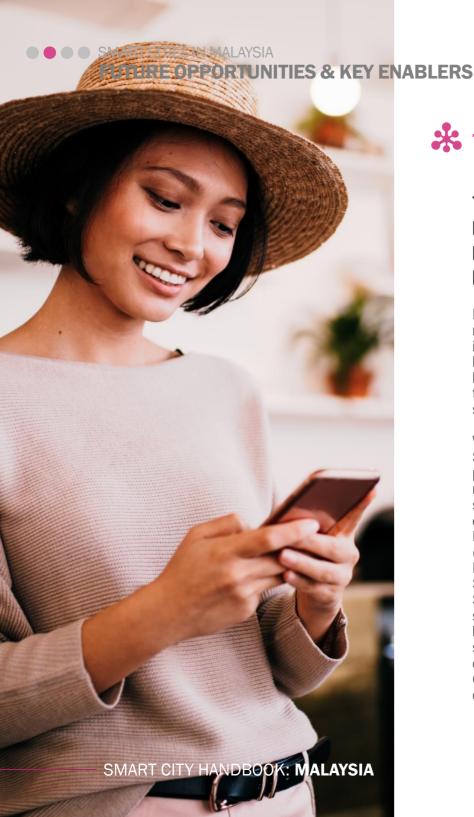
Data collection, centralisation and sharing present great opportunities. Data centralisation is best planned ahead, as it can be costly and time consuming to later integrate siloed data.

MAMPU, which is responsible for modernising and reforming the public sector, launched the country's first open government data portal (data.gov.my) in November 2014, calling agencies from all three levels of government to identify datasets to publish onto the data portal. Since then, various initiatives have been planned and implemented to address Open Data readiness.

# MALAYSIA HAS EMBARKED ON SEVERAL DATA PLATFORMS, KNOWN AS URBAN OBSERVATORIES, THAT WILL BE IMPLEMENTED AT NATIONAL, REGIONAL AND LOCAL LEVELS.

An emerging exemplar is the Iskandar Malaysia Urban Observatory. These platforms can offer public datasets that can spur community-based solutions development and innovation. Issues around data granularity, data privacy and legitimate use, and fragmentation will need to be addressed.







# THE SUCCESS OF SMART CITY INITIATIVES OFTEN HINGES UPON THE COLLABORATION OF MULTIPLE STAKEHOLDERS ACROSS PUBLIC, PRIVATE AND ACADEMIA

Malaysia's Global Innovation Index is ranked at 33, indicating some scope for improvement. While innovation is enabled by triple helix approaches, the ecosystem here is somewhat dominated by technology providers selling off-the-shelf solutions

While collaboration platforms like Malaysia Smart City Alliance do exist, there is potential for closer partnerships that could result in outcome-based research and subsequent commercialisation. One example is the partnership between Tun Hussein Onn University of Malaysia (UTHM) and Sena Traffic Systems Sdn Bhd to enable students to partake in Smart City developments, in particular the Smart Traffic Light Systems. Such systematic multi-sector partnerships can bring in academia's contribution to the smart city agenda while the private sector can attend to commercialisation. Government can support through funding or incentivising research.

### CONNECTIVITY

According to the Global Connectivity Index 2020, Malaysia is ranked 34<sup>th</sup>, out of 79 countries, with three technology enablers below average and one just above average: broadband (62/120), cloud (36/120), AI (27/120) and IoT (39/120). <sup>66</sup> Key technology enablers will require national-level planning and implementation.

MCMC is currently pursuing ambitious programmes in the provision of digital infrastructure through the National Fiberisation Connectivity Plan as well as JENDELA to address fixed and mobile broadband coverage, including the rollout of 5G networks. It will also address accessibility to digital infrastructure for stakeholders and end-users.

# CONNECTIVITY ENCOMPASSES INTEGRATION OF DIGITAL INFRASTRUCTURE, INCREASING PEOPLE AND ORGANISATIONAL AWARENESS, PROPER USE AND MAINTENANCE.

The above aspects need to be simultaneously considered to ensure that technological connectivity potential are fully realised.

#### CYBERSECURITY

The consequences of cyber attacks can be disastrous to city operations and infrastructure, potentially bringing entire urban systems (grids, water, traffic lights) down for extended periods of time.

# THE POTENTIAL OF CYBERSECURITY RISKS IS NOW HIGHER THAN EVER.

With an 82.5% spike in cybersecurity threats just last year during the pandemic related lockdown, and 18% of the attacks affecting local companies, KKMM has taken steps to start putting measures in place such as through the Malaysia Computer Emergency Response Team (MyCERT)

The comprehensive National Cyber Security Policy that Malaysia enforced in 2019 is a multi-ministry effort to integrate resources in securing critical national information infrastructure. This policy is also extended to the private sector, safekeeping the interests of Malaysian consumers. This underscores the need for cybersecurity protection at a national level. For cybersecurity strategies to succeed it is important for all stakeholders to agree on a risk assessment and a common proactive approach to securing digital infrastructure, data and devices.

## LEGAL FRAMEWORKS

#### SMART CITY TECHNOLOGIES RAISE ETHICAL AND LEGAL QUESTIONS THAT, IF LEFT UNANSWERED, MAY IMPEDE THEIR IMPLEMENTATION

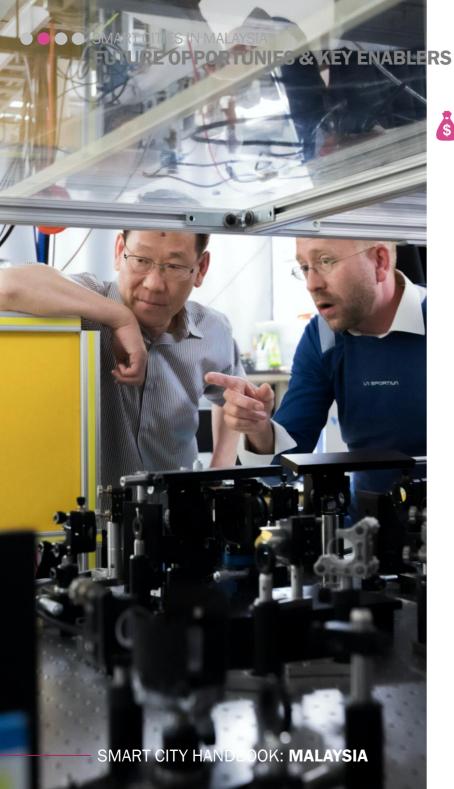
Common questions that arise are about personal data protection, digital inclusivity, and extent of alignment to core national and global policy objectives.

Malaysia has taken extensive efforts to ensure that their smart city and related initiatives are undertaken in an organised manner and that the governance structure is defined. Malaysia Smart Cities Framework is a significant step in this direction.

Implementation is significantly enabled by regulation- since technology has created ambiguities around data ownership, privacy and surveillance. New frontiers created by digital innovation translates to new partnership and business models which means there is a need for new legal frameworks. New legislation can help foster collaboration and data sharing and enforce interoperability requirements while opening funding pathways. While policies and blueprints provide guidelines, regulatory support will be required to accelerate adoption and streamline best practices.







### 🐧 FUNDING & FINANCING

Funding and financing smart city initiatives are great challenges in themselves, particularly when they involve expensive infrastructure and technologies.

#### STRATEGICALLY FUNDING AND **ENCOURAGING SMART CITY INITIATIVES.**

A primary enabler in the Industry 4WRD policy is to have funding and outcomebased incentives in place to prioritise smart city projects.

Smart cities globally rely on alternative funding mechanisms, such as PPPs and financing from international development organisations. Malaysia is no exception. For instance, Penang state's partnership with Maxis to provide 5G-enabled IoT pilot projects.

With clear incentive structures and alternative financing models, opportunities for funding, revenue sharing, tax abatements, deferred payments, and nonfiscal incentives can be explored.

### 🔖 RESEARCH & INNOVATION

Smart city programmes benefit from the existence of vibrant ecosystems of research and innovation. Malaysia offers such ecosystems that can be nurtured and expanded further to drive applied research and commercialisation.

#### PRIVATE SECTOR LED RESEARCH AND DEVELOPMENT ENABLES TALENT TO UPSKILL.

The Collaborative Research in Engineering, Science and Technology (CREST) is an industry-led platform for market-driven R&D in six focus technology clusters such as advanced manufacturing and IoT embedded systems. This helps equip the talent ecosystem with tomorrow's technology.

There are several Centres of Excellence: living labs and test beds across Malaysia. Many government bodies, such as the Sarawak Digital Economy Cooperation, are fostering and supporting R&D and experimentation using smart city frameworks. Programmes to spur academia and international collaborations like the Newton-Ungku Omar Fund managed by UK Department for Business, Energy and Industrial Strategy (BEIS) with local partners (MiGHT, Academy of Sciences Malaysia, and Ministry of Higher Education) foster growth in research and innovation capacity.



### **DEEP DIVE** OVERVIEW

This chapter presents snapshots of various urban improvements and smart city projects that are ongoing across Malaysia. We deep dive into seven regions and cities in Malaysia, using the Malaysia Smart City Framework as a baseline and including case study of heritage cities such as Penang and Melaka to provide a sample of the country's diverse urban economies.

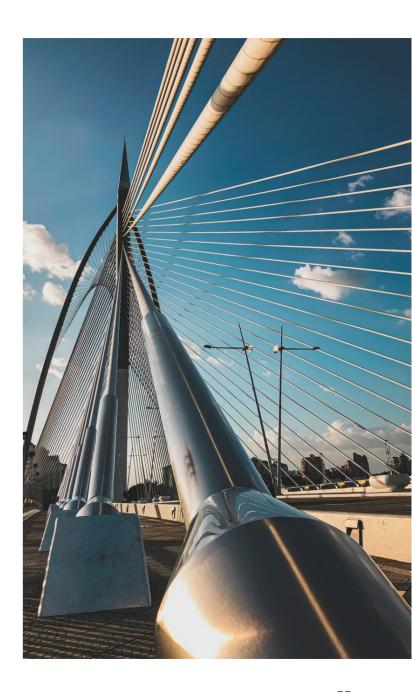
These seven urban areas by no means represent the full extent smart city developments in Malaysia. Traditionally, larger conurbations like the Klang Valley have been launchpads for smart city solutions, but many urban areas are now implementing smart cities. At a national level, initiatives are focused around enabling digital infrastructure, policy setting, standardisation and overall governance. This section will highlight recent key projects that not only represent urban priorities but also demonstrate smart city related opportunities and direction.

The **155 local government** bodies are key implementors driving Smart Cities in Malaysia

The projects we delve into reflect the unique situations local municipalities face and involve networks of national and local actors within city level ecosystems.

We look at how Malaysian cities have been sourcing and implementing smart city projects, and how these projects have been transforming their urban landscapes. The following section focuses on questions such as:

- What unique situations do different cities in Malaysia face and how have Smart City Technologies helped?
- What prominent projects have these cities implemented, and what are the technologies involved?
- What type of opportunities could these projects potentially offer to organisations and smart cities players in the UK?



## SMART CITY DEEP DIVE MALAYSIA DEEP DIVE OVERVIEW

#### **SELECTED PROJECTS**



- Smart City Standards
- JENDELA
- Hyper Scale Data Centres



- Safe City
- Climate Action Plan
- AV Test Route In Cyberjaya
- Cyberview Living Lab
- Smart Selangor



- Smart Grid Pilot Project
- Digitalisation of Water Utilities
- Sustainable Mobility Planning



- Integrated Waste Management
- Integrated BRT System



- Penang South Island (Island A)
- Penang Digital Library



- Integrated Flood Mitigation
- Kuching Urban Transport
   System
- Old Kuching Smart Heritage



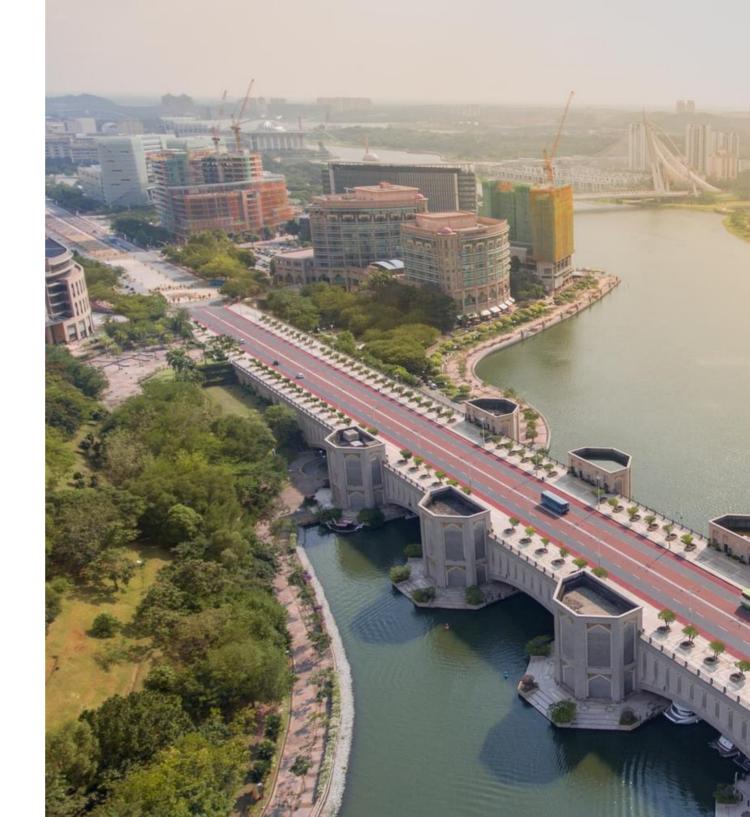
- Smart Integrated Mobility System
- Kulai Iskandar Data Exchange
- Iskandar Malaysia Urban
   Observatory



• Tekno-Eko-Pintar 2035

# 3.1 NATIONAL INITIATIVES

A growing number of Smart City projects have been or are being implemented across the country as national level initiatives. In this section, we explore a few prominent projects.



## SMART CITY DEEP DIVE MALAYSIA NATIONAL INITIATIVES

# NATIONAL HIGHLIGHT #1 PLANMALAYSIA SMART CITY STANDARDS

**TIMELINE:** 2020 – 2023

PROJECT VALUE: Not Available KEY COMPONENTS INVOLVED:

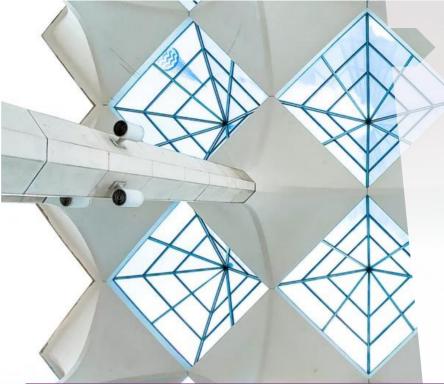
- Data Standards and interoperability
- Frameworks and standard operating procedures
- Smart City Accreditation

#### **OVERVIEW**

PLANMalaysia as the Federal Department of Town and Country Planning has been involved in Smart Cities by supporting the Malaysia Smart City Framework (MSCF), developing blueprints such as the MySmart Wilayah Blueprint for the three federal territories of the country<sup>67</sup>, helping build the national smart city platform and the development of Smart City standards for Malaysia.<sup>68</sup>

These are being developed as part of the MSCF stipulated Policy 6 and in collaboration with the Department of Standards, Malaysia. A multidisciplinary Technical Committee for Sustainable Cities and Community provides support in developing and reviewing the Smart Cities Standards.

The standards include an extensive global benchmarking component and will be



#### PROJECT STAKEHOLDERS

- Ministry of Housing and Local Government (KPKT)
- PLANMalaysia
- Department of Standards, Malaysia
- Malaysian Communications and Multimedia Commission (MCMC)
- Malaysian Administrative Modernisation and Management Planning Unit (MAMPU)



PLANMalaysia







#### KEY URBAN PRIORITIES COVERED















based on ISO 37122 and other related standards.

Development and finalisation of these standards will be a key activity in 2021. The standards development also include indicators which allow for smart cities in Malaysia to achieve accreditation and be compared in terms of performance and achievements, locally and internationally.

A smart cities accreditation pilot project will be undertaken, with implementation of accreditation standards expected to be achieved by 2023.

#### **BEST PRACTICES FROM THE UK**

UK has led the development of smart cities standards with <u>BSI</u> leading the way. BSI's collaboration with ISO has established a substantial body of work on smart city standards and urban performance metrics.

In the Malaysian context, UK organisations such as BSI can assist with strategic capacity building, bringing global best practices for governance, integration, cybersecurity and legal frameworks. The UK can help with clear road mapping and industry matchmaking opportunities between domestic and international partners.

#### SMART CITY DEEP DIVE MALAYSIA **NATIONAL INITIATIVES**

### NATIONAL HIGHLIGHT #2 **JENDELA**

**TIMELINE: 2021-2025** 

**PROJECT VALUE: RM21 billion KEY TECHNOLOGIES INVOLVED:** 

- 4G and 5G Connectivity
- Fiberisation
- Digital Infrastructure Map and frameworks

#### **OVERVIEW**

The national digital infrastructure plan, Jalinan Digital Negara, better known as JENDELA is designed to steer Malaysia towards greater digital connectivity by boosting the efficiency of the national infrastructure and optimising spectrum usage.

Phase 1 aspires to enable nine million premises with gigabit speed fixed line broadband; expanding 4G mobile coverage to 100% in populated areas: and upgrading mobile broadband speeds from 25Mbps to 35Mbps and the gradual retirement of 3G networks by the end of 2021. Phase 2 involves utilising fixed wireless access and other fit-for-purpose technologies to address gaps in the digital divide while priming for the eventual adoption of 5G once plans in Phase 1 are achieved.69

The roll out of 5G technology is expected



#### PROJECT STAKEHOLDERS

- Ministry of Communications and Multimedia (KKMM)
- Malaysian Communication & Multimedia Commission (MCMC)
- Ministry of International Trade & Industry (MITI)
- Malaysian Investment Development Authority (MIDA)
- Telcos (TM, Celcom, Maxis, U Mobile, Digi, and Time)
- State Governments

















#### **KEY URBAN PRIORITIES COVERED**















to be completed by early 2023. Malaysia is already accelerating 5G use by extending 5G demonstration projects across nine verticals and seven states.

Within the 2021-2025 12th Malaysian Master Plan, JENDELA plans to integrate digital infrastructure across the government and private sector. This would be characterised by a readily accessible digital infrastructure map that will benefit smart city planning and implementation, private sector investments, and customer experience.

#### **BEST PRACTICES FROM THE UK**

The UK has already been leading with 5G testbeds and trials looking into expanding use cases, creating enablers for expansion and use, R&D, reducing commercial risks and informing policy. UK organisations and city can help by providing technical expertise, best practices and developing local use cases for the Malaysian ecosystem. A relevant case study is the West Midlands' 5G test beds, described in Chapter 4 of this handbook.

## SMART CITY DEEP DIVE MALAYSIA NATIONAL INITIATIVES

# NATIONAL HIGHLIGHT #3 HYPER SCALE DATA CENTRES

**TIMELINE:** 2021 – 2025

**PROJECT VALUE:** RM12-15 billion **KEY TECHNOLOGIES INVOLVED:** 

- Data ManagementInternet Connectivity
- **OVERVIEW**

In February 2021, Amazon Web Services (AWS), Microsoft, Google Cloud and Telekom Malaysia were granted conditional approval to build and manage hyperscale data centres and cloud services in Malaysia, as part of government plans to drive mass digital adoption and also to reduce governmental cost in information technology management.<sup>70</sup>

Central to such efforts will be a select channel ecosystem of managed service providers (MSPs) comprising Enfrasys Solutions, Prestariang Systems and Cloud Connect. Each will work closely with Cloud Service Providers (CSPs) to manage services delivered to agencies in the public sector, in line with government ambitions to strengthen the capabilities of local providers.

To support plans to "empower cloud computing services in the public sector" the government has also targeted



#### PROJECT STAKEHOLDERS

- Telekom Malaysia
- Google Cloud
- Amazon Web Services (AWS)
- Microsoft Cloud
- Enfrasys Solution
- Prestariang Systems
- Cloud Connect















#### **KEY URBAN PRIORITIES COVERED**















the migration of 80% of public data to a hybrid cloud environment by the end of 2022. Geographic location is a significant factor that affects the performance of data centres, and they should be near their target audience. Thus, this move is important for building a sustainable digital infrastructure for the country.

Small and medium enterprises (SMEs) in Malaysia will benefit significantly if they fully embrace the services provided by Google, Amazon, and Microsoft as well as the digital transformation enabled by the government through accessible technologies such as hyper-scale cloud, data, mobile, social media, IoT, and AI.

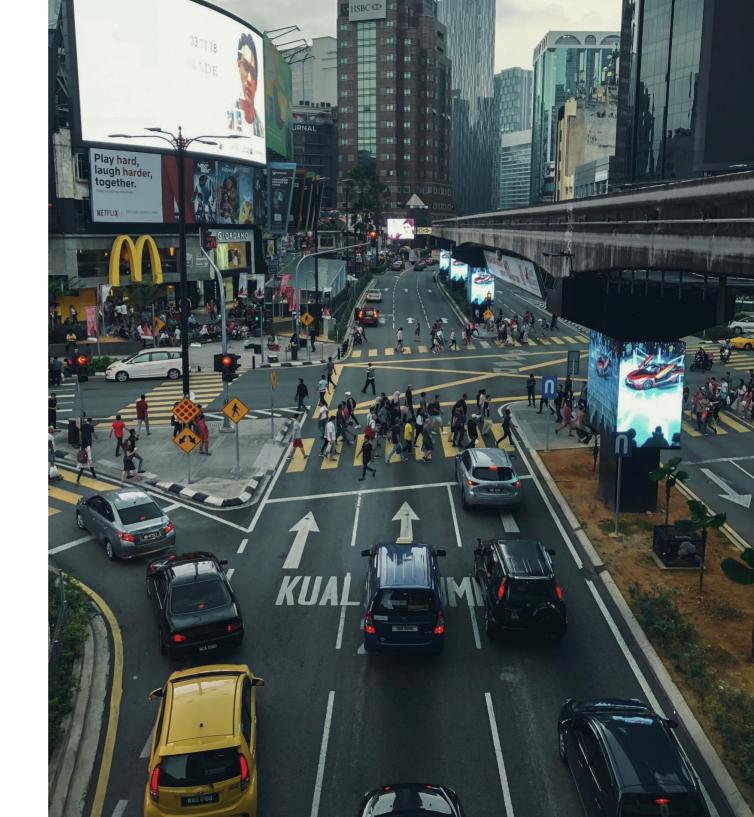
#### **BEST PRACTICES FROM THE UK**

Digital infrastructure opens opportunities for smaller organisations in Malaysia to more readily adopt digital transformation.

While the COVID-19 pandemic has accelerated growth in adopting digital services, there may be opportunity for Malaysia to borrow lessons from UK's policy initiatives such as 'Help to Grow: Digital' scheme to help smaller businesses adopt digital technologies. UK companies can offer capacity building, digital toolkits, process best practices and digital training.

# 3.2 KLANG VALLEY

The Klang Valley is the most urbanised and interconnected region in the country. The area comprises the capital city Kuala Lumpur, and satellite cities within the Selangor state such as Petaling Jaya, Subang Jaya and Cyberjaya which are all home to several smart city initiatives.



# REGION DEEP DIVE: KLANG VALLEY

#### THE ECONOMIC CENTRE OF MALAYSIA

The Klang Valley is home to over 7.5 million people (in 2018). It is the country's largest urban area and a major commercial, financial and cultural hub. It comprises two federal territories: Putrajaya, Malaysia's Federal administrative centre and Kuala Lumpur (KL), Malaysia's capital city, and includes adjoining cities and towns in Selangor such as Petaling Jaya, Cyberjaya, Shah Alam and Subang Jaya. It is the central connection hub for the region, including two international airports, the nation's only Light Rail Transit (LRT) and Mass Rapid Transit (MRT) rail systems.

As the fastest growing economical region of the country, its major economic sectors comprise of financial and business services, education, retail and tourism; making it attractive to both local and foreign businesses as well as tourists.

# SMART CITIES FOR THE KLANG VALLEY - A CONCERTED URBAN MANAGEMENT AND OUTCOME-LED APPROACH

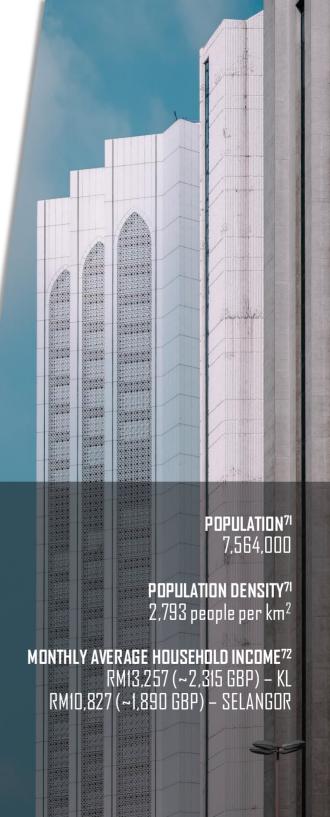
As a key growth centre with rapid urbanisation, the Klang Valley has many urban challenges. Like many capital regions, there are traffic congestion and stresses on city infrastructure.

The local governments within Klang Valley have embarked on developing Smart City initiatives and capabilities to chart a path towards sustainable urbanisation. The recently completed Smart City Master plan 2021-2025 by KL City Hall sets out concerted and integrated efforts in this regard. The capital city has also embraced green technologies with the Low Carbon Society Blueprint 2030, including initiatives for resource management and renewable energy.

Smart Selangor's Action Plan to 2025 aims to strengthen digital infrastructure and knowledge-based clusters directly feeding into the ASEAN Smart Cities agenda.

#### **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Industry 4.0
- Environment
- Smart Water and Waste Management
- Social order and Security
- Urban Upgrades
- Open Data



SMART CITY HANDBOOK: MALAYSIA

## REGION DEEP DIVE: KLANG VALLEY

#### **URBAN CHALLENGES**

#### KLANG VALLEY'S KEY URBAN CHALLENGES ARE CHARACTERISTIC OF A FAST-GROWING URBAN AGGLOMERATION IN

**SOUTHEAST ASIA.** The current metro area population of the Klang Valley increases between 2-3% from year to year. 73 Just within the limits of the capital Kuala Lumpur, population is expected to reach 2.25 million in 2040.74 Sustainable growth. efficient use of resources and managing climate change impacts will be priorities.

Simultaneously, maintaining city competitiveness by ensuring Klang Vallev is an attractive place to visit and do business would require local governments to address liveability and mobility issues. while helping key economic sectors transform into an innovation driven economy.

Whilst the more critical challenges for the Klang Valley are highlighted here, other important priorities for the region include enhancing economic productivity and creating skilled manpower and a strong workforce. On the governance front, local governments are already working on improving data integration, using data analytics for better urban management and improving information sharing.



#### SMART ENVIRONMENT

Climate change and extreme weather events affect the Klang Valley through extreme heat, flash floods and landslides. Poor drainage, inefficient water management, and overdevelopment of hilly areas all contribute to these stresses

Air and water pollution are two major environmental issues in the Klang Vallev. Water pollution is mainly caused by various industries discharging their effluents directly into the rivers. Air pollution is attributed to industrial emissions and vehicle exhaust fumes. To counter land scarcity and ineffective land management, there is a need to employ innovative methods of land regeneration and more efficient land resource use.



#### **SMART LIVING**

The Klang Valley region grapples with the provision of affordable housing. The KL Structure Plan 2020 notes that the differentiation between ideal and actual house prices stands at more than 100%. This translates to more people living farther away from central hubs, which often lead to traffic congestion issues.

Incidences of crime, accessibility to health care services and other basic services

affect liveability, which in turn influences the attractiveness of the city and its ability to attract talent in order to stay competitive.

According to Universiti Malaya's Social Wellbeing Research Centre, the number of Malaysians aged 60 and above is projected to reach 3.5 million in 2020 and  $6.3 \text{ million in } 2040^{75} - \text{about } 20\% \text{ of the } 1000 \text{ million in } 2040^{75} - \text{about } 20\% \text{ of the } 1000 \text{ million in } 2040^{75} - \text{about } 20\% \text{ of the } 1000 \text{ million in } 2040^{75} - \text{about } 20\% \text{ of the } 1000 \text{ million } 1000 \text{ m$ population. This would impact upon economic growth trends and create an increasing need for quality and accessible healthcare services.



#### SMART MOBILITY

Traffic congestion in Klang Valley resulted in opportunity cost losses of about 1.1% to 2.2% of national GDP in 2014.76 Since then, there have been significant improvements to the public transport system, though issues with coverage and accessibility of the underlying secondary transport, i.e., bus systems as well as enhancing first mile-last mile connectivity remain. These factors, coupled with disconnected land use planning and residential affordability, translate to fragmented urban sprawl that contribute to the transportation and accessibility issues.

#### SMART CITY DEEP DIVE MALAYSIA **KLANG VALLEY**

### **KLANG VALLEY HIGHLIGHT #1 KL SAFE CITY**

**TIMELINE:** 2004 – 2024

**PROJECT VALUE:** RM126 million **KEY TECHNOLOGIES INVOLVED:** 

- CCTV and Surveillance technologies
- Integrated Control Centre
- Al, facial recognition

#### **OVERVIEW**

Reported crime in Kuala Lumpur doubled between years 2000 to 2009 when bikeborne bag snatchers were a chronic problem in the city.<sup>77</sup> The city then set itself an ambition to be among the world's top ranked safest cities. The city government invested in smart city initiatives to cut crime and improve liveability while amending policies for better planned development.

To achieve its goal, the city laid out a plan to make use of inter-connected web devices, software, and cloud storage systems to improve security and surveillance in hotspots. The city will install and upgrade Smart CCTV cameras where the footages will be integrated to a designated control centre while utilising facial recognition and AI to predict human behaviour.

Until recently, the existing CCTV networks operated in isolation. The city has now increased coverage to over 5000 CCTVs



#### PROJECT STAKEHOLDERS

- Ministry of Housing and Local Government (KPKT)
- Kuala Lumpur City Hall (DBKL)
- PLANMalaysia
- Royal Malaysia Police (PDRM)





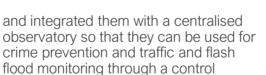












This project will improve the capacity of city authorities in delivering and managing data sets. From an enforcement point of view, it will provide a safe and efficient environment for enforcement personnel to work and quickly respond to incidents and emergencies. Al and other predictive systems will allow for efficient monitoring and analytics.

centre.78



City surveillance and law enforcement is a critical priority not just for Kuala Lumpur but across the country. Security and safety providers from UK offer software and services for best-inclass incident prevention and response management. The UK is a world leader in urban open data and spatial data analysis, modelling and visualisation - all of which can offer best practices and develop analytical capabilities from urban surveillance and monitoring datasets. There are also key considerations such as personal data privacy and cybersecurity; and many UK based data sharing and analytics platforms are adept at addressing these.

## SMART CITY DEEP DIVE MALAYSIA KLANG VALLEY

# KLANG VALLEY HIGHLIGHT #2 KL CLIMATE ACTION PLAN

**TIMELINE:** 2021 – 2023

**PROJECT VALUE:** Not Available **KEY TECHNOLOGIES INVOLVED:** 

- IoT sensors
- Al, Big Data
- Flood Management technologies
- Heat Management technologies

#### **OVERVIEW**

Kuala Lumpur is committed to reducing its carbon emissions by 20% by 2022, demonstrating strong climate leadership for the region. <sup>79</sup> As part of this commitment, Kuala Lumpur in September 2020 launched its Climate Action Plan 2050 as a complement to its Low Carbon Society Blueprint 2030.

The Climate Action Plan was launched as part of a C40 Cities Climate Action Planning Southeast Asia Programme. This was funded by UK BEIS' International Climate Finance and Denmark's Ministry of Foreign Affairs.<sup>80</sup>

The key components of the Climate Action Plan include a pathway to emissions neutrality by 2050, resilience to climate hazards, ways to ensure inclusivity and equitable distribution of benefits, as well as governance and collaboration mechanisms.<sup>81</sup>

SMART CITY HANDBOOK: MALAYSIA



## PROJECT STAKEHOLDERS

- Prime Minister's Department (JPM)
- Kuala Lumpur City Hall (DBKL)
- C40 Cities
- SW Corp
- Alam Flora
- Landscape and Recreational Development Department (JPLR)
- Department of Skills Development (JPK)













## KEY URBAN PRIORITIES COVERED















The Climate Action Plan is also reflected in KL's Smart City Master Plan. They define actions for the medium term up to 2023.82

The Master Plan proposes installation of a network of urban sensors that collect real time data for climate analytics and forecasting. The network would also serve as an early warning system. Information is expected to be processed using Al and big data for predictive and preventative analytics.

#### **BEST PRACTICES FROM THE UK**

UK companies and research institutions boast of several innovations across IoT, sensors, AI, big data, and spatial analytics that have been applied to a range of use cases from monitoring water, energy systems to climate change innovation. A unique example is the work being done at <u>Grantham Institute</u> at Imperial College London. More details are in Chapter 4.

Additionally, Malaysia can leverage UK expertise on data integration, reporting dashboards, development of interactive tools and innovative methods of gathering urban and environmental data. They can also provide capacity building and enhance climate actions.

## SMART CITY DEEP DIVE MALAYSIA **KLANG VALLEY**

## KLANG VALLEY HIGHLIGHT #3 **AUTONOMOUS VEHICLE** TESTING ROUTE IN **CYBERJAYA**

TIMELINE: 2020 – Ongoing **PROJECT VALUE:** Not Available **KEY TECHNOLOGIES INVOLVED:** 

- 5G connectivity
- IoT network infrastructure
- Artificial Intelligence
- Autonomous Vehicles

#### **OVERVIEW**

At the end of 2020, Futurise, a wholly-owned subsidiary of Cyberview under the Ministry of Finance, announced an autonomous vehicle testing route. Stretching 7km, Cyberjaya Malaysia Autonomous Vehicle (MyAV) Testing Route was developed by Futurise and the Ministry of Transport (MOT) under the National Regulatory Sandbox (NRS) Initiative for development and testing of autonomous vehicles.83

eMoovit, a local startup established in 2016, became the first company to undertake AV pilot testing in Cyberjaya. eMoovit specialises in vehicle software for urban environment routes and they are vehicleagnostic. The test route, which has been in use since January 2021 is used on an



### PROJECT STAKEHOLDERS

- Ministry of Transport (MOT)
- Futurise
- Cvberview
- Sepang Municipal Council
- Land Public Transport Agency (APAD)
- Malaysian Institute of Road Safety Research (MIROS)
- Malaysia Automotive Robotics and IoT Institute (MARii)
- Automotive Development Centre. Universiti Teknologi Malaysia (ADC, UTM)









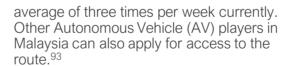








## KEY URBAN PRIORITIES COVERED



Phase 3 of the testing route will extend the length to 10 km. This project marks a key milestone for the future of mobility in the country and is an important initiative exemplifying public and private sectors working together to nurture innovation.

## **BEST PRACTICES FROM THE UK**

Malaysia is showing ambitions to be ready for the advent of autonomous vehicles.

UK is hosting numerous trials in Connected Autonomous Vehicles and testing these across various road environments. London, Oxfordshire, and West Midlands are some relevant examples, also featured in Chapter 4. UK organisations and local governments can share their experience and technical expertise around testing, safety parameters, regulations for a CAV world, technical specifications and larger proofs-of-concept that are viable for scalability.

## SMART CITY DEEP DIVE MALAYSIA KLANG VALLEY

# KLANG VALLEY HIGHLIGHT #4 CYBERVIEW LIVING LAB

TIMELINE: 2015 – Ongoing PROJECT VALUE: Not Available KEY TECHNOLOGIES INVOLVED:

- Information Security
- Creative Content Technologies
- Mobile Internet
- Internet of Things
- Cloud Computing
- Big Data Analytics
- Robotics
- Artificial Intelligence
- Green Technology
- System Integration

#### **OVERVIEW**

Cyberjaya is a Global Tech Hub that attracts all forms of innovation. Innovators gather at Cyberjaya to pilot, validate and prototype commercial-ready solutions through the help of resources from the Cyberview Living Lab (CLL).

Framed as four key initiatives—talent, accelerators, pilots and enterprise, CLL enables innovation to be built and tested. The four key components form an open-innovation ecosystem that helps to identify and nurture entrepreneurs. Solutions are supported through ideation phase up to testing and validation for commercialisation. Start-ups are provided mentorship, network



### PROJECT STAKEHOLDERS

- Cyberview
- Ministry of Finance
- Malaysia Digital Economy Corporation (MDEC)
- Malaysian Global Innovation & Creativity Centre (MaGIC)









## **KEY URBAN PRIORITIES COVERED**

alliances, and marketing support to ensure the sustainability of innovations.

Overall, CLL acts as a catalyst platform or feeder for creating and applying innovations for Cyberjaya Smart City and the three tech clusters: Smart Mobility, Smart Healthcare and Digital Creative, identified as Cyberjaya's pillars of growth. These solutions offered provide visible value to Cyberjaya through enhanced efficiency and sustainability.<sup>84</sup>













## **BEST PRACTICES FROM THE UK**

Cyberview's initiatives to foster the innovation environment in Malaysia is an exemplary launchpad for the digital economy and Smart City related enterprises.

Potential collaboration opportunities may exist with UK's innovation hubs and accelerators such as <u>Connected Places</u> <u>Catapult</u> programmes. These can be focused on co-development of solutions, learning from shared experience, or even expanding greater networking opportunities between entrepreneurs and innovation stakeholders in UK and Malaysia.

## SMART CITY DEEP DIVE MALAYSIA KLANG VALLEY

# KLANG VALLEY HIGHLIGHT #5 SMART SELANGOR

**TIMELINE:** 2020–2025

**PROJECT VALUE**: Allocated RM300 million **KEY TECHNOLOGIES INVOLVED**:

- Data Infrastructure
- Internet-of-Things (IoT) Platform
- Blockchain technology
- Automation & Digitalisation of Process
- · Community applications

#### **OVERVIEW**

Selangor is the state that borders the federal territory of Kuala Lumpur and is home to the major urban areas of the Klang Valley. Its physical infrastructure enables a focus on more service-based industries and is home to almost 20% of the nation's small to medium enterprises. Nearly all the 3,000 technology start-up companies in Malaysia are based in Selangor (SSAP 2025).85

The Smart Selangor programme aims to make Selangor as the most livable state in the region by 2025. It is driven by the Smart Selangor Delivery Unit, a wholly-owned subsidiary of Menteri Besar Selangor Incorporated (an investment body for the state), mandated to spearhead smart initiatives by the Selangor State government.

The programme has three objectives that can be achieved through strategic interventions and initiatives in digitalisation. These objectives include improving economic productivity by providing



## PROJECT STAKEHOLDERS

- Selangor State Government
- Selangor Smart Delivery Unit (SSDU)
- Smartsel







## KEY URBAN PRIORITIES COVERED



The identified initiatives for the programme are captured in the Smart Selangor Action Plan 2025, which is an update of the 2016 blueprint. There are over 60 initiatives identified which are framed around four domains of smart digital infrastructure, smart economy, smart government and smart communities within the action plan t oachieve the aforementioned objectives.











## **BEST PRACTICES FROM THE UK**

Smart Selangor's initiatives aim to foster innovation and digitalisation as well as build capacity of its communities. These could be launchpads for Smart City related enterprises.

Programmes could collaborate with the UK through knowledge sharing and the setting up of appropriate supporting financing ecosystem for business scaleups. Several UK city and regional authorities have spearheaded similar Smart City plans and roadmaps such as London, Bristol, Oxford (See Chapter 4 for more details). Ultimately, UK expertise could encourage creating new growth prospects for smaller firms and provide new opportunities for the state.

# 3.3 MELAKA

Melaka State has a rich history dating back to the 15<sup>th</sup> century as one of the first trading hubs of Malaysia. As the city moves into the future, it has made great strides towards sustainable growth. Innovation and technological improvements can help accelerate its progress.



# REGION DEEP DIVE: MELAKA

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## AN URBANISED STATE

Melaka State is located on the southwestern coast of Peninsular Malaysia and lies between Kuala Lumpur and Johor, which provides a physical link to Singapore. The state faces the Strait of Malacca, which had a major influence in Melaka's development as an important trading port in Southeast Asia. Melaka continues to focus on port development to this day in order to spur economic growth.

The state is divided into three administrative districts (Alor Gajah, Central Melaka, and Jasin) and four municipalities (Alor Gajah Municipal Council, Hang Tuah Jaya Municipal Council, Melaka Historic City Council, and Jasin District Council). Melaka City, the state's capital, is located in Central Melaka District where the majority of the state's population resides. Melaka City was declared a UNESCO World Heritage Site in 2008 because of its historical and cultural influences arising from its former function as an important centre for trade.

Manufacturing and services are Melaka State's two most dominant sectors. While the manufacturing sector has been a steadily growing industry, the service sector has flourished at a rapid rate on the back of medical and cultural heritage tourism.

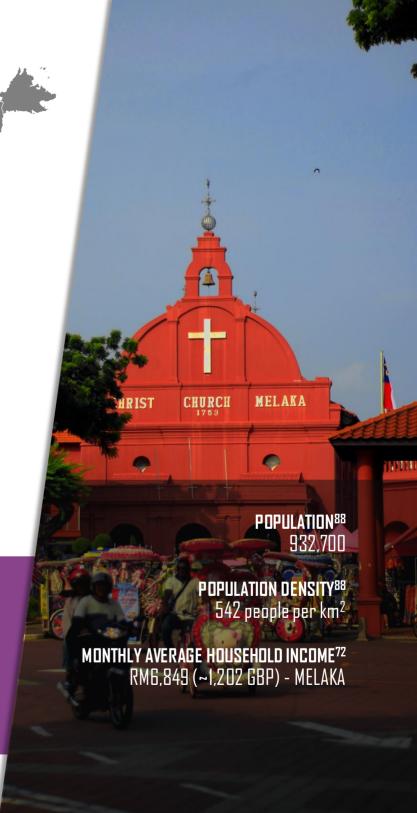
# MELAKA'S ASPIRATIONS OF BECOMING A GREEN "CITY-STATE" BY 2020 with a

focus on green technology and Smart City to channel sustainable and inclusive growth, and to maintain its World Heritage Status. <sup>86</sup> The Melaka state government is also focusing on the Melaka Waterfront Economic Zone (M-WEZ), an area along the Melaka coast identified as the 'State Regional Centre' Development Zone. It is expected that between RM3-4 billion (5% of the state's annual GDP) is to come from the M-WEZ by 2035. <sup>87</sup>

The Melaka Historic City Council, the local government authority for Melaka City is a part of the 100 Resilient Cities Programme network. Two key direction setting documents to refer to are the Melaka State Structure Plan 2035 and the Melaka State Climate Action Plan 2020-2030.

## **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Green Technologies
- Flood Control
- Environment
- Smart Water and Waste Management
- Urban Upgrades
- Smart Tourism



## DEEP DIVE: MELAKA

## URBAN CHALLENGES

Melaka faces a wide range of persistent urban challenges, and although they vary in scope and complexity, many of them are being driven and influenced by one another. For example, road network connectivity, a mobility issue, also adversely impacts public safety, a liveability issue. Similarly, environmental practices around sanitation and drainage can create health issues with an upsurge in water and food related diseases. This highlights a critical need for a more integrated approach to urban planning to tackle challenges concurrently.

## INTEGRATED URBAN APPROACHES NEED **WELL FUNCTIONING GOVERNANCE**

**MECHANISMS** While key urban challenges are described here, key enablers such as integrated coordination approaches can benefit multi-level governance approaches. For example, the Melaka River Rehabilitation Project was initiated at state level, yet several implementation activities fall under the purview of the Melaka Historic City Council which is responsible for maintaining infrastructure. Another area that the city council and the state have to work together is in lowering traffic congestion to coincide with the lowcarbon city goals while ensuring that the city centre is still attractive to visitors.



## SMART ENVIRONMENT

The impacts of urban development and a changing climate have left a wide range of environmental management problems for Melaka. These have caused water shortages, high rates of non-revenue water, flash floods and inefficient solid waste management.

Waste generation also presents an issue. as infrastructure needs to keep up to handle the growing quantum of waste. Waste removal services in public spaces are also poor, partly because it is difficult to access the historic city's narrow roads. especially in the World Heritage Site.

Moreover, environmental damage from land reclamation activities, such as loss of shoreline vegetation, loss or fragmentation of natural habitat, and soil erosion, are other important challenges to address.



## SMART MOBILITY

Melaka experiences high levels of daily traffic congestion. Currently, 90% of all journeys are being made by cars and the road network is at maximum carrying capacity for car access into and around the historic city centre.89 This is being exacerbated by the increase in the number of vehicles during peak tourist periods.

Walkability in Melaka is in general poor due to an absence of walkways and the prevalence of roadside parking. In the World Heritage Site, residents and tourists are forced to walk on the road and this poses threats to their safety in areas where car usage is high. There are now initiatives to introduce comprehensive planning as well bus network connectivity.



## SMART ECONOMY

Melaka's economy in recent years has been performing well on the back of positive tourism and manufacturing growth. However, aging buildings and infrastructure conditions within the World Heritage Site poses risks. Loss of tourism sector revenue due to COVID-19 pandemic makes planning for economic resilience a critical consideration for the state. To remain competitive both locally and regionally, Melaka may need to rethink its strategic priorities and link them with opportunities that boost productivity. Digital transformation and readiness for technology adoption can unlock opportunities.



# MELAKA HIGHLIGHT #1 SMART GRID AWARENESS & DEMONSTRATION PROJECT

**TIMELINE:** 2020 – 2025

PROJECT VALUE: RM 50 Million KEY TECHNOLOGIES INVOLVED:

- Renewable Technologies
- Smart Grid
- Grid to Vehicle
- Smart building
- Energy Management Systems
- Energy Storage systems

### **OVERVIEW**

Melaka is one of the first states in the country to debut smart grid technology with an aim to adopt advanced technologies for city planning and urban management.<sup>90</sup>

The Smart Grid Awareness and Demonstration Project will be implemented in three phases with the first phase focusing on preliminary data integration and reporting of selected energy projects.



## PROJECT STAKEHOLDERS

- Ministry of Housing and Local Government (KPKT)
- Global Environment Facility (GEF)
- United Nations Industrial Development Organisation (UNIDO)
- Malaysian Industry-Government Group for High Technology (MIGHT)
- Melaka Historic City Council (MBMB) local authority
- Tenaga Nasional Berhad (TNB)













## **KEY URBAN PRIORITIES COVERED**















Phase 2 will address data integration and analytics for selected energy projects, future large scale solar projects and rooftop solar projects using net energy metering. An Integrated Server Room will also be set up in Melaka.

These will be visualised on dashboards in Phase 3 and along with the Future Green Mobility project, will be connected to the National Load Dispatch Centre. This will enable Grid to Vehicle energy usage for EVs too.

### **BEST PRACTICES FROM THE UK**

Melaka is leading with renewable energy and smart grid systems that if successfully piloted can be scaled to fully-fledged green technology projects.

The UK can offer experience in energy management systems, distributed energy, energy storage solutions, grid to vehicle, and vehicle to grid technologies. UK research institutes and businesses can provide advice on achieving scalability and innovative business models that allow for these technologies to be sustainable. Softer aspects such as regulatory frameworks, and pricing can also be addressed by leveraging UK experience.



# MELAKA HIGHLIGHT #2 DIGITALISATION OF WATER UTILITIES

**TIMELINE: 2019** 

PROJECT VALUE: Not Available KEY TECHNOLOGIES INVOLVED:

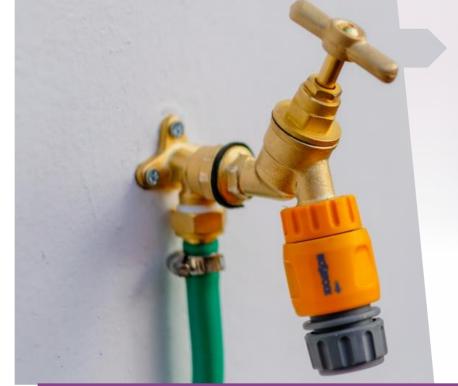
- · GIS and Spatial platforms
- Digital database

#### **OVERVIEW**

Syarikat Air Melaka Berhad (SAMB), a government-linked company responsible for providing water utility services in Melaka, is working with digital solutions provider TM ONE, the business solution arm of integrated telecommunications service provider Telekom Malaysia, on an intelligent water system for the state. The partnership sees the use of GIS technology for the creation of a digital database that stores design and property information of their water pipes.<sup>91</sup>

SAMB uses TM ONE's call centre to respond to customer complaints on water leakages and pipe malfunctions. TM ONE immediately maps the information onto the GIS system for pipe repairs, which is then automatically dispatched to the nearest SAMB repair team for investigation.

All information, including consolidated data on the pipes' sizes, materials, and



## PROJECT STAKEHOLDERS

- Syarikat Air Melaka Berhad (SAMB)
- TM ONE
- National Water Service Commission (SPAN)







KEY URBAN PRIORITIES COVERED















how they are connected, is available online via the system, enabling repair teams to refer to the problem pipes from their devices. With this new and improved smart system, water supply can resume in 3-4 hours, a vast improvement from when this could take up to 24 hours.

SAMB will be exploring other areas within their business where digital solutions can be introduced.

### **BEST PRACTICES FROM THE UK**

Utility companies stand to benefit significantly from digitalisation as it brings operational efficiency and reduces resource losses.

UK companies can offer their services to the numerous utility companies across Malaysia, in terms of digitalisation services, data integration, cloud integration, analytics for consumption patterns, cashless transactions, automated monitoring of remotely located infrastructure, and better customer services. Some of these are included in the list of UK Smart City Firms in the handbook.



# MELAKA HIGHLIGHT #3 SUSTAINABLE MOBILITY PLANNING

**TIMELINE:** 2020-2022

PROJECT VALUE: Not Available KEY TECHNOLOGIES INVOLVED:

- Non-motorised Transportation
- Eco-friendly public transport
- Intelligent Transport System

#### **OVERVIEW**

As part of UK's Global Future Cities Programme in partnership with Melaka State Economic Planning Unit and Melaka Green Technology Corporation, an overarching Green Transport Masterplan for Melaka will be developed which will encompass the Green Bus Network Implementation Plan and the Heritage Area Mobility Plan.

The masterplan considers the long-term development of green transport in Melaka state. It provides a vision for Melaka to create a high-quality sustainable transport network, with adequate pedestrian provision and strategies to increase public transport mode share. The Green Bus Network Implementation Plan aims to improve the overall bus network in Melaka and increase ridership by enhancing the quality of the bus fleet and infrastructure. A particular focus is noted toward maximising the potential of green public transport vehicles and smart operating systems along the heavily used corridor between the exit of the toll highway at Ayer Keroh and Melaka city centre.



## PROJECT STAKEHOLDERS

- UK Foreign Commonwealth and Development Office
- Melaka State Economic Planning Unit
- Melaka Green Technology Corporation
- Mott Macdonald (Programme's Delivery Partner)
- UN-Habitat (Programme's Strategic Partner)
- UK Built Environment Advisory Group (Programme's Strategic Partner)



Foreign, Commonwealth & Development Office











## KEY URBAN PRIORITIES COVERED















The Heritage Area Integrated Mobility Plan will connect to and integrate with the bus network, designed with the aim of guiding the sustainable development of the mobility system of Melaka's World Heritage Site core and buffer zones. Both interventions are fully dedicated to the principles of Melaka's Green City Action Plan, Sustainable Development Goals (SDGs) and the implementation of the New Urban Agent (NUA). They are expected to drive increased mobility for the city through improved access to safe, affordable and sustainable transport systems, contributing to inclusive economic growth and gender equality/social inclusion goals. 89

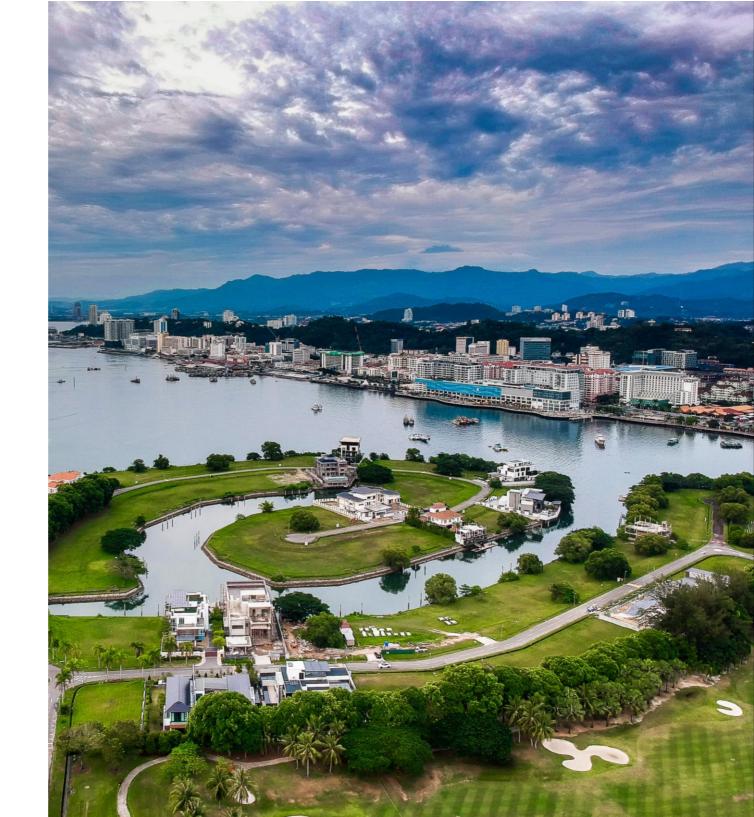
#### **BEST PRACTICES FROM THE UK**

The intended sustainable mobility interventions will help improve the economic vitality of the heritage area.

There can potentially be several downstream opportunities from the provision of ITS solutions, such as payment and information systems, innovative micro mobility interventions and non-motorised transport infrastructure. Placemaking ideas enhanced by digital technology can also create a desirable and attractive user experience.

# 3.4 KOTA KINABALU

Kota Kinabalu is the capital city of Sabah state in East Malaysia. It is a tourist destination and an important economic engine for the state and the wider region. The city is starting its journey into smart cities with the help of the ASEAN Smart Cities Network international partnerships.



### **KOTA KINABALU**

# CITY DEEP DIVE: KOTA KINABALU





## A FAST-GROWING TOURIST DESTINATION

Kota Kinabalu is the capital of Sabah, the second-largest state in Malaysia. It is the central node within the large urban conurbation of Greater Kota Kinabalu. with a population of over 640,000 and a key area of focus for the Sabah Development Corridor.

The city's economy is dominated by industry due to its rich natural resources. Industries are concentrated in the areas of Likas, Kolombong, and Inanam. The upcoming Kota Kinabalu Industrial Park (KKIP) in Sepanggar should boost the city's commercial importance. The city is a strategically important node in the Brunei-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) region.

## KOTA KINABALU IS TAKING STEPS TO **IMPLEMENT SMART CITIES**

The Kota Kinabalu Industrial Park is planned as a digital free trade zone and its pipeline development will incorporate smart city planning. South Korea through its partnership with the

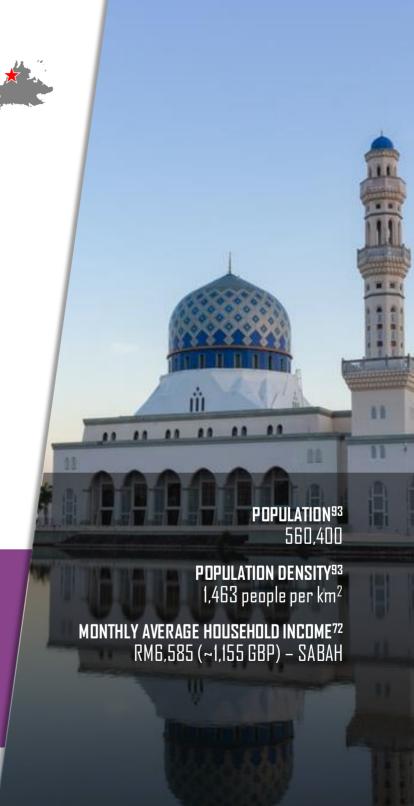
ASEAN Smart Cities Network plans to support the city in achieving its Smart City ambitions.

Kota Kinabalu City Hall (DBKK) is the local authority of Kota Kinabalu. Overarching strategies guiding the development of the city include Sabah Development Corridor Blueprint 2008-2025 and Sabah Structure Plan 2033. DBKK in collaboration with ADB also prepared the Green City Action Plan 2018-2019 to guide urban resilience and sustainable growth actions to become "a nature resort city".

The state will soon have a Smart City Unit to coordinate its smart city development planning and implementation. Digital transformation is another related and active area focused on smart farming, digital infrastructure, data sharing and cybersecurity.

## **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Environment
- Smart Water and Waste Management
- Urban Upgrades
- Smart Tourism
- Social order and Security
- Flood Control



### **KOTA KINABALU**

## CITY DEEP DIVE: KOTA KINABALU

## URBAN CHALLENGES

Kota Kinabalu is a growth engine and a relatively prosperous area within Sabah, a state that has the highest poverty rate (at 19.5%) compared to other states in Malaysia. 94 Kota Kinabalu's development is expected to serve as an exemplar for the rest of the state in achieving sustainable growth while establishing best practices to address urban challenges.

The Green City Action Plan prepared with ADB identifies the challenges Kota Kinabalu faces and the corresponding sustainable responses.95

## SMART CITIES CAN OFFER A MEANS TO EFFECTIVELY IMPLEMENT THESE IN A COMPREHENSIVE AND INTEGRATED

**MANNER.** The urban challenges briefly described here set the direction of the current interventions that the city is working on. The city and the state recognise that there are clear synergies between smart city approaches and actions required to chart future sustainable growth. Its current focus is thus centered on putting digital infrastructure in place and this can be seen from recent large scale telco development in the State.



## SMART ENVIRONMENT

Climate change impact is being felt in Kota Kinabalu and Sabah as a whole. There is the risk of rising sea levels that cause flooding and coastal erosion. The city is also approaching critical levels of energy use and GHG consumptions, with the biggest contribution coming from the transport sector.

Another environmental challenge in the city is ineffective management of solid waste, with 800 tons of solid waste being disposed to landfill per day, reflecting unsustainable waste generation. Open burning in landfills also pollute air quality. along with traffic congestion and vehicular fumes. Population growth and tourism influx encroaches on natural areas and impacts biodiversity.



## **SMART LIVING**

The city's real estate market's current priorities included providing adequate affordable housing. Rapid increases in house prices makes it harder for people to enter the property market. There are large tracts of land currently occupied by squatter and informal settlements, highlighting the issue of housing unaffordability.

As a fast-growing city, infrastructure provision has not kept up, and this also impacts upon quality of life.



## SMART MOBILITY

There is a need for integrated public transport system, as the main form of transport is motorcycles and private vehicles. Public buses operate with limited coverage, which impacts accessibility. The road connectivity between urban and remote areas also needs to be improved for travel speed as well as safety. Public transport improvements and electrification of vehicles are being planned to help improve mobility and address GHG emissions.



## SMART GOVERNMENT

A key challenge in urban management has been reducing non-revenue water. This will require significant infrastructure investments in pipe networks and smart and efficient processes to manage water provision and wastewater treatment. Municipal capacity to effectively use technology and innovation to enhance governance would be a necessity going forward.

## SMART CITY DEEP DIVE MALAYSIA KOTA KINABALU

# KOTA KINABALU HIGHLIGHT #1 INTEGRATED WASTE MANAGEMENT (IWMPP)

TIMELINE: 2018 – 2048 (concession

period)

PROJECT VALUE: RM130 million KEY TECHNOLOGIES INVOLVED:

- Waste Management
- Renewable Energy

#### **OVERVIEW**

The State Ministry of Local Government and Housing (MLGH) is drafting a bill to make solid waste management and public cleanliness in Sabah more sustainable, integrated, efficient and cost-effective. The Solid Waste and Public Cleansing Management Enactment bill is expected to be tabled at the state general assembly sitting in early 2021. The bill aims to provide local authorities with powers to regulate, enforce, collect and process solid waste. <sup>96</sup>

To improve solid waste and cleansing management, the ministry would be upgrading two landfills, increasing the utilisation of waste processor machines and adding garbage bins in cities and towns next year.



## PROJECT STAKEHOLDERS

- Borneo Waste Industries Sdn. Bhd.
- Ministry of Housing and Local Government (KPKT)
- Kota Kinabalu City Hall







**KEY URBAN PRIORITIES COVERED** 















The planned Integrated Waste Management Processing Plant will have capacity to process up to 800 tons per day of municipal solid waste. This will serve as raw material for Borneo Waste Industries and will be processed into recovered plastics, paper, metals, organic fertiliser and bottled CNG. The waste will be collected from Kota Kinabalu and four districts. It is estimated that recycling will prevent 800,000 plastic bottles from reaching the landfill daily.<sup>97</sup>

#### **BEST PRACTICES FROM THE UK**

This is a pathbreaking project for Kota Kinabalu, where waste management is a significant challenge. Supported by legislative framework, integrated waste management can realise its full potential for the city and adjoining areas.

The UK has specialist organisations that can advise and provide solutions from waste management, waste to energy, anaerobic digestion and other alternative disposal options as it tries to reduce its own waste to landfills. The UK is also a leader in circular economy and can help cities like Kota Kinabalu recover value from waste and create sustainable business models.

## SMART CITY DEEP DIVE MALAYSIA KOTA KINABALU

# KOTA KINABALU HIGHLIGHT #2 INTEGRATED BRT SYSTEM

TIMELINE: 2016 – 2020
PROJECT VALUE: RM1 billion
KEY TECHNOLOGIES INVOLVED:

- BRT
- Intelligent Transportation Systems

#### **OVERVIEW**

The Bus Rapid Transport (BRT) system is an initiative under the Kota Kinabalu Public Transport Enhancement blueprint. It was provided an allocation of RM1billion under Budget 2016, with a plan to be implemented by 2020. 98 However, recent plans now await federal funding under the 12th Malaysia Plan (2021-2025).

The project would bring improvements to the bus transportation system through the restructuring of existing bus services and providing affordable options for travel, especially from adjacent districts such as Penampang, Tuaran and Papar. BRT would need to compete against minivans, e-hailing and the preference for private commute options.

Under the BRT project, four integrated bus terminals have been planned, with only two currently in operation – the Northern Inanam Integrated bus terminal and Kota Kinabalu Sentral terminal. BRT



### PROJECT STAKEHOLDERS

- Kota Kinabalu City Hall
- Public Works Department
- Commercial Vehicle Licensing Board and Road Transport Department (LPKP Sabah)
- Prasarana Malaysia Berhad









## KEY URBAN PRIORITIES COVERED















buses would be battery operated and ecofriendly with the ability to decrease travel time by half compared to existing transportation systems.

The City Hall of Kota Kinabalu aims to become a livable city by 2022. This objective will be driven through two master plans: the Kota Kinabalu Public Transport Master Plan and the Traffic Improvement and Urban Transport Master Plan for Kota Kinabalu Central Business District.<sup>99</sup>

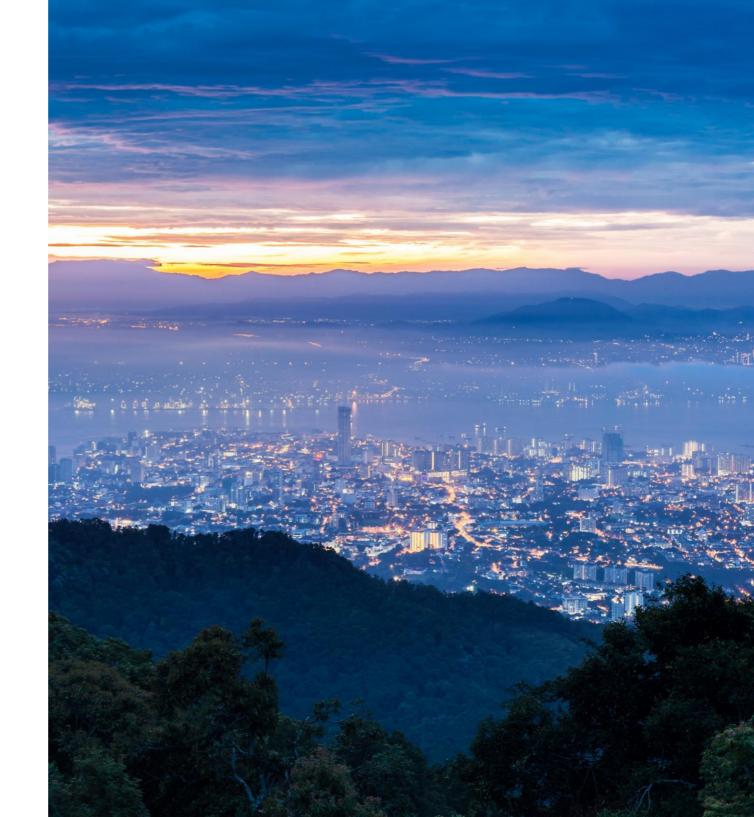
### **BEST PRACTICES FROM THE UK**

Public transportation improvement plans open several opportunities where UK companies and cities with their strong expertise in mobility solutions can assist.

The UK can help across the entire value chain with integrated planning studies, transport demand assessments, engineering design and supporting services for effective operations including ITS, real time information systems, integrated ticketing solutions, first mile last mile mobility planning and data platforms to assist with operations and maintenance. Several mobility companies are identified in the list of UK Smart City Firms in the handbook.

# 3.5 **PENANG**

Penang is a significant contributor to Malaysia's economic prosperity and is one of its most urbanised states. It has also been a cornerstone and leader in Smart City initiatives spurred by its aim to achieve the Penang2030 vision.



# REGION DEEP DIVE: PENANG







Penang is a state located in the north of Peninsular Malaysia. The island manages to embrace modernity while retaining its quaint traditions. Due to its well-preserved heritage buildings and intangible culture. Penang's capital, George Town was accorded listing as a UNESCO World Heritage Site, making it a popular tourist destination.

## THE EMPHASIS ON SMART CITIES DEVELOPMENT IN THE PENANG2030 VISION HAS LED TO A WIDE RANGE OF INNOVATIVE PROJECTS.

The Penang State Government initiated the Penang2030 vision to develop a family-focused green and smart state. The government aims to improve liveability to enhance the quality of life, upgrade the economy to raise household incomes, empower people to strengthen civic participation, and invest in the built environment to improve resilience.

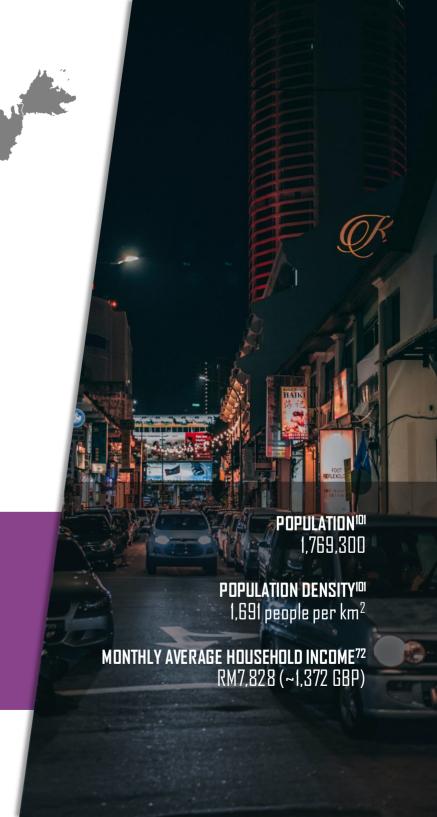
Penang's Smart City initiatives encompass a variety of measures such as the Penang Digital Library and Penang Smart Parking, and long-term partnerships with telco service providers and technology consulting firms.

Smart Cities development in Penang takes place at the local level as many initiatives belong to both local authorities in the state - Penang Island City Council (MBPP) and Seberang Perai City Council (MBSP) and are in line with the Penang2030 vision.

Also relevant to Penang's Smart City initiatives is Digital Penang, an agency tasked with accelerating efforts to create opportunities in the digital economy. It recently released the Digital Transformation Masterplan which will drive over RM 50 million over the next three years to leverage technology for achieving the Penang2030 vision. 100

## **KEY SMART CITY FOCUS AREAS**

- F-Government
- Transport
- Environment
- Open Data
- Urban Upgrades
- Industry 4.0
- Liveability
- Flood Control



## DEEP DIVE: **PENANG**

# URBAN CHALLENGES PENANG HAS SUCCESSFULLY LED SEVERAL SMART CITIES INITIATIVES OVER THE YEARS.

The state is continuously working to attract more technology-intensive projects that will generate higher quality jobs in the electronics, semiconductor and medical devices industries. Penang is currently preparing its own Smart City Roadmap that is framed around five pillars and will likely include over 70 projects for implementation. Alongside the digital transformation masterplan, this is an active market that is invested in making the best use of technology.

Penang is at the forefront of the emerging creative sector with technology start-ups companies, culture-based activities, and innovation-based organisations (such as Penang Science Cluster) established to build an ecosystem that nurtures creative industries and niche business services. All these provide the right ingredients to help realise Penang's smart and sustainability ambitions. Appropriate enablers around human capital development, participatory governance approaches, integrated digital platforms and appropriate incentives for private sector enablement will help craft successful and long-lasting improvements to urban living and economic competitiveness.



## SMART ENVIRONMENT

Flooding is one of the main urban challenges Penang has faced over the years with more frequent occurrences of extreme weather and sea water level rising. The Penang state government has implemented several flood mitigation projects such as improvements to the drainage system to prevent back flow from the sea. However, some low-lying areas still suffer from flash floods occasionally, indicating a need for a concerted effort to advance city resilience. Another critical issue is waste management – while the recycling rate has increased, the quantum of waste has doubled over the last decade indicating the need for more drastic measures to resolve the issue, reduce waste and ensure value recovery.



## **SMART LIVING**

Penang has been recognised as one of the most liveable and safe cities in Malaysia. 102 To retain that reputation, Penang has to constantly address citizens' needs to improve its quality of life. On public safety and cleanliness, the state relies on the collective efforts of the civil society and communities. Implementation of smart digital technologies will improve the standard of living in Penang further. Other challenges include addressing housing affordability, healthcare access

for an aging population and ensuring diversity of recreational and cultural facilities to maintain social and cultural vibrancy.



## SMART MOBILITY

Traffic congestion is one of the main challenges in mobility as the primary mode of transport used by Penang's inhabitants are private vehicles. Public transport services though extensive, cannot compete with the convenience of cars. There have been many initiatives, ongoing and planned, such as Penang's intelligent traffic and transport system, and mobile application services with real time transport information. There are also significant investments being made to implement solutions focused on expanding the public transport network. Accessibility by foot is also difficult with lack of safe spaces for walking and cycling in the city.



## **SMART ECONOMY**

As a primarily manufacturing based economy, Penang faces competition from other countries within the region due to lower wages and lower cost of doing business. It is critical that Penang moves to higher value-added industries. The Digital Transformation Masterplan seeks to address this need.

## SMART CITY DEEP DIVE MALAYSIA PENANG

# PENANG SOUTH ISLANDS (ISLAND A)

**TIMELINE:** 2021 – 2016

PROJECT VALUE: RM6 to 7 billion KEY COMPONENTS INVOLVED:

- Masterplanning
- Land Reclamation
- Infrastructure and Construction

#### **OVERVIEW**

The Penang South Islands project consists of three islands totaling a size of 4,200 acres and are located next to the Bayan Lepas Airport. <sup>103</sup> The profit from this project is meant to fund the Penang Transportation Master Plan (PTMP) that is estimated to cost RM46 billion. <sup>104</sup>

In 2020, Penang government signed an agreement with SRS consortium as the project delivery partner for PTMP and the Penang South Islands (PSI) reclamation. The first phase of the PSI - Island A (2,300 acres) - is expected to kick off in the first quarter of 2021 and will take around 10 years to complete. <sup>105</sup>

Island A is touted to be an environmental, social and governance (ESG)-centric development, targeted to grow and attract high value E&E players complementing Bayan Lepas' industrial ecosystem.



### PROJECT STAKEHOLDERS

- Penang Island City Council (MBPP)
- SRS consortium
- Bjarke Ingels Group (BIG)
- Ramboll
- Hijjas Architects and Planners











## **KEY URBAN PRIORITIES COVERED**















Among the notable Smart City solutions to be introduced in Island A are smart mobility, including autonomous vehicles, wastewater management, solid waste management and biodiversity management.

## **BEST PRACTICES FROM THE UK**

This is a large development and infrastructure project that will shape Penang's economy and city planning over several years.

Opportunities could be across delivering smart mobility systems, smart buildings and homes, infrastructure planning, overall project management and upstream services such as strategy development, urban planning and design for the upcoming islands. Smart City solution providers can contribute to various components across the development. Several companies across various relevant domains are identified in the list of UK Smart City Firms in the handbook.



# PENANG HIGHLIGHT #2 PENANG DIGITAL LIBRARY

TIMELINE: 2016 – 2020 (4 PDLs)
PROJECT VALUE: RM10.8mil - PDL2
KEY TECHNOLOGIES INVOLVED:

- Cloud computing
- IoT technologies
- Knowledge Management

#### **OVERVIEW**

The Penang Digital Library (PDL) was an initiative by the Penang State Government in collaboration with Keysight Technologies, Eastern & Oriental and supported by Time dotcom. The first digital library was built in 2016 on the grounds of the oldest English public school (the Penang Free School) and was followed by another three PDLs – one next to the first, and others in Batu Maung and Butterworth. 106

PDL – a library without books – is paperless and relies on a cloud-based network to access information. The aim is to re-engineer how information is curated and consumed in today's digitally-driven world and 'humanise' social collaboration. PDL's target to serve across all age groups within the community, and the facilities within the premises are open to the public free of charge.



### PROJECT STAKEHOLDERS

- Penang Island City Council (MBPP)
- Seberang Perai City Council (MBSP)
- Keysight Technologies
- Eastern & Oriental
- Time dotCom



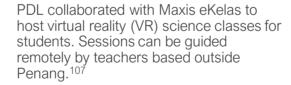












The PDL's financial model is through a public-private partnership, a good example of private companies collaborating with state governments, as PPPs in Malaysia are typically applied at a federal level due to their perceived complexities.

### **BEST PRACTICES FROM THE UK**

The Digital Library is an example of a Smart People initiative that helps communities with digital literacy as well as ensuring accessibility and inclusivity for all. Expanding into digital delivery of education, knowledge and training is even more important in a post pandemic world. UK companies can bring across best practices associated with digital talent, curriculum design for digital literacy and provide their own programmes to Malaysians for skills development and training as the functionality of digital transcends geographical barriers. Experiential technologies can be used to enhance the learning experience.

# 3.6 KUCHING

Kuching is the capital of, and the largest city in, Sarawak, the largest state in Malaysia. It is an important economic engine for East Malaysia. At the state level, there has been a significant push for digital transformation and Smart Cities as a means of achieving future growth.



# CITY DEEP DIVE: KUCHING



## SARAWAK'S ECONOMIC ENGINE

Sarawak state spans a land area about the size of Peninsular Malaysia. Its capital, Kuching is a medium sized city and an important economic engine for East Malaysia. Over the last decade, Kuching demonstrated sturdy growth attributed mostly to its high industrial productivity in clusters of manufacturing located in the Sama Java Free Industrial Zone and other such industrial parks. Lower cost of electricity given the abundance of hydroelectric power in Sarawak is a key reason for its attractiveness for chemical and metal related manufacturing sectors. Incentives from the federal and state government help in providing a favourable business environment. The state has been among the top four destinations in Malaysia for foreign and domestic investments for over a decade.

Kuching is the main gateway for tourists coming to Sarawak and Borneo. Besides being a main industrial and commercial centre, it is also well known for its cultural heritage and is currently vying for several of its sites to be listed as UNESCO heritage sites.

Kuching is administered by three local authorities: Kuching North City Hall (DBKU), Kuching South City Hall (DBKS)

and Padawan Municipal Council (MPP). As the state capital, several state level authorities are also involved in the development and growth of Kuching.

# THE STATE HAS A WELL LAID OUT PLAN TO MOVE TOWARDS A DIGITAL ECONOMY and

other sustainable sectors such as renewables. In line with that, it aims to develop Kuching as a Smart City by 2030. The overall direction of Kuching's development is set through several documents such as the Kuching City Competitiveness Masterplan and Greater Kuching Regional Development Plan. An important document driving the development of Smart initiatives and Digital Economy is the Sarawak Digital Economy Strategy spearheaded by two state-owned agencies: Sarawak Multimedia Authority (SMA) and Sarawak Digital Economy Corporation (SDEC).

## **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Environment
- Open Data
- Urban Upgrades
- Smart Tourism
- Flood Control
- Social order and Security



## CITY DEEP DIVE: **KUCHING**

### URBAN CHALLENGES

The state government is aggressively developing more value-added industries in the state and supporting these through generous and tailored incentive packages for investments into manufacturing segments that improve the downstream potential for local businesses. Overall, the digital economy is seen as a means to improve economic sustainability.

## THE REGION HAS ONLY RECENTLY EMBARKED ON A DIGITAL TRANSFORMATION JOURNEY

It will need enablers to be in place to nurture an innovation ecosystem, build talent and skillsets and readiness within the market. SMA and SDEC are leading efforts for implementation, developing initiatives for promoting research and innovation, and providing testbed opportunities.

Beyond the economic perspective, there are challenges that Kuching faces despite being a smaller sized city. Smart city initiatives can help address and manage challenges while an integrated implementation and capacity building approach can help Kuching leverage on its economic, natural and cultural strenaths.



## SMART ENVIRONMENT

Kuching is a riverfront city, located in a low-lying area. It has experienced occasional vet serious flooding problems especially during the rainy season. Urban resilience is therefore a key consideration especially since low-lying areas are more vulnerable to extreme precipitation events and sea level rise. Kuching has also had instances where haze has resulted in very poor air quality. This is believed to be largely from dense smoke from forest fires in Sumatra and Kalimantan in Indonesia



## **SMART PEOPLE**

In Kuching as well as the rest of the state, urban poverty is relatively high. The urban poor have lower secondary education, which correlates with low awareness of smart cities that in turn results in instances of vandalism and misuse of technology in the city. 111 This has indirectly slowed down the progress of smart city transformation. Lack of digital inclusion among the urban poor can exacerbate income divide and social inequalities. The backbone of a smart economy is human capital and skillset development. The state government has rolled out many programmes to upskill and reskill its people.



## **SMART MOBILITY**

Low population density and pre-existing infrastructure in Kuching have restricted the development of an effective public transport system. Private vehicle ownership is also a challenge with vehicle growth rate generally being double the population growth rate. The ensuing congestion spills over into adjacent communities and districts. This bears an impact on quality of life and on economic arowth.

Kuching has announced that the Autonomous Rapid Transit system will form part of its public transport network, which is expected to be implemented in a few years time.



## SMART GOVERNMENT

While streamlined delivery of current egovernment offerings is led by initiatives such as Sarawak Pay and Sarawak ID, much of the urban data such as land use and tenure records as well as processes are yet to be digitalised. Urban planning and management of urban infrastructure will need to be more effectively planned by leveraging data sharing, integration and data analytics abilities.

## SMART CITY DEEP DIVE MALAYSIA KUCHING

# KUCHING HIGHLIGHT #1 INTEGRATED FLOOD MITIGATION

**TIMELINE:** 2014 - 2022

PROJECT VALUE: Not Available KEY TECHNOLOGIES INVOLVED:

- Digital Mapping
- IoT and Sensors
- Emergency Response and Early Warning systems

#### **OVERVIEW**

As flash floods happen in an instant, a shorter response time provides the opportunity to warn residents and undertake evacuation and activate floodgate management.

The response system planned for Kuching uses over 300 telemetry stations to provide timely information to the local authorities and to provide early warning notifications to residents. Four Intelligent Gauges (IG) have been installed in flood prone areas in Kuching<sup>112</sup> – they are part of a flood detection and warning system that measures the water level and provides early flood warning both through audio and visual signals to nearby residents. The system triggers an alarm when the water level reaches a preset alert level. In such an event, data is sent via text messages to



## PROJECT STAKEHOLDERS

- Kuching South City Council (MBKS)
- Kuching North City Council (DBKU)
- Department of Irrigation and Drainage (DID)







## **KEY URBAN PRIORITIES COVERED**















DID officers' mobiles phones. Existing IG data is displayed in the iHydro website for flood monitoring.

The government continues to push for efforts to improve the current flood management system.

## **BEST PRACTICES FROM THE UK**

Flood risks exacerbated by climate change is a challenge that plagues Kuching and other coastal cities across Malaysia.

UK companies can offer software and consultancy services with relation to sensor deployment and flood modelling. UK can provide big data analytics and risk forecasting especially tailored to climate change. There are opportunities to enhance capacity building, framing flood management policies and governance frameworks. UK and Sarawak research institutes can collaborate on climate impact modelling to inform resilient urban planning.

## SMART CITY DEEP DIVE MALAYSIA KUCHING

# KUCHING HIGHLIGHT #2 KUCHING URBAN TRANSPORT SYSTEM

TIMELINE: 2018 – 2025
PROJECT VALUE: RM 6 billion
KEY TECHNOLOGIES INVOLVED:

- Trackless Tram
- Hydrogen Fuel Technology
- Intelligent Transport Systems

#### **OVERVIEW**

The Autonomous Rail Transit (ART) system for Kuching and its neighbouring divisions will be funded through the 12<sup>th</sup> Malaysia Plan. This project is in line with Sarawak state's aspiration to become a developed and high-income state by 2030.

Kuching Urban Transportation System (KUTS) is a government-initiated project involving the ART system implemented by Sarawak Metro, a wholly owned subsidiary of Sarawak Economic Development Cooperation.

The first phase of the project will involve the construction of two urban lines, with a total alignment length of approximately 50 km. The trackless tram technology will be mostly at-grade with some elevated sections. The ART vehicle will be powered by hydrogen fuel cell technology and the



## PROJECT STAKEHOLDERS

- Sarawak State Government
- Sarawak Ministry of Transport
- Sarawak Metro
- Sarawak Economic Development Corporation (SEDC)
- Sarawak Multimedia Authority (SMA)



























first mile last mile connectivity will be provided by hydrogen powered feeder buses, in line with the hydrogen economy aspirations of the state.<sup>114</sup>

In addition to its low carbon and sustainable mobility objectives, Sarawak Metro also runs the Socio-Economic Enhancement and Development Programme which fosters partnerships between local and international partners to create opportunities for collaboration in R&D, human capital development and job growth.

### **BEST PRACTICES FROM THE UK**

The ART project signals a step change in public transport planning and heralds the mainstreaming of the hydrogen economy in Sarawak. There will be opportunities around the provision of engineering design, ITS solutions, asset management, mobility management solutions, last mile solutions and integrated operations such as one-stop mobility apps and ticketing. Hydrogen fuelled systems will need infrastructure design and operations planning. UK companies and local governments can support as solution providers and collaborators. Several transport and mobility companies are identified in the list of UK Smart City Firms in the handbook.



# CLD KUCHING SMART HERITAGE

**TIMELINE:** 2017-2022

PROJECT VALUE: Not Available KEY TECHNOLOGIES INVOLVED:

- Digital conservation records
- Tourism products
- AR/VR apps for enhanced experience

#### **OVERVIEW**

The Old Kuching Smart Heritage (OKSH) project reflects the vision for Old Kuching to meet UNESCO requirements to be certified as a Smart Heritage City, OKSH acts as a platform to support and improve socioeconomic value through digital and technology-based support systems and infrastructure.

It is a collaborative effort between state agencies, local authorities, enterprises, higher education institutions, training centres and NGOs targeted at heritage preservation through the use of ICT and digital technology, and the promotion of local culture, art, and sports.

OKSH covers historical monuments, villages, businesses and riverfront heritages elements of the city from old Padungan to Kubah Ria.



## PROJECT STAKEHOLDERS

- Sarawak State Government
- Ministry of Local Government & Housing Sarawak
- Ministry of Tourism, Art, Culture, Youth and Sport
- Kuching North City Hall
- Kuching South City Council









## KEY URBAN PRIORITIES COVERED













The programme intends to use technology to preserve and conserve Kuching's heritage using digital tools, while improving tourist experience. Through the creation of tourism and culture products and services, it hopes to create employment opportunities and empower the local community.<sup>115</sup>

### **BEST PRACTICES FROM THE UK**

OKSH is an established programme that allows for innovation with respect to digital preservation, information dissemination, placemaking and user experience technologies. This will support conservation activities, promote awareness, creativity, arts and culture and enhance tourism experience.

UK technology companies and urban design and planning firms can bring innovative approaches, use of technology, ideas and roadmaps to assist Kuching in its cultural journey and tourism sector development. Bristol city is known for its innovative approaches of engaging citizens with cities and urban environments creatively.

# 3.7 ISKANDAR MALAYSIA

This rapidly urbanising economic region is Malaysia's gateway to Singapore and vice versa. Many Smart City initiatives in Malaysia germinated here, including initiatives seen as critical tools for sustainability.



## **ISKANDAR MALAYSIA**

# REGION DEEP DIVE: **ISKANDAR MALAYSIA**

## **GATEWAY TO SINGAPORE**

Iskandar Malaysia (IM) is an economic region located within Johor, covering approximately 4,749km² of land. 116 Johor Bahru (JB), the second-largest city in Malaysia, is situated in the rapidly urbanising IM. It is closely connected to Singapore and has significantly benefited from economic agglomeration. As a result, the region offers some comparative advantages, such as land availability and affordable living costs compared to KL. However, while this opens growth opportunities, it has contributed to challenges such as traffic congestion.

# IN 2012, IM ENDORSED AS MALAYSIA'S FIRST SMART CITY MODEL Iskandar

Regional Development Authority (IRDA), the federal authority responsible for promoting the region, was one of the first proponents of the smart city concept in Malaysia about a decade ago. Smart Cities were seen as application of technology and innovation to accelerate IM towards fulfilling its vision of being a strong and sustainable metropolis of international standing. IM's

Comprehensive Development Plan (CDP), which has since been enhanced and now known

as CDP II and the Circle of Sustainability have been guiding the region's growth trajectory. Several blueprints have been published to drive the implementation of CDP, such as the 'Iskandar Malaysia Low Carbon Society Blueprint' published in 2014.

IM has been a launchpad for smart initiatives for government, private sector and international organisations. This includes the first Urban Observatory in Malaysia, the Mobility Management System, and the development of robust and stable data communication infrastructure to attract IR4.0 investors. Some key highlights in the upcoming project plans would be the implementation of the BRT system as a public private partnership, and pilots for autonomous vehicles.

## **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Environment
- Open Data
- Smart Water and Waste Management
- Smart Tourism
- Social Order and Security
- Green Technologies



### **ISKANDAR MALAYSIA**

## REGION DEEP DIVE : ISKANDAR MALAYSIA

## **URBAN CHALLENGES**

THE REGION HAS AMBITIOUS PLANS FOR ECONOMIC EXPANSION WHILE PURSUING SUSTAINABLE GROWTH. As an economic region, IM plans to reach a population size of about 3 million by 2025 from its current 2.23 million, with a target of cumulative investments of almost RM 400 Billion. JB will account for a third of IM's forecasted population.

To meet these ambitions, the region aims to attract residents and investments with its promise of liveable and green urban areas, transport convenience, and an attractive community to live, work and play. As a pioneering low carbon society in Malaysia, it also aims to halve its GHG emissions from its 2005 baseline by 2025.

Building competitiveness, protecting its natural resources, effective urban management and ensuring inclusivity are its key priorities. The region has several plans already in place, many of which utilise smart city concepts. Core challenges around environment, living and mobility are still relevant – these require integrated planning and enablers such as regulatory and governance frameworks that can tie in isolated initiatives into more system-based approaches.



## **SMART ENVIRONMENT**

Environmental protection needs to be comprehensively addressed to avoid long term sustainability issues for JB and IM. There have been reports of river and air pollution attributed to industrial pollutants.

The state needs to do more to safeguard its water quality and resources, noting that it exports water to Singapore.

Sprawling growth has created issues concerning waste and land resource management and encroachment of urban boundaries into natural and rural areas. JB also suffers from flash floods.



## **SMART LIVING**

IM has seen rapid urbanisation and development with several residential townships primarily catering to foreign markets and higher end living. This has impacts housing affordability. Matching demand to supply is currently inefficient due to the lack of quality housing stock data, information flows and streamlining of processes. Other aspects of affordability such as access to healthcare and ensuring safe communities are focal needs of this urban region.



## SMART MOBILITY

Some 300,000 Malaysians travel across the Johor-Singapore Causeway every day (pre-COVID), making it one of the busiest overland border crossings in the region. Traffic congestion is a major challenge in JB and IM. As the economy has expanded and spending power has increased, so has the rate of ownership of private vehicles that worsen the city's traffic.

This preference of private vehicle ownership has resulted in low ridership and use of public transport. Congestion is also caused by rapid development and a traffic management system that struggles to cope with the influx of vehicles. Although several improvements to support integrated planning and improve public transport networks and connectivity are underway, there is a still a way to go to meet the low carbon ambitions of IM.



## SMART GOVERNMENT

The government has been undertaking several measures to use technology for the benefit of its citizenry and for urban and natural resource management. Relatively mature in the smart city context, the key governance challenges now centre on achieving strong regulatory frameworks, ensuring integration and fostering participatory approaches to governance.

## SMART CITY DEEP DIVE MALAYSIA **ISKANDAR MALAYSIA**

## ISKANDAR MALAYSIA HIGHLIGHT #1 **SMART INTEGRATED** MOBILITY MANAGEMENT **SYSTEM**

**TIMELINE:** 2019-2022 (Design Phase) **PROJECT VALUE:** Not Available **KEY TECHNOLOGIES INVOLVED:** 

- GIS and Spatial Platforms
- Real time traffic management
- Transport simulation models

#### **OVERVIEW**

As part of UK Global Future Cities Programme and in partnership with IRDA. this project helps develop the implementation strategy for IM's Smart Integrated Mobility Management System (SIMMS), 118

There are several benefits that SIMMS brings - it allows for a data driven and evidence-based approach to inform transport and urban planning as well as efficient mobility management. This translates to reduced congestion, a cleaner environment and reduced GHG emissions.

SIMMS will provide a platform for the sharing of data from different applications that can leverage that data for the purpose of the application and the needs



### PROJECT STAKEHOLDERS

- UK Foreign Commonwealth and Development Office (FCDO)
- Iskandar Regional Development Authority (IRDA)
- Mott Macdonald (Programme's Delivery Partner)
- UN-Habitat (Programme's Strategic Partner)
- UK Built Environment Advisory Group (Programme's Strategic Partner)



Foreign, Commonwealth & Development Office

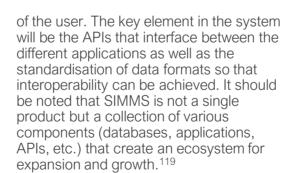








## KEY URBAN PRIORITIES COVERED



#### **BEST PRACTICES FROM THE UK**

IM is a leading region in Malaysia in terms of smart city efforts. Given their maturity and strong partnership with the UK, there are many downstream opportunities for the UK to bring experience and expertise.

The UK has an impressive list of companies that provide mobility solutions, ITS systems, mobility data insights, real time information services and first mile-last mile solutions. These companies can provide both infrastructure and services to implement SIMMS. UK cities can also provide their transport expertise to IRDA to transfer best practices and build local capacity.

## SMART CITY DEEP DIVE MALAYSIA ISKANDAR MALAYSIA

# ISKANDAR MALAYSIA HIGHLIGHT #2 KULAI ISKANDAR DATA EXCHANGE (KIDEX)

**TIMELINE:** 2020 - 2023

PROJECT VALUE: Not available KEY TECHNOLOGIES INVOLVED:

- Data centres
- · High speed network connectivity
- Alternative energy sources

#### **OVERVIEW**

The Kulai Iskandar Data Exchange (KIDEX) is being built on 301 ha of land in Sedenak by TPM Technopark Sdn Bhd (TPM Technopark), which is a subsidiary of Johor Corporation (JCorp). It is designed to attract the data center market and is set to attract over RM17.5bil worth of investments into the state. 120

Supported by the Malaysian Digital Economy Corporation (MDEC) and the Malaysian Investment Development Authority (MIDA), the park aims to provide an opportunity for data centre investors with incentives and support for data centre services.

The robust and stable data network infrastructure that KIDEX aims to provide will be a catalyst to grow the data industry. It will also complement the existing data hub in Singapore and attract investors seeking to establish large scale or cost-competitive operations in the



## PROJECT STAKEHOLDERS

- Malaysian Digital Economy Corporation (MDEC)
- Malaysian Investment Development Authority (MIDA)
- TPM Technopark
- Johor Corporation





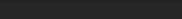






region. TPM Technopark has developed KIDEX to feature closely located high, stable, redundant and abundant power of up to 600MW as well as abundant water supply, rainwater catchment banks, and a planned independent natural gas and chilled water cogeneration plant able to generate up to an additional 240MW of power.<sup>121</sup>

KIDEX will not only support data centre development but also segments related to the data industry, including the Internet of Things, cloud computing, data storage, virtual and augmented reality, e-commerce, banking, artificial intelligence and software engineering.



**BEST PRACTICES FROM THE UK** 

The KIDEX project will attract significant investment and development across data centre community, support services, and even renewable energy generation plants for alternative energy capacity. Collaboration and business opportunities exist with the UK across all of these areas. Through the Newton-Ungku Omar Fund, UK and Malaysian businesses have partnered to develop Tier 4 green data centres which are very energy efficient. Similar innovation and technology advancement can be applied and scaled at similar locations as well.

# SMART CITY DEEP DIVE MALAYSIA ISKANDAR MALAYSIA

# ISKANDAR MALAYSIA HIGHLIGHT #3 ISKANDAR MALAYSIA URBAN OBSERVATORY

TIMELINE: 2019-2022 (Phase 1)
PROJECT VALUE: Not Available
KEY TECHNOLOGIES INVOLVED:

- GIS and Spatial Platforms
- Dashboards and Interactive tools
- · Real time information
- Sensors, IoT

#### **OVERVIEW**

The Iskandar Malaysia Urban Observatory (IMUO) is a data platform for gathering, curating, analysing, and disseminating data and information on IM. Once fully operational, IMUO will analyse data from innumerable sensors and other sources to uncover patters and insights that can inform the sustainable economic growth of the region. 122

Overall, the analytics will cover every aspect of city functions by providing urban development indicators, performance against SDGs, and other strategic performance KPIs. These will serve as evidence-based outputs to guide planning and policy and to provide open datasets and analytics for public consumption.

Sharing of data and insights are critical aspects for the success of an urban observatory and IRDA is working on a co-



## PROJECT STAKEHOLDERS

- Iskandar Regional Development Authority (IRDA)
- Malaysian Administrative
   Modernisation and Management
   Planning Unit (MAMPU)
- United Nations Development Programme (UNDP)























ownership model with several ministries and agencies to achieve rich and integrated datasets. <sup>123</sup> Moving forward, the IMUO will be integrated with the Smart Integrated Mobility Management System (SIMMS) from which it will pull its mobility data while other data such as residential data will be through collaborations with private organisations such as iProperty.

IMUO analysis of river water quality and solid waste data has helped IM undertake targeted environmental interventions. The region is now moving towards 5G and potential use cases to enhance data insights to meet its overall objectives.

## **BEST PRACTICES FROM THE UK**

IMUO is a leading example of an urban observatory, with several such observatories being planned across Malaysia.

The observatories will need assistance with implementation strategies, data collaborations, innovative data collection methods, ensuring data interoperability, cybersecurity, data analytics and interactive dashboards. Integration across the several moving parts and technologies will be critical. The UK can provide its expertise on these through its governance and standards companies and data analytics companies. Some of there are featured in the list of UK Smart City Firms in the handbook.

# 3.8 **KULIM**

Kulim is a small city yet an economic powerhouse due to its manufacturing strengths that are centred around its Hi-Tech Park. The city has started to take small yet steady steps to adopt smart city development.



## CITY DEEP DIVE: KULIM

## A CATALYTIC ECONOMIC NODE FOR THE NORTHERN CORRIDOR ECONOMIC REGION

Kulim is a vibrant and growing township in Kedah State and is situated just 30km east of Butterworth in Penang. Kulim is best known for the country's first ever "HiTech Park" (KHTP) that was established in 1996 to lead Malaysia's foray into a more robust industrial economy focusing on capital intensive high-tech manufacturing, advanced technologies and R&D activities.

## KHTP WAS DEVELOPED AS PART OF MALAYSIA'S VISION 2020 PLAN AND WAS ENVISIONED AS THE "SCIENCE CITY OF

**THE FUTURE".** The key industries in the KHTP are electrical and electronic manufacturing. It is also a potential growth centre for green technology development. Several production companies from the United States, Germany, Japan and Canada are based here. 124

One of the major infrastructure investments proposed in Kulim is the Kulim International Airport, which can serve as an anchor for further greenfield development opportunities such as the proposed Aerotropolis.



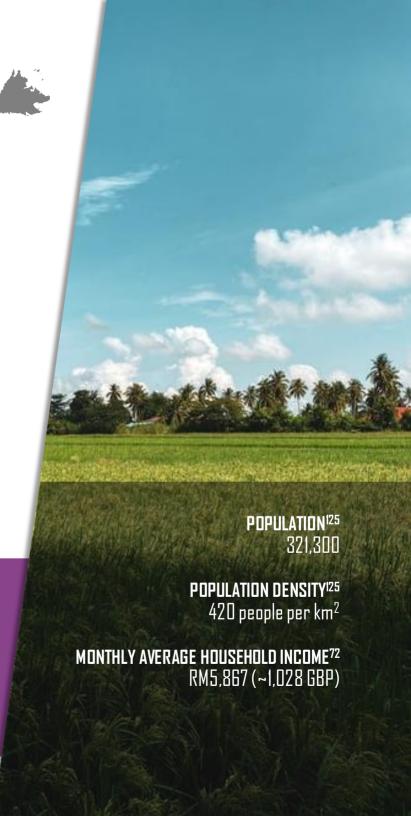
Kulim is closely connected to Penang and its industrial sectors through the Butterworth-Kulim Expressway, and is often considered a satellite city that is part of the greater George Town conurbation.

At the state level, several strategic directions are laid out through the Kedah Strategic Development Plan 2019-2035 and Kedah Green Energy and Renewable Energy Master Plan. At a city level, Plan Kulim 2035 defines the development aspirations of the city.

Some of the key smart city activities initiated in Kulim include integrated geospatial mapping for land use and tenure, community based urban farming and development of an integrated command centre for city surveillance.

## **KEY SMART CITY FOCUS AREAS**

- E-Government
- Transport
- Environment
- Open Data
- Smart Water and Waste Management
- Smart Tourism
- Social Order and Security
- Green Technologies



## CITY DEEP DIVE: KULIM

## **URBAN CHALLENGES**

Kulim is a small city with its primary economic asset being its Hi-tech Park. It has been steadily adopting small scale smart city initiatives that offer the foundational steps to achieve greater transformation

## KULIM'S JOURNEY REPESENTS A SIMILAR **EVOLUTION PATHWAY OF SMALLER CITIES** ACROSS THE COUNTRY AS THEY FORAY INTO BECOMING SMART CITIES.

Kulim does sit within the hotbed of advanced technologies and the KHTP offers a significant platform to nurture innovation It also has a municipality run programme that is trying to engage the community and introduce participatory approaches to governance. Their other key priorities are environmental protection and creating a liveable city.

While its primary urban challenges are described here, it also needs to build its digital infrastructure to be able to support its ambitions.



## SMART PEOPLE

For smart cities to achieve their full potential and benefit residents, it is important that the initiatives better the lives of all sections of society. Currently there is low awareness of digital or smart city initiatives in Kulim. This was reflected in the surveys conducted as part of the Malaysian Smart Cities Framework development. Kulim has proposed using its existing urban community farming initiative as a means of community empowerment, a critical first step before proceeding to build digital inclusion and readiness in society.



## SMART MOBILITY

Given its proximity to Penang, numerous commuting trips are undertaken between people working in Penang and living in Kulim and vice versa. This creates congestion along the main travel corridor, especially along the Butterworth-Kulim Expressway intersection with the North South Expressway. Several solutions have been proposed, e.g., providing regional BRT connectivity. Data analytics and intelligent transport systems can help increase traffic movement efficiencies and support integrated transport and land use planning.



## SMART ECONOMY

There is a need to create a betternetworked conurbation with Penang and Kulim integrated so that agglomerations can help industries cluster and grow symbiotically. Disjointed planning may introduce unintended local competitiveness within the economy. Spurred by integrated and regional approaches to planning, there is opportunity to economically integrate Penang and Kulim to catalyse new business opportunities and even spur innovation and complementarities.

On a more local scale to Kulim, KHTP also identified the lack of R&D activities and collaboration between industrial training and industrial players as an impediment to transitioning to higher value-added industries and jobs. Greater collaboration between various stakeholders can lead to innovative solutions development and upskilling of the workforce. KHTP's strength in being able to leverage the expertise, knowledge, and experience of high technology multi-national corporations is a critical strength that needs to be tapped into.



# KULIM HIGHLIGHT #1 TEKNO-EKO-PINTAR 2035

**TIMELINE:** 2018 – 2035

PROJECT VALUE: Not Available KEY COMPONENTS INVOLVED:

- Water Management
- Waste Management
- · Integrated Mobility
- Smart Agriculture
- High Tech industry

#### **OVERVIEW**

The Kulim District aspires to become a Tekno Eko Pintar City through integrated development vision up to 2035. The new district plan, prepared in 2018 for Kulim replaces previous planning documents and proposes a new land use and infrastructure plan. <sup>125</sup>

The focus is on five key objectives including building a resilient and competitive economy, a prosperous and inclusive community, a sustainable and conducive environment, infrastructure planning and effective governance.

The plan recognises the Hi-Tech Park area as a location to attract foreign investors with the ability to strengthen international relations, especially in the high-tech industry. It further proposes



### PROJECT STAKEHOLDERS

- Kulim Municipal Council (MPKK)
- Ministry of Housing and Local Government (KPKT)
- Malaysian Administrative Modernisation and Management Planning Unit (MAMPU)
- Public Service Department (JPA)
- Ministry of Finance
- PLANMalaysia











**PLAN**Malaysia

## **KEY URBAN PRIORITIES COVERED**















Hi-tech agriculture, agro-tech, tourism and industrial growth as additional sectors targeted for growth. Initiatives cover transportation, utility infrastructure, environmental sustainability, social development and rural development.

#### **BEST PRACTICES FROM THE UK**

The 2035 district plan highlights the direction for Kulim and the Kedah state to drive green growth and high technology as key pillars of their economy.

Smart technologies are a key tool to achieve sustainability. UK organisations can explore discussions with the city and the state to understand their aspirations and assist with smart city road mapping, integrated urban and regional planning, data driven analytics, smart utilities and infrastructure design, etc. There are opportunities to leverage the hi-tech hub to drive upskilling and private sector partnerships, with UK organisations playing facilitator and technical advisor roles.



Smart city transformation is shaping the future of urban environments and revealing new opportunities for businesses and communities across the UK. This chapter outlines the state of play of smart city development in the UK, including main approaches, stakeholders and enablers.



## THE **HISTORY** OF UK SMART CITIES

#### THE UNITED KINGDOM HAS BEEN BUILDING INNOVATION INTO ITS DNA

With a long-standing history and commitment to world-leading R&D, the UK is now leading the way in the transition towards a knowledge economy. Electronics, software, pharmaceuticals and life sciences, are examples of the high-tech capabilities that have driven much of the UK's productivity growth in the past few decades.

The UK has leveraged its research technology and creative talent for the development of smart cities. The UK Government took early steps to drive the concept. Notably, this was the digital transformation of the public sector. updating and enabling connectivity and funding urban innovation programmes.

The UK has also built smart cities from the bottom-up. The concept of smart cities became a call to action for cities to solve their urban challenges – from traffic congestion, decarbonisation, shifting consumption patterns, to an ageing population. While these are complex, the challenges presented a unique opportunity for cities to respond in a more integrated manner across siloed systems.

Around 1/3 of the UK's **local authorities** have launched major Smart City initiatives or strategy<sup>126</sup>

As an example, the London Datastore, a free and open data portal, was created in 2010 with the aim of dismantling such siloisation

Through the holistic approach of combining data sets from various departments, the Greater London Authority was able to grasp a better, granular understanding of the city. It highlighted where regeneration was needed, and what efforts to prioritise.

Today the UK is well-recognised as a global leader in smart cities, on the strength of its entrepreneurial workforce, innovative spirit, and business-friendly environment. As such, UK companies are regularly solicited by international partners at the highest level to counsel, advise on and implement smart city developments and innovations.



2007 Innovate UK was set up under Royal Charter for the purpose of championing business-led innovation

2011 The Government Digital Service (GDS) was set up to haul the civil service into the digital age

2018 UKRI was launched to operate across the whole of the UK, with a combined budget of more than £6 billion<sup>127</sup>

The UK announced a boost of £40 million for cuttingedge start-ups, such as VR

2020

training platforms, virtual farmers' markets, etc. 128

2005 2000

2010

2015 2020

## THE **UK APPROACH** TO SMART CITIES

## THE UK'S DECENTRALISED APPROACH EMPOWERS LOCAL GOVERNANCE

The UK Government sets the overall tone for smart city development in the UK. It encourages local players by creating a fair, open and attractive environment. To do so, the Government sets national policies relating to digital, industrial development and climate change. It also provides funding programmes, creates platforms for smart city players to network and promotes common standards and regulatory compliance.

The UK embraces a more decentralised approach to smart city implementation. The UK City Deal model is the Government's innovative strategy for building stronger urban and regional growth by providing cities with greater autonomy. For example, City Councils have more control over infrastructure investment and urban planning. This approach can empower cities to play their strengths and develop cutting-edge technologies that cater to local needs.

Several other factors that have made this approach successful. Cities often set their own smart city policy and strategy. Cities are generally well-connected and can tap into a variety of public and private funding sources. Lastly, they can leverage a large local pool of creative and tech talent.

A successful decentralised approach hinges on five main best practices:

- Growing the Ecosystem the UK has a large and rich smart city ecosystem, a wide range of public and private sector players, academia and associations
- 2 Encouraging Partnerships going beyond traditional government delivery and public / private choices, the UK encourages shared-value creation through joint ventures, PPP, franchising and privatisation
- Fostering Innovation and Inclusion

   partnerships are the key to bringing innovative products and services to the market, through technical, business and legal support
- Technology Standards and Regulations interoperability across devices and technology vendors and regulations are helping to accelerate innovation and level the playing field
- Meeting Real Citizen Needs cities are more and more embracing bottom-up citizen co-creation and design of smart cities.



## THE **SMART CITY ECOSYSTEM** IN THE UK

The UK has a rich ecosystem that involves stakeholders across national and local governments, private sector, academia and associations. The diagram below provides an illustrative – though not exhaustive – representation of that ecosystem.

#### NATIONAL GOVERNMENT

National Departments play a key role in outlining regulation, funding innovation, and setting national smart city related policies. Includes:

- National Departments
- Agencies/Public Bodies



Department for Business, Energy & Industrial Strategy













dq:cities

Opportunity Peterborough













#### PRIVATE SECTOR

Provides smart city technology and services, leading digital transformation in a wide range of sectors, funding initiatives and commercial support

- Technology Vendors
- National Utilities
- Carriers
- Local Enterprise Partnerships
- Professional Services
- SMEs / Startups



**ARUP** 

**Deloitte** 

#### LOCAL GOVERNMENT & OPERATORS

Local governments set the vision for smart cities and play a key role in funding, sourcing, tendering and implementing smart city projects. Includes:

- Combined Authorities
- City Councils
- Local Operators
- Local Utilities







Transport for











Growth Hub









Develops centres of excellence, sharing best practices, fostering coordination, facilitating financing, and plays a key role in developing products and services



- Universities
- Research Institutes
- Centres of Excellence
- Associations
- Charities





## KEY NATIONAL GOVERNMENT ACTORS IN **SMART CITY DEVELOPMENT**

#### THE UK'S NATIONAL DEPARTMENTS PLAY A KEY ROLE IN PUSHING THE ENVELOPE OF INNOVATION

A wide range of national departments are involved in smart city development, as is the case for Malaysia. Each views its involvement in smart cities uniquely from the lens of its mandate. For one, the **Department for Transport** drives developments for future of mobility and the Department of Health & Social Care for digital health and social care.

The Department for Digital, Culture, Media & Sport is the UK equivalent of MCMC in Malaysia. They both take on the responsibility of laying the foundations for connectivity.

The Department for Business, Energy & Industrial Strategy is also significantly involved. BEIS leads on national industrial strategy. As such, it is the private sector's key collaborator. It also secures affordable and clean energy.

This highlights that innovation in a central aspect of UK smart cities.



Established in 2016, BEIS develops and delivers on a comprehensive industrial strategy, collaborates with the private sector, and secures affordable and clean energy for the UK. BEIS leads five smart city initiatives that focus on developing clean growth, digital manufacturing, quantum technology, the space industry, and technology for healthy ageing.



Established in 2002, DfT plans and invests in the UK's transport networks and critical infrastructure. It prioritises economic growth and opportunity, improving journey experiences and ensuring safe and sustainable transport. DfT is responsible for three smart city initiatives, these are: future of mobility, digital railways and smart ports. DfT is steering the UK through a transport revolution that is electric, shared, autonomous and connected.



Department for Digital. Culture Media & Sport

Formed in 1997, DCMS leads on telecommunications and digital policy development. Its main role in smart cities is to develop telecommunications infrastructure, AI, creative industries, and cybersecurity. DCMS leads three smart city initiatives that focus on 5G. broadband networks, and the data economy.



NHSX is the unit under the DHSC leading the digital transformation of health and social care services. It aims to digitise National Health Service (NHS) services, connect its health and care systems using technology, and transform patient care delivery, both in the hospital and at home. Some of NHSX's key initiatives include an electronic payment records system, the NHS Al Lab, procurement frameworks to assess the quality of new digital health products, among others.

# OTHER IMPORTANT NATIONAL GOVERNMENT ACTORS

Innovation has been an integral part of the success of the UK smart cities. UK Research and Innovation sits within BEIS and is the national research and innovation funding body. There are three public innovation agencies leading on innovation. They all provide funding support for business and research and help to build a thriving innovation community. However, each has a unique value add.

As UKRI brings together nine member Councils, it offers research grants across economics, humanities and sciences. With UKRI, Innovate UK is the national innovation agency. Its grants have a stronger business focus. Connected Places Catapult provides impartial 'innovation as a service' for public bodies, businesses, and infrastructure providers.

As the UK's communications regulator, it's essential **Ofcom** keeps up-to-date with changing technology. Ofcom considers how these changes affect the sectors it regulates now and in the future. The **Government Digital Service** is a world leader in using innovative techniques to deliver outstanding public services.



Ofcom is the communications regulator and competition authority in the UK. Its role covers quite broadly, TV, radio, fixed line telecoms and mobile services. It also oversees postal services and the airwaves used by wireless devices. Through this role, Ofcom is helping to ensure access to communications services, a diversity of service providers and user protection. It ensures regulations keep pace with new technological developments.



Connected Places Catapult's is the UK's innovation accelerator for cities, transport, and places. It connects businesses and public sector leaders to cutting-edge research to spark innovation and grow new markets. It runs technology demonstrators and SME accelerators to scale new solutions. It operates across six domains, including mobility, public space, wellbeing and more, to develop opportunities for innovation within each.



UKRI launched in 2018 under BEIS as the national funding body for research. It brings together seven Research Councils, Innovate UK and Research England. UKRI convenes and invests in collaboration to build a thriving, inclusive research and innovation system. UKRI draws on a great breadth and depth of expertise across its member Councils to realise its ambitious agenda. UKRI provides support and grants to the whole research ecosystem.



GDS is a unit of the Cabinet Office tasked with transforming the provision of online public services and helping government work better for everyone by leading digital transformation. It works with governments around the world to help them tackle issues ranging from corruption, data systems, and citizen engagement. It also works with leading consulting firms to develop integrated data platforms to increase efficiency and streamline tasks.

# SPOTLIGHT ON CONNECTED PLACES CATAPULT<sup>129</sup>

#### WHY IS IT IMPORTANT?

The Connected Places Catapult (CPC) supports UK businesses develop innovations in mobility services and the built environment. It aims to be the catalyst to stepchange improvements in the way people live, work and travel by enabling new levels of physical, digital and social connectedness.

CPC develops, implements and commercialises the latest technology and innovation for existing markets, as well as creates demand to grow new markets in the UK and globally.

# CPC IS AN INNOVATION ACCELERATOR FOR CITIES, TRANSPORT, AND PLACES.

The CPC operates as the intersection between public and private sectors and between local government and transport authorities. They convene the disparate parts of the market to help innovators navigate the complexity of doing business, creating new commercial opportunities, improving productivity and socioeconomic and environmental benefits for the UK and beyond. It improves productivity and creates new jobs and exports across sectors, including smart cities.

Collaboration is a core component of CPC. They work with academic partners to support and implement cutting-edge innovation research and initiate new partnerships, secure procurement and scale commercial success. Its support for innovation projects and programmes have been a catalyst for smart city initiatives.

Some of the innovation programmes include the Business Programme, the Government Programme, the Research Institutions Programme and the Global Programme. These programmes main objectives are to connect stakeholders across markets and ecosystems, spark new innovation and investment and accelerate commercial success.

Through its Global Programme, CPC has helped international partners grow their innovation clusters and scale their solutions. They also work with innovative locations to deepen their social and physical connectivity.

Through CPCs inter-governmental bilateral agreements, they have successfully fueled long-term cross-border investments that have opened opportunities for global markets to work with UK innovation and technology.

# "We have already delivered more than 20 international projects across four continents."

CPC's global opportunities are multipronged and range from their Innovation Location programme where CPC helps cities distinguish themselves as industry leaders in a regional or global market; to the Global City Standards programme which offers local government bodies and private sector actors around the world the opportunity to apply for CPC's expertise in state-of-the-art standardisation and accreditation to their local climate. Alongside these programmes are also City Testbeds and Innovation Hubs that help create smart city innovation ecosystems.



#### **SUCCESS STORY**

### INNOVATING FOR CLEAN AIR PROJECT, UK & INDONESIA

E-mobility has become a strategic necessity in Indonesia as it commits to reducing emissions and address its issues within the transport sector as well as air quality. Through the Innovating for Clean Air (IfCA) programme, Connected Places Catapult and the British Embassy in Indonesia are supporting the country in its aspirations to address transport decarbonisation challenges through the adoption of e-mobility solutions and policy interventions.

Through the Catapult's IfCA programme, the opportunity to decarbonise Indonesia's transport systems is presented to firms in the UK's e-mobility ecosystem.

This project builds on the ongoing collaborations that have taken place in three cities – Bandung, Denpasar and Surabaya – to strengthen UK-Indonesia linkages and exchanges of information, technologies and know-how.

Some of the key UK successes to date in the Indonesian mobility sector has occurred among large companies typically partnering with government or other large firms. For example, UK conglomerate Jardine Matherson is one of the key players in the Indonesian emobility sector through its majority stake in Astra, the leading provider of automobile products in the country.

### OTHER RELEVANT CONNECTED PLACES CATAPULT PROJECTS

- Whitefox Technologies: a cleantech gaining a foothold in the US biofuel industry
- iGeolise: an online platform which allows search by travel time and transport mode
  - **SwiftKey**: predictive texting app installed on more than 350 million devices worldwide
    - **nquiringminds**: making cities smarter places to live and work using IoT technology

## THE UK'S PRIVATE SECTOR IS DIVERSE, LARGE AND STILL GROWING

British technology vendors, carriers, utilities and professional services firms have been playing a vital role in delivering smart cities. They partner with local authorities and academia on collaborative initiatives across the country. There are also a number of players taking on key support roles to grow the market. **The private sector plays two main roles:** 

1 SERVICE PROVIDER

SMART CITY ADVISOR

Smart city service providers primarily include technology companies, national utilities, smart city consultants and SMEs that work both collaboratively and independently on smart city projects.

Smart city advisors support smart city development in two ways, through sharing knowledge and expertise and providing commercial support. They are typically Local Enterprise Partnerships (LEPs),

venture capital firms, spin out companies from City Councils, institutes and standards organisations.

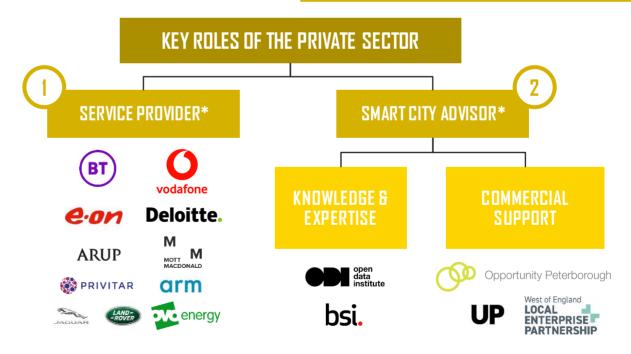
There are two main types of smart city advisors in the UK:

 Knowledge & Expertise – supports the whole smart city ecosystem through sharing knowledge and expertise. Typically, specialist areas of expertise, including standards and open data. They share best practices, recent developments in their fields, and conduct studies and research

 Commercial Support – supports local businesses through funding, networking opportunities, business advice and more.

## SNAPSHOT OF PRIVATE SECTOR SMART CITIES ACTIVITIES

- Opportunity Peterborough is an example of a Council-owned private company that is dedicated to promoting local businesses.
- UP Ventures Group is a corporate technology accelerator that is launching a smart city accelerator programme with MediaCityUK
- BT is a communication service provider that is involved in several smart city initiatives. For one, B' created a single IoT data hub for Manchester's CityVerve demonstrator.



<sup>\*</sup>logos presented here are a sample and not an exhaustive representation of all private stakeholders

# THE BRITISH STANDARDS INSTITUTION

#### WHY IS IT IMPORTANT?

BSI is the UK's only National Standards Body, responsible independently for preparing British standards, publications and for coordinating input of UK experts to international standards organisations.

BSI delivers a comprehensive business services portfolio to clients, both locally and globally, for their smart city development. These services are helping to shape, integrate and scale smart city development across cities and countries.

## BSI SHARES KNOWLEDGE AND BEST PRACTICE AROUND THE WORLD

The British Standards Institution (BSI), the world's first National Standards Body, was first established in 1901. For more than a century, BSI has been challenging the way things are and have been done to help embed excellence into the way people, organisations and their products work.

As smart cities began to develop, an opportunity to tie together these efforts emerged. BEIS worked with BSI to develop a standards strategy for smart cities in the UK that would define a best practice framework. This led to a standard PAS 181 Smart city framework, which gave city leaders a clear guide.

Alongside this, PAS 181 is part of a suite of seven standards. The PAS 180 series is aimed at leadership, middle management, and technical teams on smart city development. They serve as a guide to terminology, developing project proposals, interoperability, sharing data and more.

PAS 181 later became an international standard, ISO 37106, keeping the UK at the forefront of smart city standards development. In addition, PAS 182 has been adopted as BS ISO/IEC 30182 and others are under consideration. Today BSI engages around 30 cities in the UK, advising them on how to interpret and use

these standards in the context of the city's needs.

BSI also owns and operates a registered certification mark, the BSI Kitemark™, which has grown into one of the most recognised symbols of quality and safety. Since the launch of its Kitemark certification scheme for smart cities, five South Korean smart cities have been awarded this status. Certification can help cities to position themselves as global leaders in this space.

## "We strongly recommend **Kitemark Smart City certification** based on ISO 37106" – Sejong City<sup>130</sup>

BSI has a strong global presence with its international offices, partnerships and service offerings. BSI has recently worked in Indonesia and India, delivering training schemes, roadmaps and plans to support smart urban development. BSI also plays a key role in identifying the emerging needs for standards. In 2020, PAS 186 was published for safeguarding data and information security in cities. BSI is also working with DfT on a mobility-as-a-service and multimodality study to identify and address the gaps for standards.



#### **SUCCESS STORY**

## SMART CITY TRANSFORMATION PROGRAMME, INDIA

BSI delivered a tailored Smart City Transformation Programme in two Indian states to bring pan-city leaders together to develop common solutions to shared urban priorities. In order to achieve this, BSI first conducted in-depth research to develop a deep understanding of the regional context. Drawing on this understanding, BSI was able to tailor its recommendations on global good practice, policy and innovation. BSI used a collection of PAS frameworks

to benchmark and assess the maturity of smart cities in the region. BSI then delivered a clear roadmap and implementation plan. It also matched these opportunities with potential domestic and international partners. This helped to strengthen the collective smart city journey and establish the foundations to respond to smart city opportunities. The Programme can be replicated and adapted for in other cities and communities across the world.

#### OTHER RELEVANT BSI PROJECTS

- **Urban Transition Training**: a customised training scheme for senior Indonesian officials
- Urban Innovation Framework: a framework to support innovation on a pan city basis.
- Information Resilience: worked with a global company on data protection compliance
- MVMC: helped UK's manufacturing sector accelerate take-up of digital technologies
- HSBC: helped to create a fast-track standard to make sustainable finance mainstream
- **FCDO, Mott McDonald**: help identify partner country pathfinder organisations.
- nnovate UK: worked with BSI to help to bring quality to health and wellness apps
- Connected Places Catapult: with BSI to create a more informed smart city market
- FCO, Mott McDonald: organisational governance assistance for Indian city authorities

## ACADEMIA & ASSOCIATIONS GENERATE NEW KNOWLEDGE AND SHARE INSIGHTS INTO URBAN INNOVATION

Their main role is to generate new knowledge and share insights into how this can be applied in a city context. In the UK, academia and associations lead the conversation on digital, cities, and innovation. **Nesta** contributes thought leadership on these topics. **techUK** and research institutes facilitate knowledge and best practices sharing.

These organisations bring new smart city products and services to the market. British universities are working towards turning their intellectual property into commercial products. **UKBEAG** provides consultancy services to support smart city capacity development.

Some are particularly involved in climate change matters. Local authorities and business are reaching out for help to develop their net-zero initiatives. The Grantham Institute, within Imperial College London, is an example of an active climate innovation leader in the ecosystem.



National Endowment for Science, Technology and the Arts (NESTA) is an innovation charity with a mission to help individuals and organisations bring great ideas to life. It contributes regularly to academic thought leadership on innovation as a key economic growth driver.

## tech<sup>uk</sup>

techUK is a trade association that brings businesses, government and civil society together to realise the full potential of digital technologies. The UK is home to an invigorated generation of tech startups, who techUK seeks to represent. techUK has created a network of more than 270,000 companies.

## UKBEAG UK Built Environment Advisory Group

UKBEAG draws upon the expertise and collective skills of over 100,000 built environment professionals in more than 150 countries. UKBEAG, working in close collaboration with UN Habitat, is developing and delivering a strategic capacity development component as part of FCDO's Global Future Cities.



The University of Cambridge is one of the world's foremost research universities. The Cambridge University-Nanjing Centre of Technology and Innovation was created in 2018 as a partnership with the Nanjing Municipal Government. The Centre was set up to support research and innovation in smart cities and fully integrated urban environments.



University College London is a leading public research university recogised for its academic excellence and global impact. The UCL Bartlett Centre for Advanced Spatial Analysis (CASA) is an interdisciplinary research institute focusing on in the science of cities. CASA offers a Postgraduate Diploma in Smart Cities and Urban Analytics.

## Grantham Institute Climate Change and the Environment

Climate Change and the Environme

The Grantham Institute sits at the heart of Imperial College London's work on climate change and the environment. The Institute launched a new Centre for Climate Change Innovation, which is set to be a further catalyst for advancement in this space. At the heart of it, The Greenhouse is a 12-month innovation programme to assist climate positive technology startups.

## UK SMART CITIES **OVERVIEW**



# For this report, we have assessed the maturity of **24 cities in the UK** in their smart city development

The development of smart cities in the UK is gathering pace. To capture the current state of this development, we compared the strategies, projects and overall readiness of 22 cities.

**Smart City Leaders -** differentiated themselves through plans and action

- Strategies: delivering on clear, broad and inclusive plans
- Key Projects: leading significant pilot and full-scale projects
- Overall Readiness: solid digital infrastructure, engaging multiple stakeholders and good governance

## **Smart City Contenders -** done a lot to establish a solid foundation

- Strategies: established but there is more work to be done to realise it
- Key Projects: strong initiative in few key themes
- Overall Readiness: good digital infrastructure, a number of key players but less diversity

## **Smart City Followers** - beginning their smart city journeys

- Strategies: set initial vision
- Key Projects: launching a couple of pilot projects
- Overall Readiness: opportunity to launch more concerted efforts

#### SMART CITY LEADERS

- 1. London
- 2. Bristol
- 3. Manchester
- 4. Glasgow
- 5. Leeds
- 6. Birmingham
- 7. Peterborough
- 8. Oxford
- 9. Milton Keynes

#### SMART CITY CONTENDERS

- 10. Nottingham
- 11. Cambridge
- 12. Edinburgh
- 13. Aberdeen
- 14. Newcastle
- 15. Belfast
- 16. Sheffield
- 17. Reading
- 18. Liverpool
- 19. Cardiff

#### SMART CITY FOLLOWERS

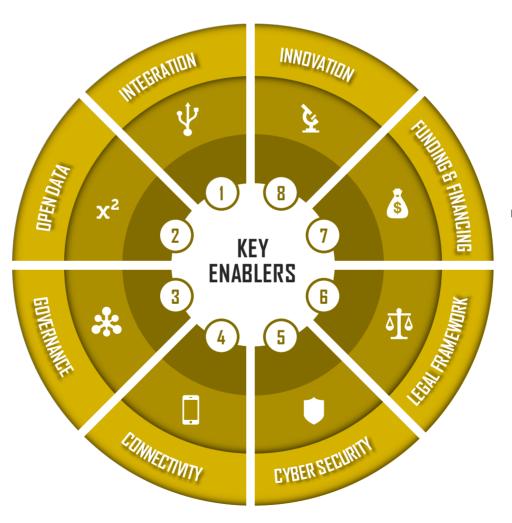
- 20. Coventry
- 21. Dundee
- 22. Exeter
- 23. Brighton
- 24. Bournemouth



## THE UK'S APPROACH TO SMART CITY ENABLERS

When it comes to the eight critical enablers identified earlier in our report, the UK has adopted a series of interesting approaches that are at the source of much of its smart city successes. We will explore each of them in further details throughout this section.

- 1 TECHNOLOGY INTEGRATION
  A strong set of national technology and data standards under the aegis of the British Standards Institution (BSI) and Data Standards Authority (DSA)
- 2 DPEN AND CENTRALISED DATA
  A focus on data hubs and open
  data experimentation, fostered
  by the Open Data Institute and
  the Public Sector Transparency
  Board
- GOVERNANCE
  A top down and bottom-up citizen centric approach whereby cities are empowered to lead smart city implementation, and helped in their efforts through the Connected Places Catapult
- 4 CONNECTIVITY
  A holistic approach to connectivity which marries large broadband and mobile telecommunication infrastructure development with a focus on access inclusivity



CYBER SECURITY

A holistic national cybersecurity strategy backed by strong cybersecurity standards and an active collaboration with the private sector

**LEGAL FRAMEWORK** 

Through a body of laws that ensure fairness in the smart city market, protection of consumers and data owners, and simpler regulations for implementation

**FUNDING & FINANCING** 

Innovative funding and financing mechanisms in order to complement national and local government efforts, and support implementation

RESEARCH & INNOVATION

A series of approaches that have secured the UK's position at the forefront of research and innovation in smart cities, and facilitates R&D application



## **TECHNOLOGY INTEGRATION**

UK has established standards applicable to various aspects from APIs, digital services and open data, to cybersecurity and data privacy. To guide the deployment of digital technology in urban development 'smart city standards' have been defined by the British Standards Institution.

## THE UK IS NOW PLAYING A LEADING ROLE IN DEVELOPING AND FINALISING INTERNATIONAL STANDARDS FOR 5G.

As standards are industry led, the UK government focuses on working through market actors and Standards Developing Organisations to support the incorporation of UK needs and ideas in the emerging 5G standards.

Through GDS, the UK government also develops and enforces a technology code of practice (TCoP) that sets standard criteria for the government to design, build and buy technology. The TCoP is combined with service standards that ensure that technology deployed meets user needs, is accessible and impact driven, among other things. GDS also plays a critical role as a coordinator of whole-of-public service digital procurement, creating a single marketplace for digital services accessible across the government.

## **x**<sup>2</sup> open & centralised data

#### OPEN DATA PROVIDES IMPORTANT RAW MATERIAL TO HELP BUSINESSES AND PUBLIC SECTOR TO INNOVATE AND IMPROVE THEIR PERFORMANCE

The UK government advocates for open data to improve accountability and the quality of public services. The Open Data White Paper, published in 2012, set out the government's aim for public bodies to achieve the maximum level of data access and transparency. This spurred the launch of the Open Data Institute (ODI), an independent non-profit that is partially funded by Innovate UK investment. The Public Sector Transparency Board (now Data Steering Group) has also been functioning for a decade to help drive the government's transparency agenda.

Recently, the Data Standards Authority (DSA) has been established to ensure high services standards (such as data ethical data use), enforce security requirements as part of technology code of practice, and provide an API design guide to facilitate data sharing.

In addition, the UK's open data strategy emphasises experimentation to develop open data applications. The government actively encourages the start-up community to innovate with open data.







The UK government is using a 'market making approach' to Smart City. The National government sets the standards, regulations, provides funding and coordination support to academia and the private sector to accelerate the development and commercialisation of new technologies and creates the right incentives for the private sector to invest in smart city infrastructure.

# CONNECTED PLACES CATAPULT IS AN EXAMPLE OF SUPPORT OFFERED TO THE ECOSYSTEM TO UNDERSTAND OPPORTUNITIES, TEST, BUILD, SCALE AND COMMERCIALISE INNOVATION THROUGH A MULTI-STAKEHOLDER APPROACH

Another instance operating at the public sector level is GDS that provides support, advice and technical expertise to government departments at all levels as new digital delivery models developed.

But much of the UK's approach relies on city devolution through City Deals that gives local areas the powers they require to address local needs and play to local strengths coupled with cutting-edge technology to help cities cope with growing urban challenges.

## CONNECTIVITY

#### DIGITAL CONNECTIVITY ENCOMPASSES TECHNOLOGY BUT ALSO ITS ENABLING INFRASTRUCTURE AND ITS USE IN THE SOCIETY AT LARGE

UK government seeks to ensure that digital infrastructure can support the rapid increase in fixed internet and mobile data traffic and provide coverage with sufficient capacity to ensure data can flow at the volume, speed and reliability required to meet future demands. Broadband and mobile are treated as the fourth utility. The government aims to provide widespread and affordable connectivity to ensure inclusive access to the digital economy.

UK and Malaysia efforts focused on connectivity, provision of basic infrastructure are based on similar principles and interventions. For e.g., Building Digital UK is delivering broadband networks to the nation through a new £5 billion UK Gigabit Programme which sets out plans to connect the first one million homes and businesses with gigabit speed broadband and maximise coverage in the hardest to reach 20% of the UK by 2025. 131

The UK government is also funding a coordinated programme of integrated fibre and 5G trials. In 2017, DCMS launched its 5G Testbeds and Trials Programme<sup>132</sup> which provides funding to encourage the development of a UK '5G ecosystem' with test beds, trials and deployment.<sup>132</sup>

## **CYBERSECURITY**

#### THE UK HAS A MULTI-PRONGED STRATEGY TO TACKLE CYBER SECURITY THREATS AND CHALLENGES

The UK formulated 2016-2021 National Cyber Security Strategy (the Strategy) which involved £1.9 billion of investment, a central role for the central government, and 12 broad strategic outcomes (such a development of cyber skills and technical measures against cyber attacks). 134 This plan is being through a new cyber strategy focused on creating a triple helix cyber ecosystem to enable a "full spectrum approach" to cybersecurity. A new National Cyber Force was also announced as part of a £16.5bn package of security measures. 135

Other cybersecurity pillars include the Minimum Cybersecurity Standard launched in 2018 and is the first in a suite of technical standards to be developed by the Cabinet Office in collaboration with the National Cyber Security Centre. The government is also working with industry to develop and deploy technology, including National Cyber Security Centre's (NCSC) Active Cyber Defence programme, to deepen its understanding of the threat, strengthen the security of the UK public and private sector systems and networks and disrupt malicious activity.



### **△**I LEGAL FRAMEWORK

Well-defined regulations and the legal framework are the foundation of UK's smart city needs and priorities.

#### THE UK HAS CREATED REGULATORY LEVERS TO DRIVE IMPROVEMENTS IN DIGITAL INFRASTRUCTURE, DATA PROTECTION AND SECURITY TO MEET **USER NEEDS.**

The government takes an active role in creating a strong and stable regulatory framework that encourages investment in the UK's digital infrastructure. The government also works with international partners like the United Nations to ensure that the internet remains open and secure for technical innovation and socioeconomic development.

For instance, the Digital Economy Act of 2017 includes a range of measures in support of the digital economy including giving all citizens the legal right to request a 10Mbps broadband connection. There is mandated responsibility for OFCOM (the UK's independent communications regulator) to help consumers access better information and facilitate switching service providers, there are new and simpler planning rules for building broadband infrastructure and removing legal barriers to digital government while reinforcing data protection laws.







### **FUNDING & FINANCING**

The government is committed to creating the right conditions to enable infrastructure and innovation investment. Across the UK, technology demonstrators have been launched on the back of both private and public funding sources. Common public sources include central government departments and agencies such as the BEIS, the DCMS, the Department for Transport, the Department of Health and Social Care. and UKRI.

#### PUBLIC FUNDS CAN NOT IN ITSELF FILL THE ENTIRE SMART CITY FINANCING GAP. AS SUCH, CITIES HAVE EXPLORED NEW FUNDING MECHANISMS.

These go beyond the public-private partnership model to include funding models that bring public and private sector together in shared-value creation. For example, Bristol Is Open was a joint venture between Bristol City Council and the University of Bristol. NEC Corporation, a Japanese firm, was also a long-term partner for this project

Academic institutions are also funders. They not only provide research support but also help to take part in bidding. A key success factor of UK's approach is the decentralisation of funds for smart cities. Smart Cambridge has used initial funding from the Cambridge City Deal to establish a range of smart city projects



#### 🔖 RESEARCH & INNOVATION

The UK has taken active steps in fostering the innovation potential of private sector and academia as a foundation to smart city development.

Industry networks such as techUK enables UK companies to build networks within the private sector as well as with city authorities, funders, academia and research organisations. Knowledge Transfer Networks by Innovate UK stimulate and accelerate innovation by improving collaboration between businesses, entrepreneurs, academics and public and private funders to foster business-led and application driven R&D

#### THERE IS ALSO A PUSH FOR CHALLENGE LED INNOVATION AS AN OUTCOME LED APPROACH THAT TACKLES BIG SOCIETAL AND INDUSTRIAL CHALLENGES OF TODAY.

The Industrial Strategy Challenge Fund is the government's flagship challenge-led innovation programme, led by UKRI with around £2.6 billion of public money and £3 billion in matched funding from the private sector invested in projects that bring together researchers and businesses. 136 Apart from these, dedicated foresight projects from Government Office for Science which work with government departments and experts and academics to identify where new or emerging science can influence future smart city development.

## WHAT DOES IT MEAN FOR MALAYSIA?

The UK Smart City experience we have explored in this report provides interesting examples of how putting in place the right environment can act as a powerful catalyst for smart city development. We summarise here **twelve main ways** that Malaysia could draw inspiration from these best practices.



## FURTHER DEVELOP SMART CITY TECHNOLOGY STANDARDS

Malaysia has already embarked upon building its own Smart City Standards. Malaysia can enhance its standards and framework across all levels from strategic, process to technical specifications. UK experience can address specific aspects that guide data interoperability, privacy, cybersecurity and resilience



## CREATE A HOLISTIC PUBLIC DATA MANAGEMENT FRAMEWORK

Malaysia has already made good progress in Open Government Data. There is now an opportunity to enhance data sharing, define legal and regulatory mechanisms and establish governance to ensure that data security, integrity, interoperability and transparency underpins all open data efforts



## COMBINE NATIONAL LEVEL STRATEGY WITH MUNICIPAL IMPLEMENTATION

Several ministries have recently formulated strategies around smart city development. There is an opportunity to further coordinate these under the overarching Malaysia Smart City Framework with clear role, budget, collaboration platforms and specific powers to guide local level implementation

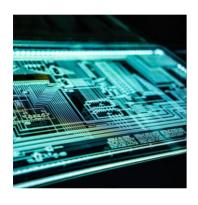


## ENSURE DIGITAL INFRASTRUCTURE ARE DEPLOYED WITH INCLUSIVITY

Malaysia emulates the UK in their drive and focus on deploying cutting edge connectivity infrastructure nationwide. Malaysia and UK can exchange best practices to embed within its smart city policies a clear focus on inclusive access to infrastructure, both geographical (rural and smaller cities) and income-wise

## WHAT DOES IT MEAN FOR MALAYSIA?

The UK Smart City experience we have explored in this report provides interesting examples of how putting in place the right environment can act as a powerful catalyst for smart city development. We summarise here **twelve main ways** that Malaysia could draw inspiration from these best practices.



## MOVE ON TO FULL SPECTRUM CYBERSECURITY STRATEGY

Malaysia has taken critical steps in setting up the foundations of its Cybersecurity response and skills with the newly launched strategy for 2020-2024. The UK provides an interesting example of how a holistic approach may look like which also includes cybersecurity standards, cybersecurity skills development, private sector ecosystem & new threats research



## ADOPT ALTERNATIVE SMART CITY FINANCING METHODS

To complement public budgets, the UK provides multiple examples of alternative financing mechanisms for smart city projects involving combined city / academia / private collaboration to secure funding, decentralised funds, private sector financing, PPPs, franchising and privatisation, among others



## REINFORCE THE LEGAL FRAMEWORK TO PROTECT AND SIMPLIFY

The UK provides a helpful example of how the legal framework has been ringfencing smart city implementation with strong personal data protection, customer protection, and simplification of specific areas of the legal system in order to simplify and foster the implementation of smart city initiatives



## FURTHER EMPOWER SMART CITY RESEARCH AND INNOVATION

The UK has always put research and innovation at the heart of its smart city strategy. Malaysia could potentially emulate certain initiatives, such as enhancing public / private collaboration platforms, enabling academia and focusing on concrete applications of R&D, develop specific centres of excellence and use demonstrators to test the way forward

## WHAT DOES IT MEAN FOR MALAYSIA?

The UK Smart City experience we have explored in this report provides interesting examples of how putting in place the right environment can act as a powerful catalyst for smart city development. We summarise here **twelve main ways** that Malaysia could draw inspiration from these best practices.



## COORDINATE TECHNOLOGY PROCUREMENT

Fragmented approaches to procuring technology lead to inefficient use of resources. The Malaysian government could review UK best practice to identify coordinated ways to procure digital solutions from service providers (such as public sector cloud) that ensure solutions are sustainable, adaptable and maintainable beyond contract periods.



## STREAMLINE AND CENTRALISE PUBLIC SECTOR DIGITAL SERVICE DELIVERY

Centralising public sector digital service procurement provides an opportunity to deliver it seamlessly across the public sector. Several of Malaysia's national, state and municipal government stakeholders are already working with GDS Global Digital Marketplace Programme. This can be expanded to other city governments as well.



#### SET UP HIGH DIGITAL SERVICE STANDARDS TO FOSTER TRUST

Many digital services (mainly related to public services) rely on the public's trust to use them. Public trust is gained not only through robust personal data protection laws like the UK's DPA and GDPR, but also through established service standards that ensure that social interests and impacts are at the core of technologies deployed



## BE OUTCOME-FOCUSED RATHER THAN TECHNOLOGY-FOCUSED

Thriving smart cities are the ones that harness technology to achieve impact. Malaysia should ensure its digital initiatives meet the objectives enshrined in its key national plans and broader socioeconomic KPIs. The "Smart Sustainable Cities (U4SSC) KPI published by the ITU provides an excellent frame of reference to measure the success of smart cities.

## 4.2 UK SMART CITIES SPOTLIGHT

Several best practices emerge from the UK's smart city experience. This chapter explores five cities that standout in their application of the key smart city enablers



## SPOTLIGHT ON FIVE UK CITIES

There are many great examples of the key enablers to smart city implementation in practice across the UK. We summarise here the key priorities, initiatives and best practices of **five UK cities** that stand out.

 CITY	BEST PRACTICES	WHY?
LONDON	London is a model for city governance and open data	A strong track record of smart city leadership and a pioneer of urban open data ecosystems
BRISTOL	Bristol takes an outcome- driven approach to innovation	Focus on sustainability and inclusivity led to innovative projects in energy and liveability
MANCHESTER	Manchester is successful in large-scale demonstrators	Explores ways to scale smart city applications that rely on integration and cyber security
OXFORD	Oxford brings world-class research to an urban context	Builds strong partnerships between city, academia and industry to drive innovation
WEST MIDLANDS	West Midlands is a great example for connectivity	Leads cutting-edge 5G trials and use-case development for manufacturing, transport etc.

## BEST PRACTICE FROM THE UK UK SMART CITIES SPOTLIGHT

## SPOTLIGHT ON LONDON

London began its transition more than 10 years ago. Sustaining economic growth and solidifying its position as a leading global city were the initial ambitions for its smart city development. In the early days, Greater London Authority began to explore how technology and data could influence the future design and efficient operation of the city's assets and systems.

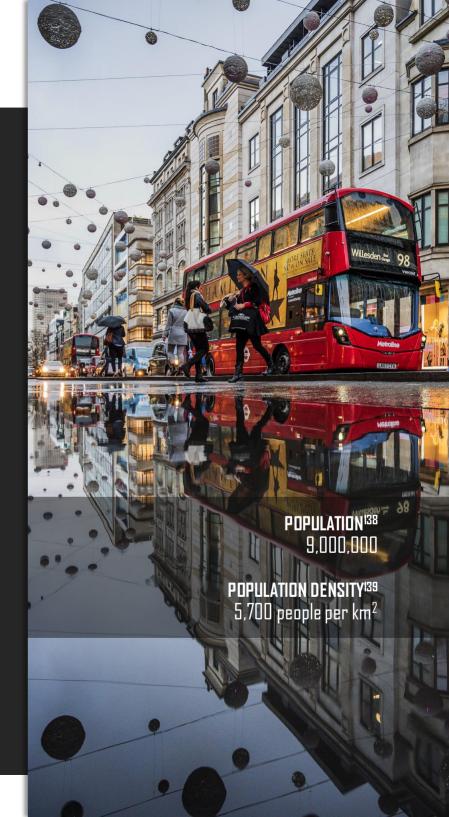
The London 2012 Summer Olympics brought home this idea that innovation could unlock opportunities for urban rejuvenation. Innovation in urban design, supply chain management, sustainable buildings and civic participation were the outcomes of the £12 billion East London redevelopment project for the creation of Queen Elizabeth Olympic Park.<sup>137</sup>

The Mayor of London launched the Smart London Plan in 2013, tying together these early initiatives. In the same year, the Smart London Board was established. A strong governance model enabled the city to implement its ambitions around data, user-designed services, growing the market, and improving infrastructure.

Today, London is a hub for Smart Mobility, CleanTech and GovTech. London is now focused on realising the 2018 Smarter London Together Plan which calls for various local authorities to collaborate better with data and digital technologies

#### **KEY INITIATIVES**

- Smart Park Queen Elizabeth Park a major urban district development that leveraged the power of an integrated single data platform to pursue further sustainability projects.
- London Datastore a city-wide open data platform that gives citizens and businesses access to data from different public department. Users can make better informed decisions.
- Sharing Cities a £22 million EU
   Horizon 2020 project based in
   Greenwich borough of London. The
   project integrated solutions across
   energy, transport, data and ICT. 140
- London Air Quality air quality has improved recently due to policies. This project is using sensors to develop ML algorithms and data science platforms to further this.
- MOVE\_UK a Bosch-led automotive consortium developed automated driving systems in real-life conditions, with the aim of accelerating its development and deployment.
- Low Carbon London a £28 million project led by UK Power Networks, an energy company, to investigate the impact of low carbon technologies for its electricity distribution network.<sup>141</sup>



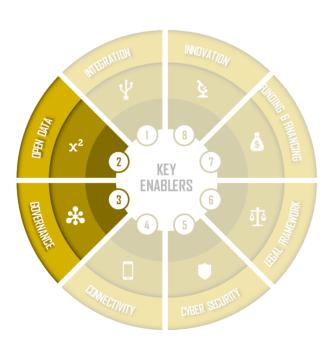
SMART CITY HANDBOOK: MALAYSIA

#### **UK SMART CITIES SPOTLIGHT**

## SPOTLIGHT ON LONDON

#### WHAT REST PRACTICES EMERGE?

London is a pioneer in many ways, from the creation of the London Datastore, transport e-ticketing to smart city policy. What started with a series of separate initiatives now represents a vision to make London 'the smartest city in the world'. While many best practices have emerged from this leading city, two are central to its success. It already has a strong track record of city leadership and an open data ecosystem to build on.





## **GOVERNANCE**

London has a smart city leadership environment that is conducive to effective implementation. It was one of the first cities in the world to set out its digital ambitions, which helped many London boroughs get their foothold in. However, as the boroughs began to set out their own visions and initiatives, it became apparent that a single point of contact would be beneficial.

A Chief Digital Officer (CDO) was appointed to lead city-wide digital transformation and smart city initiatives. The CDO serves as a point of contact

for government, industry, academia and civil society. It can help bring the right partners together and to provide the spaces, infrastructure and the right incentives for different sectors to work side-by-side.

Across local government, the London Office of Technology and Innovation (LOTI) also plays a key role in building a shared smart city vision and language. It seeks to embed standards and common approaches, build collective knowledge across boroughs, and encourage better partnerships.



## OPEN DATA

London successfully taps into data and analytics to fuel innovation in business and across its public services. Today London's innovation is driven by over 40 tech and science clusters, and its leadership in the use of data across sectors and beyond. To do so, it fosters the conditions to build and nurture an open data ecosystem.

Launched in 2010, the London
Datastore is a data-portal pioneer,
providing a platform where anyone can
access public data. It has evolved over
the years with changing technologies—
such as responding to the rise of data

search and APIs—to remain relevant to users. For example, user experience design considerations can help to make data easier to find and better inform how the data can be used to derive insights.

Collaborating with data has also been a key success factor. LOTI facilitates collaboration across its 33 boroughs, working with their Chief Information Officers and the Greater London Authority to develop a joint statement of intent on responsible data collaboration and a range of specific measures to tackle barriers to data sharing.

## BEST PRACTICE FROM THE UK UK SMART CITIES SPOTLIGHT

# SPOTLIGHT ON BRISTOL

Over the last decade, Bristol has evolved into a leading smart city in Britain. The city began its transformation into an urban testbed in 2013. It used a £2 million grant from Innovate UK, as part of the Future Cities programme, to explore the realworld applications of new technologies.

In 2015, the Bristol Is Open initiative led to the creation of the world's first 'Open Programmable City'. The project involved deploying a software-defined network to deliver virtualised network slices at city scale. Several large-scale initiatives have since launched, such as REPLICATE, Bristol Operations Centre and BigClouT.

Today Bristol is home to one of the largest digital hubs outside of London and a thriving smart city ecosystem. Bristol City Council's City Innovation Team steers the direction of smart city development and brings together corporations, universities, communities and tech and creative talent.

The Council has a vision of Bristol as a livable, sustainable and prosperous city, anchored by its One City Plan for 2050. Its smart city strategy prioritises digital inclusivity through the continued development of duct/fibre networks. Sustainable resource management is also key focus area as the city works towards achieving carbon neutrality by 2030.

#### **KEY INITIATIVES**

- **REPLICATE** an EU-funded project deploying a number of smart integrated energy, mobility and ICT solutions to create smart districts, to benefit local people & neighborhoods.
- <u>Smart Junctions 5G</u> aims to deliver Al traffic control systems to reduce congestion and pollution as well as improving productivity by cutting waiting times at traffic signals.
- Bristol Operations Centre was completed in 2016 to provide the City Council with integrated, city-wide management and service delivery to strengthen citizen living.
- Knowle West Media Centre as the city's Living Lab, the Centre supports people from a range of backgrounds to come together and create new ideas, tools & technologies.
- <u>BigClouT</u> a collaborative Big Data project that designed and built an integrated data collection and dissemination system based on open source data platform architecture.
- <u>TwinERGY</u> an EU-funded project to introduce a new digital twin framework for the energy market, for optimising demand response at the local level.

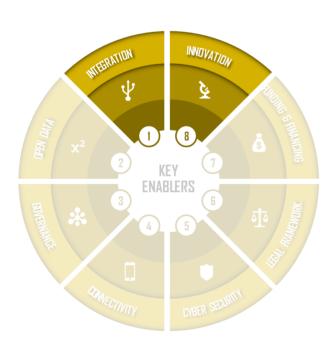


#### **UK SMART CITIES SPOTLIGHT**

# SPOTLIGHT ON BRISTOL

#### WHAT BEST PRACTICES EMERGE?

Bristol is recognised for its outcomedriven approach to smart city innovation. The city focuses on the applications of technology to achieve its net carbon zero ambition and to improve quality of life. There have been many initiatives for energy, liveability, citizen engagement and transport. From this, best practices for integration and research & innovation have emerged.





## INTEGRATION

Interoperability between technologies were essential to the design and deployment of Bristol's large-scale projects, such as REPLICATE, Bristol Operations Centre and BigClouT. The Council works with partners to drive common standards and integrated technology approaches.

The Bristol Operations Centre was designed with interoperability in mind. It integrated emergency, traffic and public safety services using 700 CCTV cameras across the city.

REPLICATE was an EU-funded project to demonstrate smart city technologies in energy, transport and ICT in districts in San Sebastian, Florence and Bristol. This required solutions to be replicable, interoperable and scalable through the adoption of international standards.

Bristol was also one of four pilot cities involved in a joint EU-Japan effort to build an integrated smart city platform. The goal was to enable data-driven IoT applications through the platform and to validate replicability.



## RESEARCH & INNOVATION

Bristol is recognised for having a distinctive approach to innovation. It is highly creative, inclusive, places people at the centre and is outcome-driven. Responsible innovation is a core aspect of Bristol's smart city initiatives. The Council engages with future partners and investors based on its guiding principles of collaboration, user-centred design and social value.

The Council uses an Innovation Ambition Matrix to select a handful of the most impact-driven projects to focus its efforts on building up. Potential projects and grant funding opportunities are evaluated against this criteria, such as, likely impact, social value, aligns with strategic objectives, etc.). This might be beneficial for cities with funding strains, allowing them to target investment and give a couple of smart solutions and services a greater chance of city-wide scale up.

The city is also known for its awardwinning framework for community engagement, 'The Bristol Approach'. It is based on participatory methodologies to empower community organisations and individuals to take the lead on developing solutions.

## BEST PRACTICE FROM THE UK UK SMART CITIES SPOTLIGHT

# SPOTLIGHT ON MANCHESTER

Manchester has been very proactive in its digital transformation. The Council's Manchester Digital Development Agency was established as early as 2001 and has published several digital strategies since. Digitalisation continues to have a major impact in public service delivery, health, education, economy and much more.

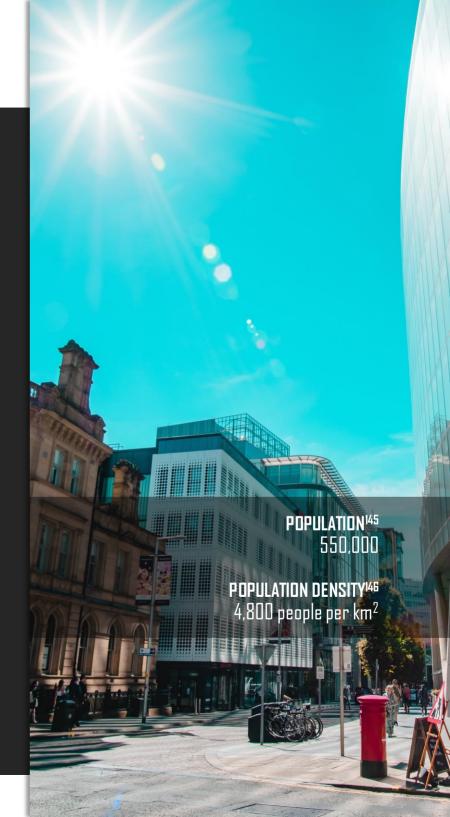
The city has been hugely successful in securing resources for large-scale technology demonstrators through collaborative working. Underpinning its winning CityVerve bid was a clear digital strategy, ambitions for regional growth, and network of corporate partners including Siemens, Cisco, and BT.

Today, the vision is to create an inclusive, sustainable and resilient smart city. The new Manchester Digital Strategy focuses on four key elements; smart people, digital places, future prosperity and sustainable resilience. The digital economy is a core aspect of the new strategy.

Manchester is focused on increasing its existing digital strengths. This includes service design, e-commerce, cyber, Al and data science, as well as in advanced materials. The city is nurturing local business growth in these areas for smart city development.

#### **KEY INITIATIVES**

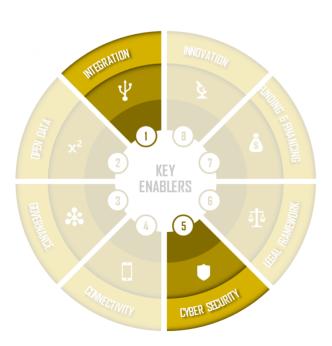
- Triangulum Corridor area of Manchester was transformed into a smart city district, integrating disparate systems, creating a smart grid and a scalable smart city model.
- <u>CityVerve</u> a £10 million IoT project to demonstrate the capabilities of IoT applications at scale across a city region to deliver transformative benefits for healthcare, transport etc. 144
- Open Data Manchester an independent network driving forward an open data ecosystem. It supports a wide range of open data initiatives, including hosting foresight events.
- Connected Health Cities a digital health programme using patient data to accelerate progress in local health services. One project is using tech & data to improve stroke diagnosis.
- Smart Systems and Heat a whole systems approach was taken to help innovators address market failure and unlock the commercial opportunity of low carbon heating.
- <u>SmartImpact</u> a partnership of 10 cities sharing experiences of the structures and processes needed to successfully plan, finance, develop and manage a smart city.



# SPOTLIGHT ON MANCHESTER

#### WHAT BEST PRACTICES EMERGE?

Manchester is known for its hosting largescale demonstrators and participating in international smart city projects. The city has explored ways to scale cyber security. It is also launching a Manchester Digital Security Innovation Hub to coordinate responses to digital threats and to support the growth of cyber security startups. From this, best practices for integration and cyber security have emerged.





## INTEGRATION

Integration is a core aspect of large-scale roll out of smart city solutions. Several best practices have emerged, such as for replicating these solutions at scale and using standards and common APIs to ensure an interoperability between technology vendors. The city was involved in SmartImpact, an EU-funded project. It brought together 10 partner cities to share best practices in five areas, including data governance and integration. Each city produced an integrated action plan, outlining current

projects and recommendations to current policies. In another example, the city launched an integrated digital platform initiative for healthcare across Greater Manchester. The Combined Authority partnered with Philips Interoperability Solutions to enable the sharing of patient data between medical devices and information systems. Using an open standards-based and multivendor solution is more flexible. Local authorities are free to change vendors in the future.



## CYBER SECURITY

Manchester is a notable example of cyber security best practices in large-scale smart city projects. Putting multiple isolated solutions under a single policy has proven to be a challenge. Manchester's CityVerve IoT demonstrator addressed this by setting a security base line for each component to comply with. This integrated policy took into consideration the individual, the device and the location of the connection to ensure there is secure access to every connected user.

The city has also launched some programmes to support SMEs become more cyber secure. The Greater Manchester Cyber Foundry is a free programme for SMEs to help with business growth, stability and security. The programme is led by a group of Manchester's leading universities, using their expertise to help SMEs protect their operations and assets. They aim to guide businesses' approach to cyber security, which is about defense as well as growth and productivity.

## BEST PRACTICE FROM THE UK UK SMART CITIES SPOTLIGHT

# SPOTLIGHT ON OXFORD

Oxford is an exemplar of a how a small urban area can leverage its academic credentials, strong partnerships and high growth science and technology sectors to build a smart city. Its winning formula is based on a living lab approach. Strategic partners, both private and academia, can test user-centered innovation with the aim of city-wide scale up.

The Smart Oxford programme was built on a strong partnership between diverse group of academia, public, private and community organisations. Its vision for Oxford is a learning city for the 22<sup>nd</sup> century, a place where innovative ideas, active citizens and stakeholders come together to collaborate.

Oxford County Council's Innovation Hub (iHUB) is another example of such collaboration. It acts as a catalyst for solution development and implementation. Businesses and universities are linked together to co-develop and test solutions. iHUB also helps with securing external funding.

The city has developed a rich smart city ecosystem to support its vision for citizencentric innovation and to secure funding for these initiatives. This has allowed the best and most useful ideas to be explored.

#### **KEY INITIATIVES**

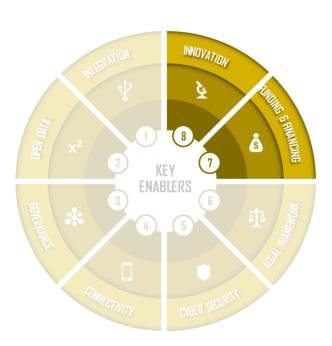
- <u>DRIVEN</u> a consortium led by local SME Oxbotica undertook public trials for a fleet of CAVs in Oxfordshire, which addressed fleet management, cybersecurity, risk management, etc.
- <u>Cities 4 People</u> an initiative to explore new approaches for community-driven mobility innovations that have low ecological footprint and a sharing mentality.
- <u>Go Ultra Low</u> installation of on street charge points for EVs across Oxford. The Council gives access to infrastructure and support to change parking regulations for EV owners.
- Hydrogen Strategy ways to integrate hydrogen in various sectors to help overcome existing technical barriers, open up markets, and increase investment opportunities.
- LoRA & SigFOX for Safety with local Fire and Rescue Service to investigate opportunities to use emerging low power communication networks for community safety.
- Oxford Flood Network a project to demonstrate IoT technologies in the city. Comprising numerous wireless water level sensors to detect levels and to visualise flooding conditions.



# SPOTLIGHT ON OXFORD

#### WHAT REST PRACTICES EMERGE?

Oxford is applying world-class research and innovation to make its city smarter. The City Council and its two universities have partnered to deliver Smart Oxford. The city also leverages its science and technology clusters and the private sector to develop and fund smart city innovation. From this, best practices for research & innovation and funding & financing have emerged.





## RESEARCH & INNOVATION

Oxford is a good example of a relatively small urban area that has leveraged its educational assets and its high growth clusters in science and technology to develop a smart city. Its two universities are the City Council's key partners to deliver Smart Oxford. The city also has an abundance of innovative businesses. For example, the University of Oxford's Robotics Institute worked with the City Council on applying robotics technology to improve public services. The team used street mapping technology to collect data on city maintenance.

At the same time, the information collected was used to support autonomous vehicle research at the Institute. Its universities have also partnered with MobOx, a community interest company that aims to build Oxford's intelligent mobility ecosystem and coordinate the city's initiatives in this space. The University of Oxford has a strong record of commercialising its research activity, which has led numerous spin out companies. For one, gaitQ is developing a wearable, smart medical device for Parkinson's disease.



## FUNDING & FINANCING

Smart Oxford emphasises private sector investment to capture long-term smart city success. The city relies on investments to develop new smart city technologies. Businesses can retain their Intellectual Property rights, which has helped the city attract private sector financing. Oxford has a good relationship with the private sector, each having clear roles to play. The Council also funds smart city initiatives through its own budget. To make the most of this, it integrates

smart cities opportunities in new procurement activities. This can help local authorities ensure that traditional investments also build smart-enabled infrastructure. For example, the city can implement new IoT backhaul networks off the back of a street lighting investment. The Council has its own innovation hub, iHUB, that is actively involved in preparing funding applications for businesses, start-ups and researchers to expand financing opportunities.

# SPOTLIGHT ON WEST MIDLANDS

West Midlands has a rich industrial legacy, well-established universities and a diverse economy to support its smart city development. This well-connected and populous county is home to the UK's first multi-city 5G testbed. The West Midlands 5G (WM5G) testbed seeks to drive productivity and bring sustained benefits in the region through digitalisation.

Additionally, WM5G's purpose is to create a blueprint for use cases of 5G technology within transport, manufacturing, health and social care services, and more. Fibre provision and high-speed Wi-Fi network is also likely to improve with this project.

The West Midlands is not only a hotspot for next generation connectivity, but also a smart transport hub. Notably, Midlands Future Mobility initiative is the largest of its kind in the UK, a real-world open road CAV trial spanning 300 km.

The synergies between the region's two focus areas has enabled the development of several new applications. For one, the West Midlands is breaking new ground in using 5G to developing transport that is fit for the future. It recently showcased the UK's very first 5G-connected tram. This groundbreaking work could potentially offer best practices for infrastructure, regulation and business models.

#### **KEY INITIATIVES**

- <u>5PRING</u> has launched the UK's first 5G commercial innovation centre to attract businesses, especially SMEs, to create opportunities that can be scaled if proven.
- Infrastructure Acceleration with mobile network operators, local authorities & infrastructure providers to accelerate the roll out of 5G and fibre networks across the county.
- Midlands Future Mobility testbed leading real-world, open road CAV operation. It is the largest trial of its kind in the UK. £33 million has been invested in this 300 km network.<sup>147</sup>
- Innovator Challenge accelerator programme run by Energy Systems Catapult. 18 SMEs have been selected to develop Net Zero energy systems for buildings, industry etc.
- Regional Energy System Operator

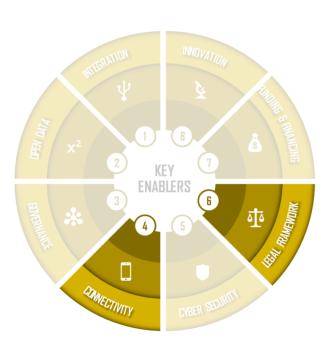
   exploring a new kind of energy
   system, including local low carbon
   energy generation, storage and
   management and future mobility.
- <u>UK CITE</u> to create the UK's first fully connected infrastructure on public roads using a combination of wireless technologies. Led by leading industry, academia, national & local authorities.



# SPOTLIGHT ON WEST MIDLANDS

#### WHAT BEST PRACTICES EMERGE?

West Midlands is a great example of connectivity. A recent report highlighted it as the best-connected region in the UK. As such, it is an ideal testing ground for 5G technology. The region is also a key manufacturing and transport hub. The UK is accelerating the development of 5G use-cases for critical economic sectors. From this, best practices for large-scale 5G deployment have emerged.





## CONNECTIVITY

The region is currently home to the UK's largest 5G multi-city testbed, WM5G. The West Midlands Combined Authority (WMCA) is leading the programme, with core funding from DCMS. The aim is to demonstrate the value of 5G technology and to develop a blueprint for use-cases that can be replicated at scale. Some best practices for infrastructure have emerged. Firstly, the importance of 5G network planning and design. The team are mapping local government assets to its suitability for 5G, identifying areas of poor connectivity.

Secondly, joining up national and local government efforts with industry can ensure best practices are captured and disseminated across cities. In addition, the region is leveraging 5G networks to benefit its key economic sectors, such as manufacturing and transport. Recognising these synergies, a group of businesses have come together to coinvest in these pioneering trials. Lastly, having a commercial innovation centre alongside the testbed can help to create new opportunities for local businesses, particularly SMEs.



## LEGAL FRAMEWORK

Site access and planning laws are some of the most common legal barriers to efficient and wide-scale 5G deployment. West Midlands has navigated some of these hurdles through new lease agreements between infrastructure providers and city authorities. This means that mobile network operators can roll out 5G network infrastructure more swiftly and efficiently. WM5G is also a good example of applying data privacy laws to 5G networks. Wherever WM5G process personal data, it is done within the terms of data protection laws.

It follows laws like the General Data Protection Regulation (GDPR), the Data Protection Act 2018 (DPA), or Privacy of Electronic Communications Regulations (PECR). The CAV testbed, Midlands Future Mobility, also has fundamental applications for regulation. Immense, a simulation platform provider is helping to create a fully capable simulation environment. This can help regulatory authorities understand better how to manage the network of the future, how to deploy CAVs and other guidelines for regulation.



## THE UK AS A **LEADER AND PARTNER**

Through decades-long progress in improving cities, both the UK Government and private enterprises have accumulated a significant amount of know-how and lessons learned in smart city implementation. One look at smart city ranking of UK cities can reveal how far ahead they are in digitising its infrastructure and services. Other countries can work with UK entities to look through how smart city projects have been executed and tease out applicable best practices to experiment in their own cities. The UK has much to provide with their wealth of experience in both successes and errors and are willing and ready to share with those who taking their own smart city journeys. Throughout the remainder of this handbook there are examples of how the UK has partnered with both public and private partners around the world.

#### PARTNERS IN GOVERNMENT

As seen from the short history of UK's own smart city endeavors, many UK Government and municipal bodies have participated and collaborated on projects that take advantage of technological development to respond to growing demands of smart citizens. They are open to assisting other nations in the same manner.

Others can learn from their libraries of publicly available resources, such as that of British Standards Institution. More engaging partnerships are also possible. with services offered by many bodies. Connected Places Catapult (CPC), the UK's centre of excellence for urban and mobility innovation, operates at the intersection between public and private sectors and between local government and transport authorities. CPC focus on growing businesses with innovations in mobility services and the built environment that enable new levels of physical, digital and social connectedness. Through their Global Programme, CPC help places around the world to design and develop programmes that grow innovation companies, scale high impact solutions to city challenges. future proof economies and form cross government bilateral business agreements for long term investments.

The best way to start engaging potential public bodies is by:

Contact the British High Commission Kuala Lumpur

Trade.KualaLumpur@fcdo.gov.uk

#### **PARTNERS IN ENTERPRISE**

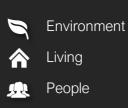
The UK's market making approach and propensity for public-private partnership

has created a group of smart city enterprises that offer a wide range of products and services. From tangible goods like smart meters to more intangible knowledge like smart services consultation, these UK suppliers can augment and improve other countries' projects to upgrade their cities. Department for International Trade (DIT) is able to assist in connecting you with the most suitable UK partners.

#### PARTNERS IN R&D

A number of university collaborations bring together different expertise and facilities from across the UK, and interdisciplinary research centres in universities connect leading-edge research in different departments with public and private partners. International research collaborations and partnerships on smart cities bring new ideas into the UK research environment and help support emerging markets like Malaysia around the world. These can be some of the most fruitful ways to develop the specialised skills needed in the smart city space.

Learn more at UK Research & Innovation: www.ukri.org



Economy



# LIST OF **UK SMART CITY FIRMS**

- Acoustic Sensor Networks Limited
- Accucities
- Actuality One
- Advizzo
- AGD Systems
- Agility3
- Air Public
- AirSensa
- Alchera Technologies
- Anaeko
- Analytics Engines
  - Angoka
  - AppyWay
  - Aquamatix
  - Aralia Systems
- Arup
  - Ash Projects
  - Atamate
- Atkins
  - Audio Analytic
  - Aurrigo
  - **Avia**

- Awen Collective
- AVATR (Inavya Ventures)
- A20 Innovation Solutions
- Babylon Health
- BARO Vehicles
- Bboxx
- Beringar
- BICO AI Ltd
  - Biffa
- BlockDox
- Bp Pulse
  - (x) Brandseye
  - Briteyellow
- Broadway Malyan
- BT BT
  - Buro Happold
    - Cambridge Intelligence
    - Cascoda
    - Centrica
    - Chameleon Technology
    - Chipside
    - Citi Logik

- Cities Reloaded
  - Cityzenith
  - Connected Kerb
- Connected Space
  - (Connexin
  - Conigital
  - Corethree
  - Corrosion Radar
- Costain
  - CrowdVision
  - Crypto Quantique
  - Cubic Transportation System
  - Cürv
  - Cycle Land
  - Datactics
  - Darktrace
  - Dynniq
  - Earthsense
  - Energy Gain
  - Energenie
- Emu Analytics
  - EtherSec

- Fabriq
  - FCC Environment
- Filament
  - FiveAl
- heatboss
  - Hello Lamppost
- Hugslock
  - Humanising Autonomy
  - Hypersphere
  - Gaist
  - Geolytix
  - Germserv
  - GlobalReach Technologies
  - Grid Smarter Cities
- MGeospatial
  - Informed Solutions
  - Informetis
  - (x) Intercede
  - IrisGuard
  - iSensing Ltd
  - Joule Group
  - JustPark

This is not an exhaustive list and represents only a sample of UK firms in the Smart Cities space. For more details please see UK Smart Cities Directory or contact DIT



# LIST OF UK SMART CITY FIRMS

- iPLATO Healthcare Ltd
- KeyOptions
- Kingspan Water & Energy
- Kinsetsu
- KnowNow Information Ltd
- Kraydel
- LightFi
  - Lightwave
  - Limitless Insights
  - Littercam
  - Locpin
- 🔁 🚇 Loqiva
  - Lowe Rental
  - Masabi
  - Metasphere
- (A) Microcab
- Mott McDonald
  - Movement Strategies
    - Mulitpass
    - NCC Group
    - mPlan
  - nquiringminds

- Open Energi
- Ordnance Survey
- OVO
- Ovon Technologies Ltd
  - Oxbotica
- Pavegen
- Perform Green
  - Perpetuum Ltd
- Pointr
- PowerOn Technologies Limited
  - ProtectBox
  - Pupil
- Qbots Energy
  - Ranplan Wireless
  - Real World Visuals
  - Red Ninja
  - Resilience Brokers
  - Rezatec
  - ← rFpro
  - Ricardo Energy & Environment
  - RingGo

- SEaB
- See.Sense
- Sensat
- Shields Energy Services
- Signol
- Skyroom
  - Skyports
  - SLAMcore
  - Space Syntax
  - Spark EV Technology
  - **Spicatech**
  - SteamaCo
  - StreetDock
  - StreetDrone
  - SustainIQ
- Sycous Limited
  - Symphonic Software
- Telensa
- The Algorithm People Ltd
  - The Lava Group
  - The Phoenix Partnership
  - Transport API

- Transport for London
- - (😭 Uleska
  - Unmanned Life
- (A) Utterberry
- W Velocity RDT
  - Vertical Future Ltd
  - M Verv
    - Vivacity Labs
    - Vodafone
- **⇔** Vortex IoT
  - NRM Technology Ltd
  - S VIVIVI TECHNOLOGY L
  - A Vu.City
    - What 3 Words
  - WhiteSpider
    - Wirth Research
    - Wondrwall Group
    - World Wall Gro
    - **S** WRAP
    - Yellow Design
- Yoti
  - Zipabout
  - **ZPN** Energy

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For more information, please contact British High Commission Kuala Lumpur: <a href="mailto:Trade.KualaLumpur@fco.gov.uk">Trade.KualaLumpur@fco.gov.uk</a>

# LIST OF SMART CITY PROJECTS IN MALAYSIA

AATIONAL KEY STAKEHOLDERS  Pal Time Air Quality Monitoring System DOE	
aal Time Air Quality Monitoring System	
tional Digital Infastructure Pla, JENDELA (2020-2026) KKMM	
tional Fibreisation And Connectivity Plan (NFCP1) 2019-2023 KKMM	
<b>/bersecurity Test Bed</b> Cybersecurity Malaysia Celcom, Huawei	
ybersecurity Lab MCMC, Huawei	
tional Smart City Policy PLANNMalaysia, KPKT	
nart City Rap KPKT, PLANMalaysia	
alaysia Urban Observatory MAMPU	
ouch 'N Go eWallet Touch 'N Go, BNM	
Grab, BNM	
gitalisation Of KPDNHEP Services KPDNHEP	
tegrated Medical Information System KKM	
bercrime Integrated Management System NACSA	
nderground Cable And Underground Fibre Cable  Telekom Malaysia	
ewton-Ungku Omar Fund (NUOF)  BEIS, British Council, MiGHT	
Procurement MOF	
Kelas (Eclass VR Experience 5G Use Case) Maxis	
nart Tourism IRDA	
<b>D-ecommerce</b> MDEC	
6 drone tech for smart cities and agritech Celcom, Aerodyne	
nart Agriculture Maxis, MARDI	
LANG VALLEY KEY STAKEHOLDERS	
Climate Change Action Plan C40, DBKL	
reen Technology Application for the Development of Low Carbon Cities UNNDP, EPU, KASA, SEDA	

DBKL, PLANMalaysia, KPKT, PDRM

This is not an exhaustive list and reflects projects researched at the time of development of the handbook.

**KL Safe City** 

KLANG VALLEY (Continued) **KEY STAKEHOLDERS** 

M Smart City app (on-going) - sino hua-an, country golding bhd Sino Hua-an, Country Heights Holdings Berhad

**Smart Tunnel** JPS, LLM, Gamuda Berhad, Malaysian Mining Corporation

i-City Golden Triangle I-Berhad **Electronic Medical Record** KKM

MyRRC - Digital Healthcare Cluster KKM, CREST, MCMC, DIGI, Cyberview

**Development of Local Talent Ecosystem** TalentCorp, Cyberview

**Creativity Skills for Innovation Lab** Google Cloud, Awanbiru Technology, MAMPU

TechCity, innovation lab (upcming) - Maxis, Huawei Saigon Hi-Tech Park, Trilliant Networks

**Gamuda Cove 5G Development** Gamuda Land, Huawei

Hyper-scale data centres and cloud services Amazon Web Services, Google Cloud, Telekom Malaysia

DBKL KL Urban Observatory (KLUO)

**City Brain Solution** Alibaba Cloud

**Cohesive Mobility Solution (COMOS)** COMOS, MAI, Green Tech Malaysia

MOT Self Driving Test Route (7km) under National Sandbox Regulatory

**R&D Innovation of Autonomous Vehicle** Futurise, Kore development Institutre KDI

**Mobility and City Planning Solutions (CATCH)** Toyota Mobility Foundation

**Traffic Management System** DBKL. ATIS

**Google Cloud Platform and Workspace Support** Google Cloud, MAMPU

**Sunway Smart Township** Sunway Cyberview Living Lab Cyberview

Selangor State Government, SSDU **Smart Selangor** 

**Cross-construction Integration & Carbon Neutral home** Sime Darby

**Smart Water Management, Selangor State government** People's Committee, Lotte Group

MELAKA KEY STAKEHOLDERS

Smart street lamp post Melaka State govt

Smart Grid TNB, UNIDO, GEF, Melaka State govt

Sustainable Mobility Planning FCDO, Melaka Green Tech Corp, MiGHT, Melaka State govt

Melaka Waterfront Economic Zone (M-WEZ)

Melaka State govt

KOTA KINABALU KEY STAKEHOLDERS

Integrated waste management programme Borneo waste

Pan Borneo Highway dashboard KKR, Pembinaan Kekal Mewah

Smart water electronic meter KeTTHA, DBKK

High Speed Mobility Solution (ongoing),Edotco, Sedco CommunicationePP, e planning permission (completed)PLANMalaysia, Sabah State govt

Bus Rapid Transit System DBKK

S-mart Sabah
Sabah Pay
Sabah State govt

PENANG KEY STAKEHOLDERS

Penang South Island MBPP, SRS Consortium

Self Sustain Urban Farming (PG)

Chief Minister Incorporated, Universiti Pendidikan Sultan Idris, Think City

Medical And Digital Technology HubPenang Development Corporation, iHeal Health

Penang Digital Library MBPP

The Light City IJM

Penang Connectivity Masterplan MBPP
Penang Smart City vison 2030 MBPP

Penang Digital Tranformation PlanMBPP, Digital Penang

Penang Intelligent Traffic and Transport System (PiTTS)

MBPP, IBM

Penang Smart Parking System MBPP

Penang Light Rail (LRT) - (upcoming)

MBPP, SRS Consortium

This is not an exhaustive list and reflects projects researched at the time of development of the handbook.

**Digital and Technology Standard**GFCP, Digital Penang, GDS

Smart Bus Shelter Edotco, MBPP

KUCHING KEY STAKEHOLDERS

Integrated Flood Management System Sarawak State Govt, DID, JPS

Digital Training Lab Huawei, Centexs

Sarawak Integrated Operation Centre (SIOC) (ongoing)

KPKT, SMA

Home2Grab SMA

Kuching Free Electric Bus Sarawak State Govt

Smart Mobility - Integrated Smart Traffic Light System (ongoing)

Sarawak State Govt, SMA

Automated Rail Transit System Sarawak State Govt

Sarawak Pay Sarawak State Govt, SMA

e-commerce transformation plan (ongoing) Sarawak State Govt

Digitisation of Water Utilities Sarawak State Govt

### ISKANDAR MALAYSIA KEY STAKEHOLDERS

**Johor Sustainable Development Plan 2030**Johor State Govt

Sultan Ibrahim Solar Park

Skymind Innovation City

Skymind Global Limited

Skymind Innovation City

Islandar Malaysia Urban Observatory

IRDA

Evidence based Transport Plan FCDO, IRDA

Smart Tourism IRDA

Automated Rapid Transit (ART) Pilot IRDA, Mobilus Sdn Bhd

Smart Integrated Mobility Management System (SIMMS)

GFCP, IRDA

Iskandar Malaysia bus Rapid Transit (IMBRT)

Integrated Operation Centre

Telekom Malaysia Bhd, UEM Sunrise, Iskandar Investment Bhd

KULIM **KEY STAKEHOLDERS** 

Majlis Perbandaran Kulim **Community Urban Farming** Intel. Kiwi Tech

IBI Urban Tech Sdn Bhd **E&E Asia Semiconductor Hub** 

MPK **TEKNO-EKO-PINTAR 2035** 

OTHER CITIES **KEY STAKEHOLDERS** 

Digi Telecommunication, Hospital Sultanah Maliha **Technology for 5G Connected Ambulance** 

Celcom Axiata, Aerodyne 5G Drone Technology for Smart cities and Agritech

Celcom Axiata, MPLBP, PDRM 5G Ready Infrastructure in Langkawi SHRDC

Malaysia Smart Factory 4.0 Programme Maxis, MARDI **Smart Agriculture in MARDI Agro Park** 

BEIS, UKRI, National Academies, British Council, Met Office Newton-Ungku Omar

Digi Teleconmmunication MAHB **5G Virtual Tourism Experience** 

**Integrated CCTV Command Centre** 

# LIST OF **ABBREVIATIONS**

ADB	Asian Development	CIP	Competitive Industrial Performance	GDPR	UK General Data Protection Regulation
Al	Artificial Intelligence	CLL	Cyberview Living Lab	GDS	UK Government Digital Service
APAD	Land Public Transport Agency	CNG	Compressed Natural Gas	GEF	Global Environment Facility
API	Application Programming Interface	CREST	Collaborative Research In Engineering, Science	GFCP	Global Future Cities Programme
AR	Augmented Reality	DBKK	And Technology Center Kota Kinabalu City Hall	GHG	Greenhouse Gas
ART	Autonomous Rail Transit	DBKL	Kuala Lumpur City Hall	GHG	Greenhouse Gas
ASCN	ASEAN Smart Cities Network	DBKU	Kuching North City Hall	GII	Global Innovation Index
ASEAN	Association Of Southeast Asian Nations	DC	Data Centre	GIS	Geographic Information System
AV	Autonomous Vehicles	DELIMA	A Digital Educational Learning Initiative Malaysia	GTMP	Green Technology Master Plan
AWS	Amazon Web Services	DID	Department Of Irrigation And Drainage	GW	Gigawatt
BCS	British Computer Society	DPA	UK Data Protection Act 2018	HS	High Speed
BEIS	UK Department Of Business, Energy And	DSM	Disaster Management System	HVAC	Heating, Ventilation, And Air Conditioning
BIM	Industrial Building Information Modelling	DOE	Department Of Environment	ICT	Information And Communications Technology
вма	Bangkok Metropolitan Administration	DOSM	Department Of Statistics, Malaysia	IFC	Industry Foundation Classes
BMS	Building Management System	EASOS	Earth And Sea Observation System	IM	lskandar Malaysia
BNM	The Central Bank Of Malaysia	EPU	Economic Planning Unit	IMBRT	Iskandar Malaysia Bus Rapid Transit
BRT	Bus Rapid Transit	ESET	Emerging Science, Engineering and Technology	IMUO	Iskandar Malaysia Urban Observatory
BSI	British Standard Institution	EV	Electric Vehicle	IR4	Fourth Industrial Revolution
CAV	Connected Autonomous Vehicles	GBI	Green Building Index	4WRD	Fourth Industrial Revolution
CCTV	Closed-circuit Television	GBP	The British Pound Sterling	IRDA	Iskandar Regional Development Authority
CDP	Comprehensive Development Plan	GCFP	Global Future Cities Programme	IT	Information Technology
CIMS	Communications Infra	GDP	Gross Domestic Product	ITS	Intelligent Transportation System

- SMART CITY HANDBOOK: MALAYSIA

# LIST OF ABBREVIATIONS

ITSM	Intelligent Transport System Association Of	MGTC	Green Technology Corporation	PG	Penang
IWM	Malaysia Integrated Waste Management	MIDA	Malaysian Investment Development Authority	PPP	Public-private Partnership
JB	Johor Bahru	MIGHT	Malaysian Industry-government Group For High	RE	Renewable Energy
KHTP	KULIM Hi-tech Park	MIP	Technology The Malaysian Institute Of Planners	RM	Ringgit Malaysia
KK	Kota Kinabalu	MITI	Ministry Of International Trade & Industry	SaaS	Software as a Service
KKMM	Ministry Of Communication And Multimedia	MKN	Malaysian National Security Council	SDEC	Sarawak Digital Economy Corporation
KL	Malaysia Kuala Lumpur	ML	Machine Learning	SDG	Sustainable Development Goals
KPKT	Ministry Of Housing And Local Government	MOE	Ministry Of Education	SESCO	Sarawak Energy Berhad
KPI	Key Performance Indicator	MOF	Ministry Of Finance	SIMMS	Smart Integrated Mobility Management System
LBU	Lebuhraya Borneo Utara	МОН	Ministry Of Health	SMA	Sarawak Multimedia Authority
LPWAN	Low-power Wide-area Network	MOHR	Ministry Of Human Resources	SME	Small And Medium-sized Enterprises
MAH	Malaysian Association Of Hotels	MOSTI	Ministry Of Science, Technology And Innovation	SMM	Smart Mobility Management
	J Malaysian Administrative Modernisation And	MOT	Ministry Of Transport	TM	Telekom Malaysia
	Management Planning Unit Malaysian Agricultural Research And	MOU	Malaysia Urban Observatory	TNB	Tenaga Nasional Berhad
	Development Institute	MOW	Ministry Of Works	TOD	Transit-oriented Development
MBKS	Kuching South City Council	MPKK	Kulim Munical Council	U4SSC	United 4 Smart Sustainable Cities
MBPP	Penang Island City Council	MSCF	Malaysia Smart City Framework	UKM	Universiti Kebangsaan Malaysia
MBSP	Seberang Perai City Council	NCSC	UK National Cyber Security Centre	UNESCO	•
	Malaysian Communications And Multimedia Commission	NDP	National Digital Policy	UNIDO	Cultural Organizatio United Nations Industrial Development
MDEC	Malaysia Digital Economy Corporation	NHS	UK National Health Service	VR	Organisation Virtual Reality
MAE	The Malaysian Economic Association	NLPTMP	National Land Public Transport Master Plan	WTE	Waste-to-energy
MEDAC	Ministry Of Entrepreneurship Development And Cooperative	NTP	National Transport Policy		5

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