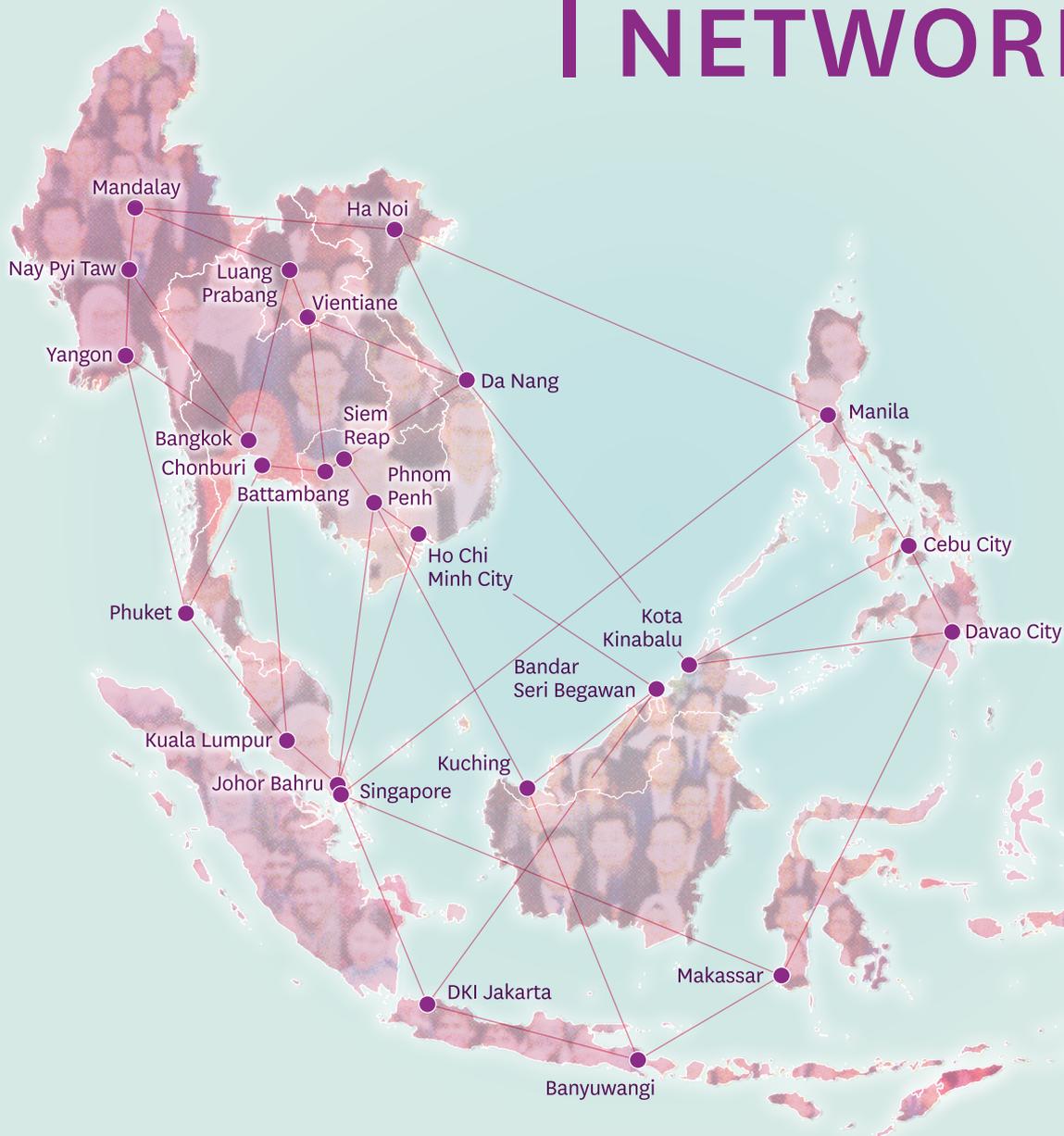


ASEAN SMART CITIES NETWORK



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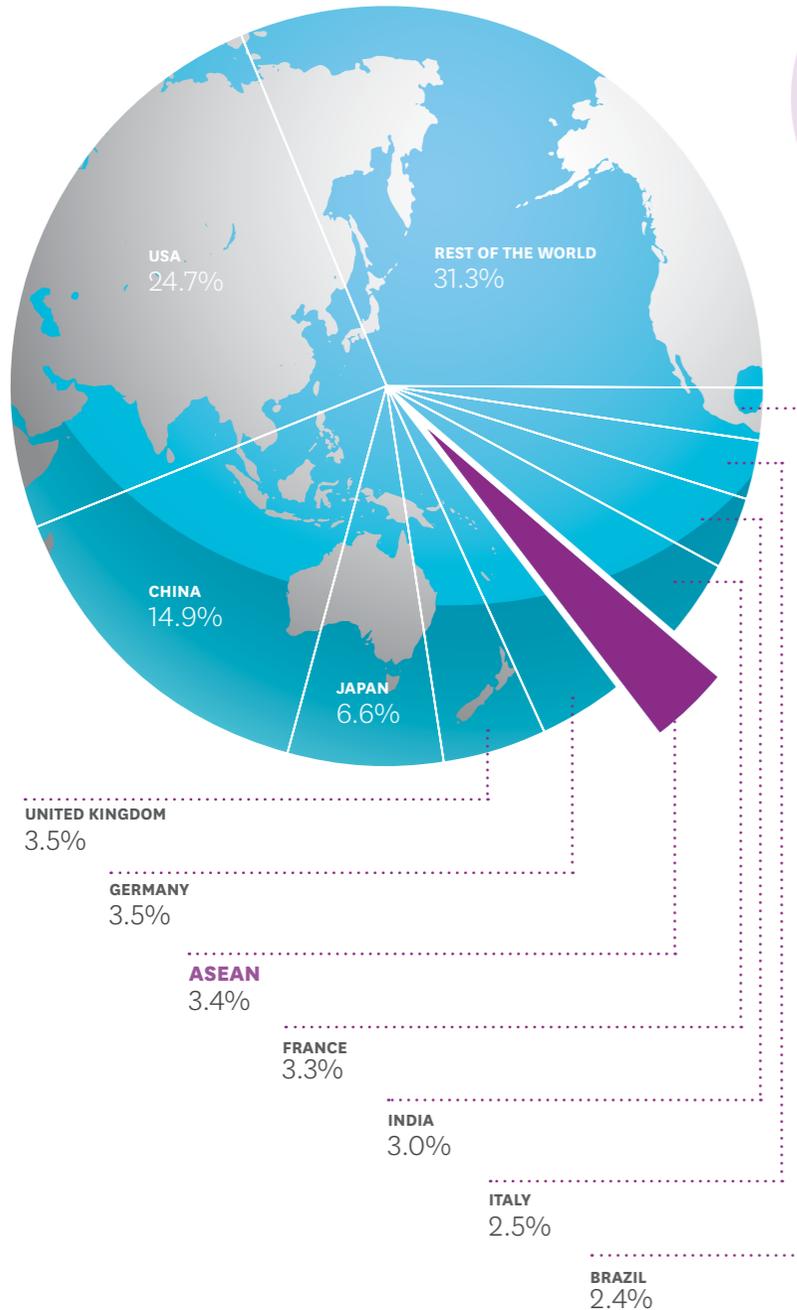
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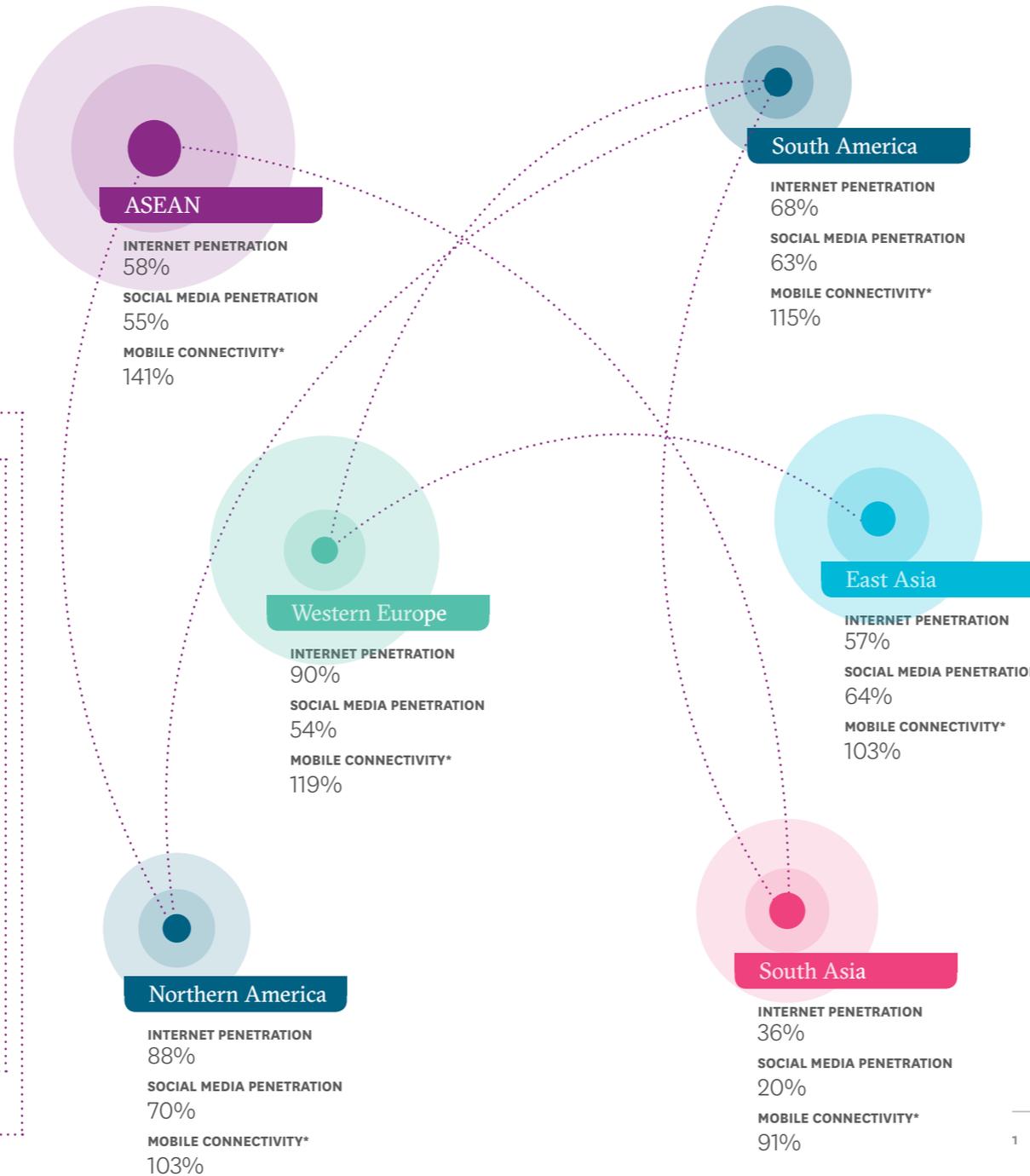
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ASEAN in statistics

Share of the World's GDP¹



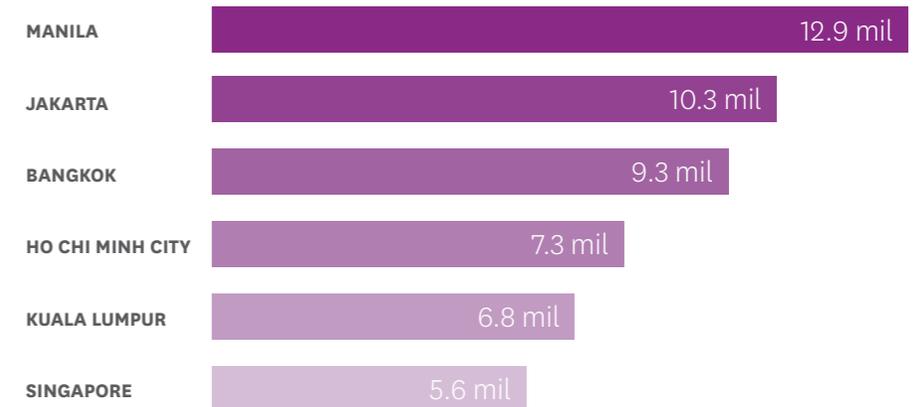
Digital Connectivity²



Urban Population (millions)³

	1990	2014	2050
ASEAN	140.1	294.4	507.7
SOUTH ASIA	316.1	609	1213.6
WESTERN EUROPE	131.0	151.4	168.1
NORTH AMERICA	212.9	291.8	390
AUSTRALIA-NEW ZEALAND	19.0	27.4	41.8

ASEAN Cities (metropolitans) Larger than 5 Million⁴



1 ASEAN Secretariat, "ASEAN Economic Community Chartbook 2017".
 2 ASEAN^{UP}, "Southeast Asia, digital, social and mobile 2018", aseanup.com/southeast-asia-digital-social-mobile/
 3 United Nations, "World Urbanization Prospects", 2014.
 4 ASEAN^{UP}, "Top Cities and Urbanization in ASEAN", aseanup.com/infographic-top-cities-urbanization-asean/ * not unique users

Myanmar

GDP (MILLIONS OF US\$) ¹
69,322

GDP PER CAPITA (US\$) ¹
1,298

MEDIAN AGE ²
27.9

% IMPROVED SANITATION FACILITIES ^{3*}
94

% IMPROVED DRINKING WATER SOURCE ^{3*}
86

INTERNET SUBSCRIBERS PER 100 PERSONS ³
21.8

CELLULAR PHONE USERS PER 100 PERSONS ³
76.7

Viet Nam

GDP (MILLIONS OF US\$) ¹
223,864

GDP PER CAPITA (US\$) ¹
2,343

MEDIAN AGE ²
30.4

% IMPROVED SANITATION FACILITIES ^{3*}
78

% IMPROVED DRINKING WATER SOURCE ^{3*}
81

INTERNET SUBSCRIBERS PER 100 PERSONS ³
52.7

CELLULAR PHONE USERS PER 100 PERSONS ³
130.6

Lao PDR

GDP (MILLIONS OF US\$) ¹
16,853

GDP PER CAPITA (US\$) ¹
2,457

MEDIAN AGE ²
21.9

% IMPROVED SANITATION FACILITIES ^{3*}
71

% IMPROVED DRINKING WATER SOURCE ^{3*}
76

INTERNET SUBSCRIBERS PER 100 PERSONS ³
18.2

CELLULAR PHONE USERS PER 100 PERSONS ³
53.1

Thailand

GDP (MILLIONS OF US\$) ¹
455,220

GDP PER CAPITA (US\$) ¹
6,593

MEDIAN AGE ²
38

% IMPROVED SANITATION FACILITIES ^{3*}
84

% IMPROVED DRINKING WATER SOURCE ^{3*}
93

INTERNET SUBSCRIBERS PER 100 PERSONS ³
39.3

CELLULAR PHONE USERS PER 100 PERSONS ³
125.8

Philippines

GDP (MILLIONS OF US\$) ¹
313,595

GDP PER CAPITA (US\$) ¹
2,989

MEDIAN AGE ²
24.2

% IMPROVED SANITATION FACILITIES ^{3*}
100

% IMPROVED DRINKING WATER SOURCE ^{3*}
100

INTERNET SUBSCRIBERS PER 100 PERSONS ³
40.7

CELLULAR PHONE USERS PER 100 PERSONS ³
118.1

ASEAN Urban Population (thousands) ⁴

	2014		2050	
BRUNEI DARUSSALAM	335	77%	458	84%
CAMBODIA	3,161	21%	8,167	36%
INDONESIA	133,999	53%	227,770	71%
LAO PDR	2,589	38%	6,435	61%
MALAYSIA	22,342	74%	36,163	86%
MYANMAR	18,023	34%	32,206	55%
PHILIPPINES	44,531	44%	88,381	56%
SINGAPORE	5,517	100%	7,065	100%
THAILAND	33,056	49%	44,335	72%
VIET NAM	30,495	33%	55,739	54%

Cambodia

GDP (MILLIONS OF US\$) ¹
22,158

GDP PER CAPITA (US\$) ¹
1,384

MEDIAN AGE ²
23.9

% IMPROVED SANITATION FACILITIES ^{3*}
62

% IMPROVED DRINKING WATER SOURCE ^{3*}
59

INTERNET SUBSCRIBERS PER 100 PERSONS ³
19

CELLULAR PHONE USERS PER 100 PERSONS ³
133

Malaysia

GDP (MILLIONS OF US\$) ¹
314,500

GDP PER CAPITA (US\$) ¹
9,944

MEDIAN AGE ²
28.5

% IMPROVED SANITATION FACILITIES ^{3*}
100

% IMPROVED DRINKING WATER SOURCE ^{3*}
95

INTERNET SUBSCRIBERS PER 100 PERSONS ³
71.1

CELLULAR PHONE USERS PER 100 PERSONS ³
143.9

Brunei Darussalam

GDP (MILLIONS OF US\$) ¹
12,128

GDP PER CAPITA (US\$) ¹
28,290

MEDIAN AGE ²
30.6

% IMPROVED SANITATION FACILITIES ^{3*}
87

% IMPROVED DRINKING WATER SOURCE ^{3*}
100

INTERNET SUBSCRIBERS PER 100 PERSONS ³
68.8

CELLULAR PHONE USERS PER 100 PERSONS ³
108.1

Singapore

GDP (MILLIONS OF US\$) ¹
323,907

GDP PER CAPITA (US\$) ¹
57,714

MEDIAN AGE ²
40

% IMPROVED SANITATION FACILITIES ^{3*}
100

% IMPROVED DRINKING WATER SOURCE ^{3*}
97

INTERNET SUBSCRIBERS PER 100 PERSONS ³
82.1

CELLULAR PHONE USERS PER 100 PERSONS ³
146.1

Indonesia

GDP (MILLIONS OF US\$) ¹
1,015,539

GDP PER CAPITA (US\$) ¹
3,846

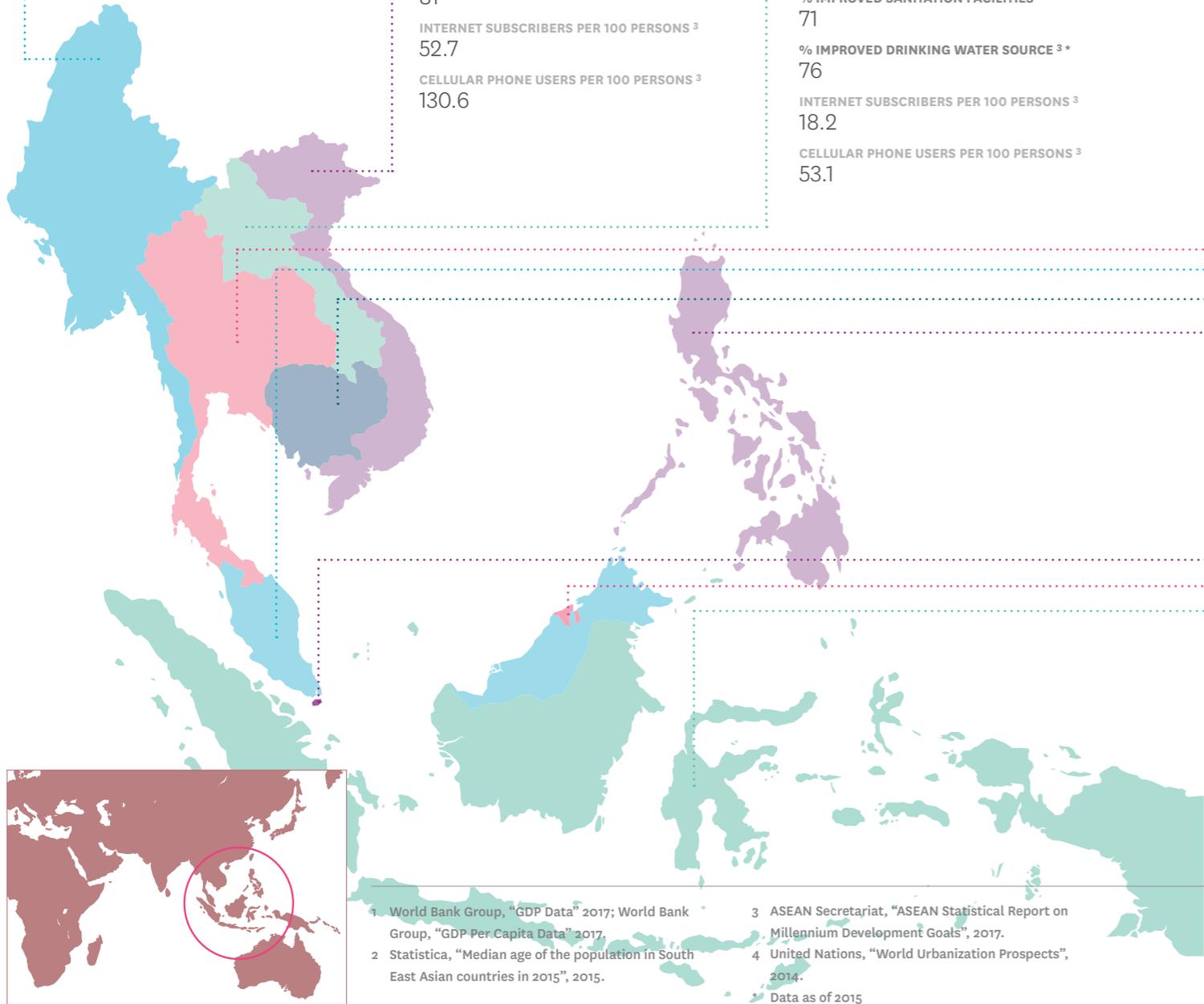
MEDIAN AGE ²
28.4

% IMPROVED SANITATION FACILITIES ^{3*}
62

% IMPROVED DRINKING WATER SOURCE ^{3*}
71

INTERNET SUBSCRIBERS PER 100 PERSONS ³
22

CELLULAR PHONE USERS PER 100 PERSONS ³
132.3



¹ World Bank Group, "GDP Data" 2017; World Bank Group, "GDP Per Capita Data" 2017.

² Statista, "Median age of the population in South East Asian countries in 2015", 2015.

³ ASEAN Secretariat, "ASEAN Statistical Report on Millennium Development Goals", 2017.

⁴ United Nations, "World Urbanization Prospects", 2014.

^{*} Data as of 2015



Foreword

Minister for Foreign Affairs, Singapore & Minister-in-charge, Singapore's Smart Nation Initiative

Dr Vivian Balakrishnan
Minister for Foreign Affairs
Singapore & Minister-in-charge,
Singapore's Smart Nation
Initiative

This is an inflexion point in human history. We are faced with two fundamental mega-trends. The first is urbanisation—90 million more people within ASEAN are expected to urbanise by 2030, and cities will drive most of our region's growth. The second trend is digital disruption, which is not only transforming patterns of production and consumption, but also revolutionising the way we live, work and play. That is why we chose the themes of "Resilience" and "Innovation" for ASEAN in 2018.

We must identify digital solutions that can relieve the pressures of rapid urbanisation, deliver integrated responsive public services and maximise job opportunities. Thankfully, ASEAN need not do this alone. We are an incredibly diverse community, and every country, city and person that forms this Association brings unique advantages to the table. The ASEAN Smart Cities Network (ASCN) was created in celebration of this diversity; in recognition that if we leverage each other's strengths, learn from each other's mistakes and successes, and equip our systems to interoperate smoothly, ASEAN will be well poised for the future.

We have made heartening progress. Our 26 pilot cities and their National Representatives met twice in Singapore this year—in May for a Smart Cities Governance Workshop and in July for the Inaugural ASCN Meeting. They have developed an ASEAN Smart Cities Framework to articulate ASEAN's approach to smart city development, crafted city-specific action plans for concrete projects, and forged partnerships with the public and private sectors to kickstart implementation.

There is still much work to be done but we are off to a good start.



Foreword

Minister for National Development & Second Minister for Finance, Singapore

Lawrence Wong
Minister for National
Development & Second Minister
for Finance, Singapore

Cities are spaces of great opportunities and challenges. We constantly hear of strained infrastructure, pollution, and the need for quality and accessible services to meet diverse demands.

We are glad to see the ASEAN Smart Cities Network established at this opportune time, as more and more ASEAN cities are turning to digital and technological solutions to address these challenges.

Singapore, too, is embarking on a Smart Nation journey and is harnessing technological and innovative solutions to make our city more liveable and sustainable. Today, geographic information systems or GIS-enabled tools allow us to plan and coordinate among agencies more productively and efficiently. We have also developed apps for residents, enabling them to make more informed decisions. Though the impact of each decision may be small, it has a large positive impact on the overall quality of living of the whole community.

All cities are still experimenting and learning, and there is much to gain from sharing best practices. Good governance, careful planning, viable financing mechanisms and close partnership with industry and ASEAN's External Partners are required to translate our plans into actions. These are also the elements in ASEAN's collective vision of a smart city, captured in the ASEAN Smart Cities Framework that the 26 ASEAN cities have drafted together.

It is timely that we document this process and present the smart city plans put forth by the cities in the ASEAN Smart Cities Network. There will be many challenges on this smart city journey, and it is only through mutual learning and collaboration that we can achieve sustainable urbanisation together.



Lim Jock Hoi
Secretary-General of ASEAN

Foreword

Secretary-General of ASEAN

The ASEAN Smart Cities Network (ASCN) is among the priority deliverables of Singapore's ASEAN Chairmanship. The ASCN embodies the spirit of this year's theme of "Resilient and Innovative", by recognising the potential contribution of technologies and innovative solutions to build resilient and sustainable communities.

So why are cities important in the ASEAN context? About half of our people are now living in urban areas. Economic activities and social interactions are centred around cities, where innovations thrive, but also where environmental and socio-economic pressures may first present themselves.

The ASCN is a new and innovative approach for ASEAN cooperation and partnership, focusing on city-level initiatives and solutions. By working at the city-level, tailored solutions could be delivered for more targeted impact. At the same time, the ASCN cities will benefit from the leverage provided by regional networks, stakeholders, and partnerships, from the opportunity for shared learning and experiences, as well as from scalable solutions.

As an ASEAN initiative, the ASCN does not stand in isolation and would benefit from other relevant and complementary initiatives in ASEAN. These include the ASEAN Sustainable Urbanisation Strategy under the Master Plan for ASEAN Connectivity 2025, as well as ASEAN work across a wide range of areas such as environment, transport, ICT and energy.

The ASCN is still at an initial stage but good progress has been made in putting in place the necessary framework and action plans. To ensure that the potential of the ASCN can be realised, we need to build a real community of practice, not only among the cities but also potential development and knowledge partners.

The ASEAN Secretariat stands ready to lend support to the ASCN and to be part of this exciting journey.

Some Thoughts from ASCN Representatives



"The Smart Cities Governance Workshop is the most useful workshop I have attended in a while"

Jonathan L. Uy
OIC Assistant Secretary
National Development Office II—
Investment Programming, National
Economic and Development Authority
and National Representative (alt)
Philippines



"ASEAN Cities can learn from the experiences and mutual technical solution sharing for Smart Cities implementation through the ASCN."

Dr Myo Aung
Mayor, Chairperson of Nay Pyi Taw Development
Committee and National Representative
Myanmar



"Industrial Revolution 4.0 is an important time for Vietnamese cities to catch up with technological opportunities. Vietnam is taking this seriously."

Dương Hải Hưng
Deputy Director General, ASEAN
Department, Ministry of Foreign Affairs
and National Representative (Acting)
Viet Nam



"The ASCN and its Framework make it clear that our foremost task is to develop liveable and sustainable cities. Smart Cities are only useful if they deliver what improves the lives of our citizens and creates new opportunities for all."

Khoo Teng Chye
Executive Director, Centre for Liveable Cities
Singapore and National Representative
Singapore



“ASCN allows ASEAN cities to share a common vision but, more importantly, to ensure that NO ONE IS LEFT BEHIND.”

Nigel Paul Villarete
City Administrator, Cebu City and CSCO, Cebu City



“Smart City is a practical and realistic concept although it requires time, resource mobilisation and knowledge transfer.”

Nuon Pharat
Vice-Governor, Phnom Penh and CSCO, Phnom Penh



“The ASCN is a ground-breaking initiative. I've enjoyed the diverse exchanges, and look forward to more discussions and collaborations.”

Tan Chee Hau
Director (Planning and Prioritisation) Smart Nation and Digital Government Office Prime Minister's Office and CSCO, Singapore



“We can learn not only from the experiences but also the ideas shared at the Smart City Governance Workshop as we work towards upgrading Nay Pyi Taw to a smart city.”

Myo Aung
Permanent Secretary
Nay Pyi Taw Development Committee and CSCO, Nay Pyi Taw



“The ASCN will bring valuable experiences for developing a smart city with smart facilities for people and a citizen-centric e-government, creating a foundation for the development of a business community in ASEAN, which is growing steadily. Ho Chi Minh City will play an active and responsible role in this Network.”

Tran Vinh Tuyen
Vice Chairman, People's Committee of Ho Chi Minh City and CSCO, Ho Chi Minh City



“It is a good idea to create this Network. It will inspire the other cities to adopt good innovations in order to create a better life for their people. The ASCN has really helped us to be an open-minded city. We have the opportunity to discuss how to address urban challenges and share best practices among the participants.”

Budi Santoso
Head of Informatics, Communication and Encryption Department of Banyuwangi Government and CSCO, Banyuwangi



“Interoperability and Integrated Services are the two defining characteristics of the ASEAN Smart Cities Network.”

Rowena Henedine Dominguez-Narajos
Information Technology Officer II City Information Technology Center and CSCO, Davao City



“The ASEAN Smart Cities Network is for the ASEAN countries to narrow the development gap; it should be a collaborative platform where cities work together with public and private institutions.”

Tin Tin Kyi
Director of Urban Planning Division and representative from Yangon City Development Committee and CSCO, Yangon



“The key enablers in the ASEAN Smart Cities framework are necessary. Thanks for matching Phuket with great partners.”

Dr Nuttapon Nimmanphatcharin
President, Digital Economy Promotion Agency and CSCO, Phuket



Introduction

About the Asean Smart Cities Network and its Journey Thus Far

The 10-member Association of South East Asian Nations (ASEAN) has a population of more than 630 million, with a combined Gross Domestic Product (GDP) per capita of US\$4,034 in 2016.¹ By 2016, ASEAN had grown to become the sixth largest economy in the world.^{2,3} It is projected to grow at an average rate of 5.2% annually over the next 10 years, becoming the fourth largest single market in the world by 2050, behind the United States, China and the European Union.⁴ This promising outlook is buoyed by ASEAN's relatively young population: 60% percent of its population is below 35 years of age, representing a huge demographic dividend that has yet to be fully realised.⁵

The region's demographic and economic growth has led to rapid urbanisation. When ASEAN was founded in 1967, only a quarter of its population lived in urban areas; today, more than half of ASEAN's population live in cities, and this is expected to increase to two in three people by 2025.⁶ While some of the additional 90 million people are expected to move into large, high density cities with populations exceeding 5 million, such as Jakarta, Bangkok, and Metro Manila, the larger growth is expected in medium-sized cities of between 200,000 and 2 million,⁷ such as Phnom Penh, Da Nang, Vientiane, and Makassar. These medium-sized cities are projected to drive 40% of the region's growth.⁸

With such rapid urbanisation, ASEAN's cities are increasingly confronting challenges such as congestion, strained infrastructure, pollution, lack of affordable housing and socio-economic inequality. Against this backdrop, ASEAN cities have had to rise to the challenges and address them with leadership, innovation and resourcefulness,

← Fig. 1: ASCN National Representatives and Chief Smart City Officers at the Smart Cities Governance Workshop 2018.

and, more recently, with the adoption of “smart” technologies. Through the adoption of such technologies, each city is leapfrogging conventional solutions and forging a steady path to achieve its unique vision of a sustainable and liveable city.

ASEAN Member States have an opportunity to embark on this journey together. Singapore’s 2018 ASEAN Chairmanship themes of “Resilience” and “Innovation” were built on this premise; on a vision of our ten countries braving the future together. While many of us have launched our own national initiatives, the benefits of such adoption and adaptation of technology could multiply exponentially if ASEAN’s cities share experiences and lessons with one another.

The ASEAN Smart Cities Network

It was in this spirit that the ASEAN Leaders announced the establishment of the ASEAN Smart Cities Network (ASCN) at the 32nd ASEAN Summit in April 2018.

What is the ASCN?

The ASCN is a platform for cities across ASEAN to work together towards the common goal of smart and sustainable urbanisation. Its primary goal is to improve the lives of ASEAN citizens, using technology as an enabler. It aims to:

- Promote cooperation on smart city development among ASEAN cities;
- Develop commercially viable projects together with private-sector solution providers; and
- Facilitate collaboration with ASEAN’s External Partners, through funding and other avenues of support.

The ASCN seeks to complement ASEAN’s existing Community-building efforts and initiatives, such as the Master Plan on ASEAN Connectivity (MPAC) 2025. It aims to provide a platform where development strategies outlined at the regional level could be translated and coordinated at the national level, and then implemented at the city level.

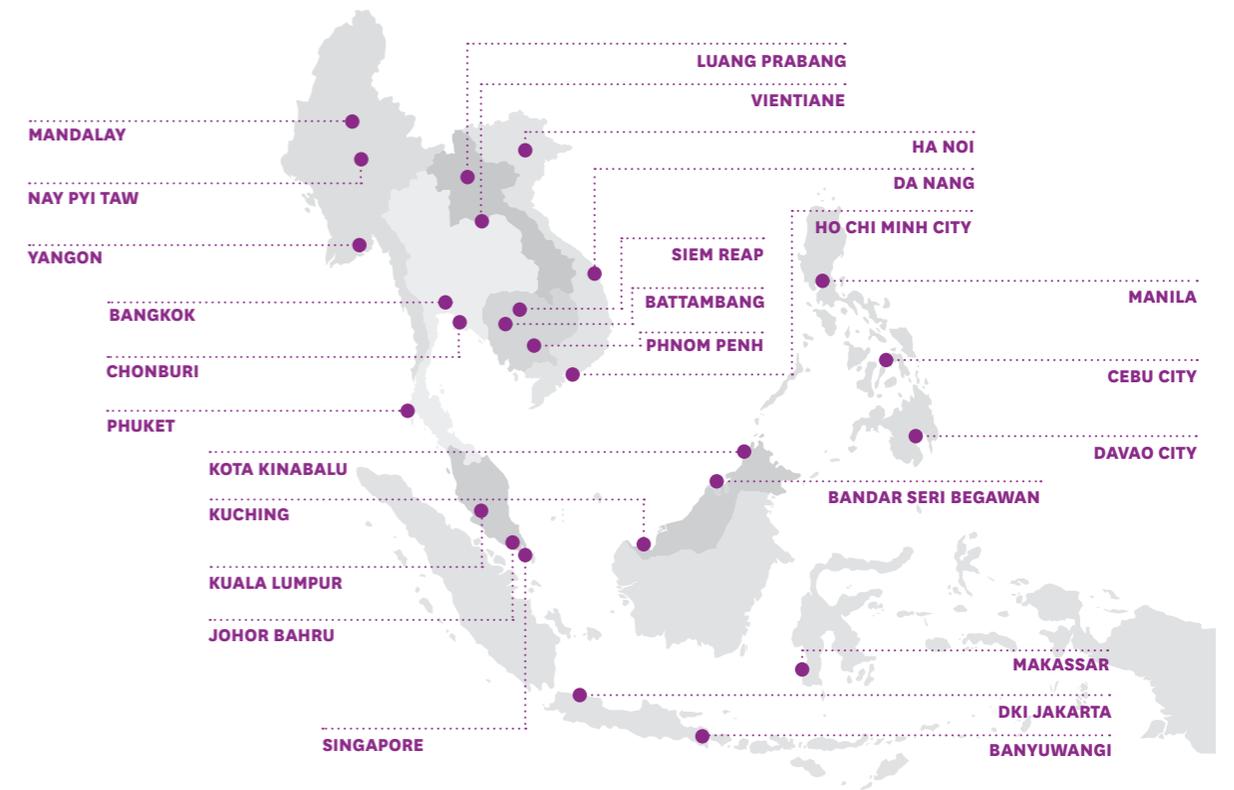


↑ Fig. 2: The 32nd ASEAN Summit

Who are its Members?

The ASCN’s pioneer batch in 2018 comprises 26 diverse cities from across our region, who were nominated by their national governments. The 26 cities are shown on the map in Figure 3.

Each city is represented by a Chief Smart City Officer (CSCO), who oversees his or her city’s drive towards smart and sustainable urbanisation. To ensure that cities are aligned with their respective national directives, and that the national vision is informed by each city’s unique needs and challenges, each ASEAN Member State has also nominated a National Representative (NR). Together, the NRs and CSCOs form the backbone of the ASCN.



↑ Fig. 3: The 26 pioneer ASEAN Smart Cities

While the ASCN’s membership is regional, its reach is envisioned to be truly global. One of its core goals is to find suitable collaborators among governments, businesses and financial institutions across the globe, leveraging ASEAN’s existing network of External Partners to forge mutually beneficial partnerships beyond the ASEAN region. See Appendix 3 and Appendix 4 for lists of ASEAN’s External Partners and ASCN Solution Partners.

The ASEAN Smart Cities Framework

One of the ASCN’s foundational documents is the ASEAN Smart Cities Framework. This serves as non-binding guide for smart city development in ASEAN, identifying the strategic outcomes, urban systems, focus areas, and enablers of ASEAN’s smart city efforts. It articulates ASEAN’s unique approach to smart and sustainable urbanisation, in recognition of each city’s different needs and potentials, as well as its local and cultural context.

The Framework envisions a smart city in ASEAN as one that strives to balance three interdependent Strategic Outcomes:

a High Quality of Life, a Competitive Economy, and a Sustainable Environment. These outcomes are underpinned by two key urban systems, Integrated Master Planning and Development, and Dynamic and Adaptive Urban Governance. The Framework recommends that an ASEAN Smart City could implement initiatives in any of six identified development focus areas, namely, Civic and Social, Health and Well-Being, Public Safety and Security, Quality Environment, Built Infrastructure, and Industry and Innovation, that are reflective of the city’s and its people’s needs. The Framework further suggests that the planning and management of smart and sustainable urbanisation can be supported by key enablers such as Digital Infrastructure and Applications, and Partnerships and Funding.

The Framework encapsulates the collective voices of ASEAN, and their shared vision for smart and sustainable urbanisation. After the initial draft prepared by the Centre for Liveable Cities (CLC), Singapore’s Ministry of Foreign Affairs (MFA) and consultants from Ernst & Young (EY) underwent several rounds of negotiation among the ASCN members, it was

endorsed by the Network at its inaugural meeting on 8 July 2018. It was then formally adopted by the ASEAN Leaders at the 33rd ASEAN Summit in November 2018.

The full text of the Framework is presented in the next section of this book.

Brainstorming for Smarter Cities: the ASEAN Smart Cities Governance Workshop

The first milestone in the ASCN's journey was the ASEAN Smart Cities Governance Workshop, organised by MFA and CLC in Singapore from 22 to 25 May 2018. This was the chosen cities' first opportunity to meet, exchange ideas and learn from industry experts about successful adoptions around the globe. It was also a valuable chance for them to establish partnerships with funders, solution providers, consultants and experts.

Leading up to the workshop, CLC and MFA worked together with Enterprise Singapore and Singapore's Economic Development Board to engage partners from companies and multilateral banks interested in ASEAN's fast-emerging smart city ecosystem. MFA leveraged Singapore's network of External Partners in ASEAN to bring in a global profile of solution providers and potential "twin" cities. Non-governmental organisations (NGOs) were also brought into the network.

During the workshop, the cities worked with expert consultants to develop their Smart City Action Plans, had robust discussions on the draft ASEAN Smart Cities Framework, and networked with prospective partners from the public and private sectors across the world to explore potential collaboration on commercially viable projects. The projects, reflecting the varied needs of the diverse ASEAN region, range from urban solutions requiring a digital interface such as e-payments, financial technology, and security analytics to urban solutions requiring environmental sustainability such as water and waste management and



↑ **Fig. 4:** NRs and CSCOs articulating their smart city aspirations at the Smart Cities Governance Workshop.

Fig. 5: Cities were "matched" with External and Solution Partners to explore possible collaborations.

Fig. 6: The discussions encouraged cities to review their smart city action plans to make them more bankable and implementable.



↑ **Fig. 7:** Cities shared their challenges and aspirations through the four days of the workshop.

Fig. 8: Delegates interacted with startups at Singapore's One North innovation district.

Fig. 9: Delegates further developing their smart city plans with Resource Persons from various solution partners.



↑ **Fig. 10:** Delegates conferred to identify suitable solution partners before the matchmaking session.

Fig. 11: Delegates networked with startups to understand how to facilitate entrepreneurial ecosystems.

Fig. 12: NRs, CSCOs and delegation representatives took the opportunity to strategise together.



↑ **Fig. 13:** (L to R) Representative from ASEAN Secretariat, Minister of State for National Development, Singapore, and Representative from Thailand sharing their hopes for the ASCN.

Fig. 14: Delegates being briefed on how data analysis could improve logistics.

Fig. 15: Delegates learnt how Singapore built a logistical hub vertically.

↑ **Fig. 16:** Delegates at the Intelligent Transport Systems Centre getting insight into Singapore's integrated transport planning system.

Fig. 17: Delegates exploring the latest in supply chain innovation at YCH Supply Chain City.

Fig. 18: Delegates had the opportunity to dialogue with industry leaders, such as Dr Robert Yap, Chairman of Supply Chain City.



↑ **Fig. 19:** Singapore's Minister for Foreign Affairs and Minister-in-charge of the Smart Nation initiative opening the ASCN Inaugural Meeting with a keynote address.

Fig. 20: Interactive exhibition showing each city's Smart City Plans on the sidelines of the biennial World Cities Summit.

Fig. 21: Partnerships were signed during the Inaugural Meeting.

preserving ASEAN's unique heritage and culture. They will be discussed in detail in this book.

Cities were introduced to the range of innovations that are being adopted in Southeast Asia and globally. They heard how "disruptors" were working with governments by sharing transport data analytics and how international banks and developers collaborated with governments in public-private partnership arrangements and financing. A full list of the presenters, panelists, moderators and curators for the SCGW can be found in Appendix 5.

The workshop culminated with the cities presenting their Smart City Action Plans and priority projects to representatives from over 60 different governments, private sector solution providers and multilateral banks. CLC arranged for each city to meet its chosen partners in a "matchmaking session", catalysing productive conversations and collaborations in the smart city space.

Following the workshop, the cities were tasked to further develop their Smart City Action Plans and priority projects with a view to unveiling them at the inaugural ASCN meeting in July 2018.

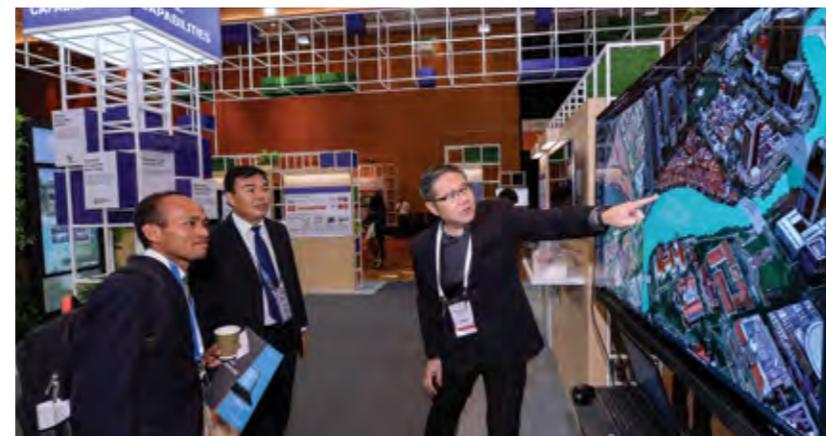
The Inaugural ASCN Meeting

The Inaugural ASCN Meeting was held in Singapore on 8 July 2018, on the sidelines of the World Cities Summit (WCS), a biennial event organised by CLC.

ASCN Opening Ceremony

Singapore's Minister for Foreign Affairs delivered a keynote address at the opening ceremony of the meeting, which was attended by over 250 public and private sector representatives from around the globe.

The Smart City Action Plans that the 26 ASEAN cities had developed during their workshop were showcased during the



↑ **Fig. 22:** Delegates were able to visit exhibitor booths at the World Cities Summit.

Fig. 23: Myanmar delegates at the ASCN Inaugural Meeting sharing updates since the May Smart Cities Governance Workshop.

Fig. 24: Delegates conversed with representatives of Chambers of Commerce and External Partner envoys.

↑ **Fig. 25:** Malaysian delegates consulting prior to the ASCN Official Closed Door Meeting.

Fig. 26: The Cambodian National Representative conferring with the Cambodian CSCOs.

Fig. 27: Laotian delegates exploring World Cities Summit exhibits.

Inaugural Meeting, as part of an interactive touch-screen exhibit. This exhibit generated tremendous attention not only among the ASCN members, who were proud to share the results of their hard work, but also their expanding network of partners.

The popularity and relevance of the ASCN was apparent, as five partnerships in the form of Memoranda of Understanding (MOUs) or Letters of Intent (LOIs) were announced within a matter of weeks of the ASEAN Smart Cities Governance Workshop and signed at the Inaugural ASCN Meeting. The partnerships were between the Japan External Trade Organization (JETRO) and the United Nations Development Programme (UNDP) on activities for the ASCN, between Phuket and UNDP on smart technology assistance, between Banyuwangi and the publishers John Wiley and Sons on digital-based learning, between Chonburi and Yokohama Urban Solution Alliance on sharing in the area of smart energy management, and between the World Bank's International Finance Corporation and IBM to work towards accelerating commercial adoption of innovative technologies in emerging markets. The ASCN now boasts more than 100 partners in its network (see Appendix 4).

Official Closed-Door Meeting

After the opening ceremony, the ASCN's National Representatives and Chief Smart City Officers gathered for their first annual meeting. This was an important milestone for the network, as it symbolised its formal establishment as an ASEAN body. The Meeting achieved significant outcomes, with the endorsement of the ASEAN Smart Cities Framework and the 26 cities' Smart City Action Plans. It also laid the foundation for the ASCN's future evolution, with ASCN members tasking the ASEAN Secretariat to draft the Network's Terms of Reference, as well as a Monitoring and Evaluation Framework.

Thailand, the incoming ASEAN Chair, pledged to support the Network's further evolution in 2019, and shared its plans to host two ASCN Meetings in 2019.

Summary

The ASCN has made encouraging progress since its establishment in April 2018. In the short span of a few months,

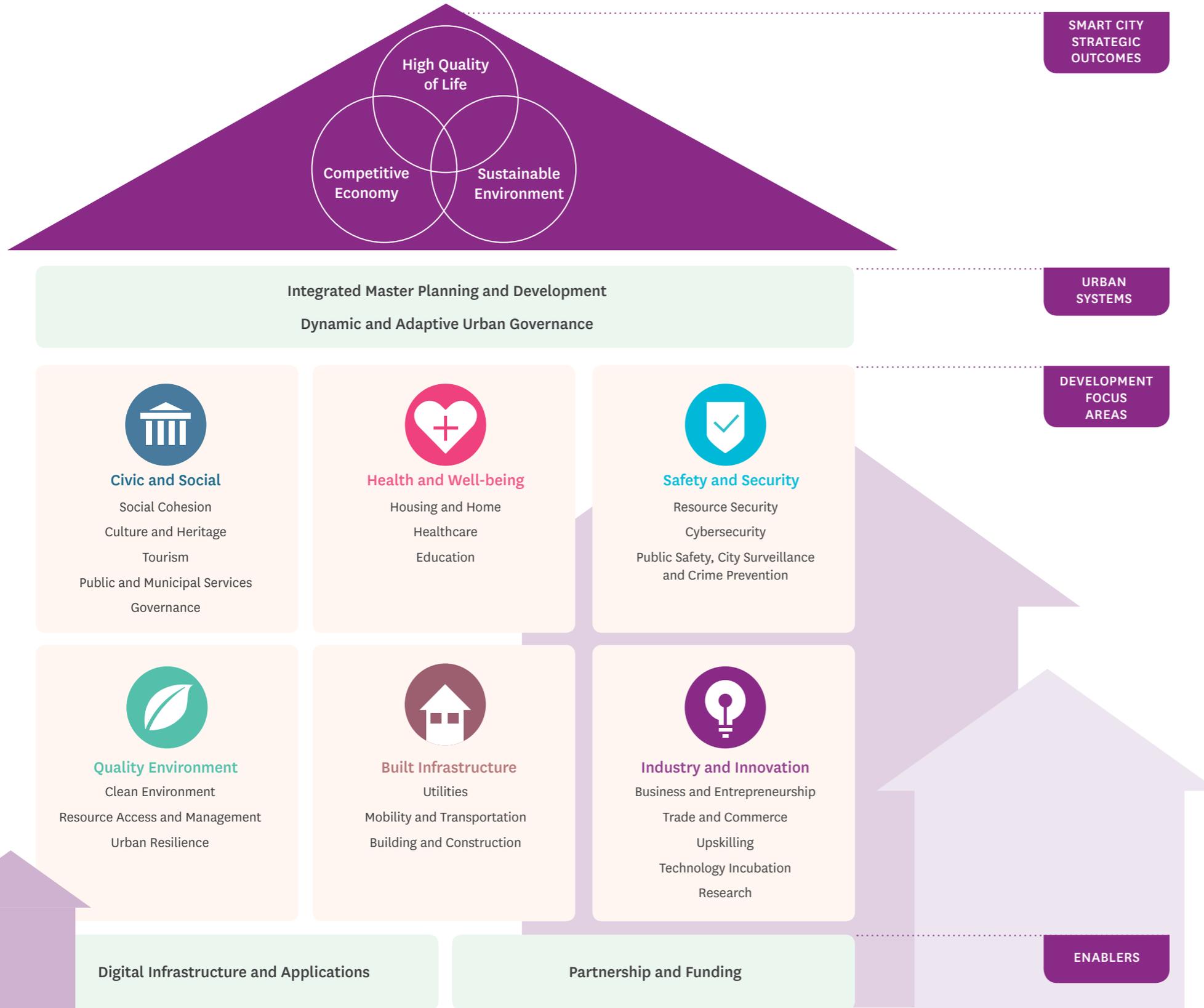


↑ **Fig. 28:** ASCN NRs and CSCOs attended the first ASCN Meeting.

Fig. 29: Singapore's National Representative chairing the Official Closed Door Meeting.

the 26 pilot cities have gathered twice, forged lasting friendships and achieved meaningful outcomes such as the ASEAN Smart Cities Framework and Smart City Action Plans. They have also looked beyond the region, inking promising partnerships with governments, multilateral institutions and private sector companies to boost the Network's fast-expanding global reach.

This publication delves into ASEAN's definition of a smart city, which reflects the rich diversity across the ASEAN cities. It will also tell the story of how these frameworks, plans and partnerships are already being translated into tangible projects with real-world impact. That, after all, is at the very heart of the ASCN—to improve the lives of ASEAN's people.



ASEAN Smart Cities Framework

Most of ASEAN’s growth has been, and will continue to be, driven by urban centres, with more people expected to urbanise by 2030 and “middleweight” cities of between 200,000 and 2 million residents forecast to drive 40% of the region’s growth. This rapid urbanisation is not without its challenges, as it has implications for important issues such as city congestion, water/air quality, poverty, rising inequalities, the urban-rural divide, as well as people’s security and safety. Technological and digital solutions as well as innovative non-technological means can be utilised to resolve these issues and to enhance the quality and accessibility of services, thereby improving our people’s lives across the urban-rural continuum, creating new opportunities for them and ensuring that no one is left behind.

In this connection, ASEAN Member States (AMS) have established an ASEAN Smart Cities Network (ASCN). The ASCN is a collaborative platform where cities work together towards the common goal of smart and sustainable urban development. Its primary goal will be to improve the lives of ASEAN’s peoples, and promote new business opportunities and innovation in smart city development, using all means including technology. The ASCN will adopt an inclusive approach to smart city development that is respectful of human rights and fundamental freedoms as inscribed in the ASEAN Charter. It will focus on people-oriented, people-centred solutions and liveability, and also contribute to enhancing mutual understanding across cultures. Ultimately, the ASCN will contribute to realising a “politically cohesive, economically integrated, and socially responsible” community in line with the ASEAN Community Vision 2025, contribute to relevant aspects of the ASEAN Community Blueprints 2025, the Master Plan on ASEAN Connectivity (MPAC) 2025 and the Initiative for ASEAN Integration (IAI) Work Plan III, and

build on the global commitment to achieving the 2030 Agenda for Sustainable Development and the New Urban Agenda.

The ASEAN Smart Cities Framework serves as a non-binding guide to facilitate smart city development in each ASCN city, in a manner that is specific to each city's needs and potentials, as well as its local and cultural context. This document articulates the key features of ASEAN's smart cities, by (i) identifying strategic outcomes; and (ii) outlining key urban systems, focus areas, and enablers. This Framework seeks to complement existing national development plans or help to build new ones.

Strategic Outcomes

A smart city in ASEAN harnesses technological and digital solutions as well as innovative non-technological means to address urban challenges, continuously improving people's lives and creating new opportunities. A smart city is also equivalent to a "smart sustainable city", promoting economic and social development alongside environmental protection through effective mechanisms to meet the current and future challenges of its people, while leaving no one behind. As a city's nature remains an important foundation of its economic development and competitive advantage, smart city development should also be designed in accordance with its natural characteristics and potentials.

At a strategic level, a smart city in ASEAN should achieve a balance between three interdependent objectives.

Competitive Economy. A competitive economy in a smart city provides opportunities for all people, including those in rural areas, to make a living and achieve a degree of economic security, ensuring that no one is left behind. It also helps to promote start-up accelerator and incubator networks to support entrepreneurship among its people, especially its youth. It is able to generate income, create job opportunities

and attract investment to sustain itself—especially for small and medium enterprises (SMEs) and innovation startups—promoting equitable regional economic growth across the urban-rural continuum. It will also focus on the development of the digital and creative economies, leveraging innovation and entrepreneurship to generate business opportunities. Collectively, this means an improvement in the region's capacity to respond to global challenges and mega trends, taking into account the different levels of development in each city.

Sustainable Environment. A sustainable environment is essential to ensure the long-term viability and accessibility of healthy ecosystems, including vital resources such as land and water, as well as to enhance disaster resilience and mitigate climate change impact. It is also an integral determinant of the region's growth. Hence, a smart city could incorporate a sustainable, green and resilient growth agenda that promotes the science-based use of, and support for, green technology and energy, as well as promote sustainable consumption and production through innovative policies.

High Quality of Life. High quality of life focuses on the social, physical and psychological well-being of people across the spectrum of society, including the vulnerable groups. A smart city should promote equitable access to quality goods and

“A smart city has to make life easier. It has to be linked to sustainability.”

Seng Vannak
Chief of Administration
Phnom Penh City Hall

services; social infrastructure such as education, healthcare and housing; safety and security; preservation of culture; and any other resources and opportunities needed to lead a fulfilling and meaningful life. This will create a more equitable, inclusive and resilient society.

Urban Systems

To achieve the three strategic outcomes of an ASEAN smart city, two key urban systems should be focused upon to manage, balance and coordinate the various domains and priorities of a city.

Integrated Master Planning and Development enables the government to create and manage the various urban domains that balance the three strategic outcomes of smart city development, and ensures that smart urbanisation aligns with policy and regulatory frameworks. Amidst a dynamic political, economic and social environment, the drawing up of long-term plans and blueprints allows cities to meet their needs in a sustainable manner. Master planning and the implementation of plans should also be integrated into the planning process. The implicit principles of this system include: adopting a long-term perspective; productive decision-making; built-in flexibility; effective execution and implementation; systematic innovation; as well as robust monitoring and evaluation.

Dynamic and Adaptive Urban Governance is the foundation of effective public leadership. It is about engaging diverse and capable stakeholders such as citizens, government officials and businesses, including local enterprises and startups, in decision-making and oversight of how the city plans, utilises and manages its resources. Various collaboration modalities can be explored, such as public-private partnerships (PPP), with government support for development efforts. The principles under this system include: visionary and pragmatic leadership; integrity; sound institutions and rule of law; stakeholder involvement; and market-oriented implementation.

“The ASEAN Smart Cities Framework helps us to make plans in the best way, not only in the minds of government officials who make the decisions, but also as it accommodates all suggestions among the participants.”

Budi Santoso, Head of Informatics, Communication and Encryption Department of Banyuwangi Government and CSCO, Banyuwangi

Focus Areas

The detailed conceptualisation and implementation of smart city projects in ASEAN can involve one or more of the focus areas below, which reflect the cities' and people's needs.



Civic and Social. Smart cities in ASEAN can focus on enhancing social harmony, cultural diversity and the spirit of community. Smart solutions can advance goals such as (i) achieving social cohesion amidst diversity; (ii) promoting social equity to eliminate all forms of discrimination; (iii) preserving and deepening appreciation for cities' cultural authenticity and heritage; and (iv) promoting the tourism sector. Smart cities can also leverage technology to improve the citizen experience and facilitate seamless living. They can find innovative and effective ways to enhance the delivery of public and municipal services, and work towards goals such as building a cashless society. Through good governance, they will ensure their capabilities in the provision of better service delivery, decision making, transparencies and accountability and information accessibility.



Health and Well-being. Smart cities in ASEAN can apply innovative solutions to enhance the overall welfare of their citizens. This will improve the quality and efficiency with which they provide key services such as healthcare, housing and education, in a manner that optimises the use of public resources and enhances preparedness. It will also help to promote inclusive communities, and address barriers to the enjoyment of equitable access to opportunities for all ASEAN peoples.



↑ **Fig. 30:** ASCN cities networked with ASEAN's External Partners during the Inaugural Meeting.

“ASEAN cities all have different cultures. A smart city needs to answer to the requirements of each city, to make the city more liveable, and make the people happy.”

Dr Passakon Prathombutr
Senior Executive Vice President
Digital Economy Promotion
Agency, Phuket Delegation



Safety and Security. Smart cities in ASEAN can adopt effective technologies to solve urban security problems, strengthening (i) security of vital resources such as food and water; (ii) cybersecurity of networked infrastructure and objects, as well as (iii) public safety, city surveillance and crime prevention, among others.



Quality Environment. Smart cities in ASEAN can focus on building a quality environment, leveraging technologies to, for example, (i) maintain a clean and pleasant environment; (ii) promote the sustainable use of ecosystems, natural resources and biodiversity; and (iii) strengthen resilience against disaster risks and potential climate change impact.



Built Infrastructure. Smart cities in ASEAN can invest in smart infrastructure to deliver multiple benefits across various stakeholders, whether private, public or corporate. These can include: (i) smart utilities such as energy, water and waste water treatment; (ii) smart mobility and transportation; and (iii) smart buildings and construction.



Industry & Innovation. Smart cities in ASEAN can encourage their industries and businesses to capitalise on new technologies, using innovation as a catalyst to build competitive advantages and transform processes. This will increase their competitiveness and productivity, particularly for Micro, Small

& Medium Enterprises (MSMEs), and promote inclusive and equitable growth. Initiatives in this area will focus on areas such as: (i) business and entrepreneurship; (ii) trade and commerce; (iii) upskilling of the workforce; (iv) technology incubation; and (v) research.

Enablers

The planning, implementation and management of ASEAN smart cities and their detailed projects in the various focus areas can be supported by a few key enablers.

Technological and Digital Solutions. Smart cities should embrace the opportunities afforded by new technologies and innovation, and adopt solutions with wide-ranging applications in order to maximise benefit optimisation and resource efficiency. Some examples include: (i) geospatial databases to monitor various aspects in the city; (ii) urban spatial data information systems; (iii) data analytics to support city operations and drive innovation; (iv) ICT networks; (v) automation; and (vi) e-payments and digital platforms.

Partnership and Funding. Mutually beneficial partnerships, such as between ASEAN and its external partners, with other city networks, or with the private sector, will provide additional resources to support the development of smart cities in ASEAN. The development of ASEAN smart cities will be an iterative journey involving multiple stakeholders and robust financial investment, as well as the development of knowledge sharing and capacity strengthening platforms.



Development Focus Area Civic and Social

The ability to relate to cultural and civic spaces and form social connections is an important attribute of liveable cities. ASEAN boasts a rich and diverse history and culture. Its tapestry of indigenous ethnic cultures has overlays of Chinese, Indian, Arab, and, more recently, European historical influences. This unique heritage is reflected in ASEAN's wealth of ancient temples, churches, monuments, colonial buildings and other heritage sites, colourful festivals, and world-famous cuisines. Thirty-seven heritage sites in ASEAN have been inscribed in the UNESCO World Heritage list— apart from the world-renowned Angkor Wat, these include less well known ones such as the towns of Luang Prabang and Mandalay. Safeguarding this cultural heritage is an important responsibility of ASEAN governments as is ensuring social connectedness amidst diversity and the challenges of urbanisation. This will enable the people of ASEAN and visitors alike to enjoy the region's riches.

Rapid urbanisation and population growth often tend to put strains on land use, resulting in historical landmarks and religious, cultural and social spaces giving way to housing and commercial needs as well as public infrastructure. Architectural heritage is also often lost in the process. ASEAN cities are cognisant that the loss of familiar reference points and of religious, cultural and social support systems could cause a sense of alienation and loss of identity among urban dwellers while also affecting social cohesion. Civic and social development is thus a key development focus area to create the liveable and sustainable cities so aspired by communities.

← **Fig. 31:** Luang Prabang
City authorities are pushing to conserve heritage so as to retain city identity even as the surrounding spaces are modernised.

Some of the ASEAN smart city initiatives include heritage development, which also has important spinoffs for the tourism industry. Travel and tourism accounts for approximately 12% of ASEAN's GDP and is expected to continue playing an important role in the region's growth.⁹ Beyond projects aimed at improving tourist infrastructure, ASEAN's cities are keen to capitalise on their heritage value and use tourism as a catalyst to spur urban regeneration. In addition, city governments are turning to smart solutions to better engage and serve their residents so that they do not feel disenfranchised as cities grow in size, density and complexity.

Smart City Roll-Outs

City governments are expanding their public outreach to understand the desires of the people and improve service delivery. Social media and digital platforms are used to reduce traditional institutional barriers and engage citizens in civic matters, such as by crowdsourcing smart solutions and gathering feedback on the quality of services. In Jakarta, for example, a social issue reporting application (app), "Qlue", lets people report problems in real-time and gives the government the ability to monitor the performance of its officials and address problems that may arise. This process ensures that decision makers are making informed decisions based on the desires of residents.

City governments are also working to increase the efficiency of service delivery by automating several citizen-facing government services. At the click of a button or touch of a screen, citizens can register for new utility connections, pay utility fees, apply for licences, and file taxes. Aside from being cost efficient and convenient, such services also minimise or eliminate the need for middle-men and enable greater transparency in the provision of government services. Makassar, for instance, is moving several of its municipal services online and is working on a smart city project that involves the online integration of tax services.

Singapore is developing its "National Digital Identity" (NDI) system, building on its earlier "SingPass" system. The NDI will allow citizens and residents to manage their use of personal data for simpler online transactions and have a single digital identity to transact with both the government and private sector. NDI improves efficiency and saves time as users need not provide verifying documentation: they can automatically fill in personal details from government-verified data. Although it was designed initially for government agencies, the system was extended to the banking sector in 2017 and has since been extended to more private sector services. The NDI will be fully operational in 2020.

Cambodia's third largest city, Battambang, seeks to improve the city's liveability through the creation of quality public spaces and well-designed streets. The city also has its sights on making its urban development more inclusive through infrastructure improvements and the rehabilitation of 50% of its street hawkers into formal retail outlets equipped with proper infrastructure. Yangon and Bandar Seri Begawan have both identified priority smart city projects focused on conserving heritage and culture to enhance residents' sense of identity, thereby also enhancing their cities' attraction as tourist destinations and gaining from the resulting job dividends.

"Smart City development in ASEAN naturally comes in various forms and shapes, as uniquely differentiated by the region's booming and young population, rich demographics and diverse cultural and religious heritages. Three relevant outcome-based metrics are: growth, inclusivity and sustainability."

Bess Ng Yi Fung, Surbana Jurong Private Ltd, Resource Person for BSB during Smart Cities Governance Workshop

ASCN CITY HIGHLIGHT



Yangon

Downtown Conservation Project

Yangon is Myanmar's historical and commercial capital and home to 5.14 million people.¹⁰ In May 2018, Myanmar unveiled a US\$2.5 billion urban redevelopment master plan for Yangon region, comprising 42 projects, including 10 valued at US\$249 million for renovation and redevelopment of Yangon's Central Business District (CBD).¹¹ The plans are part of Yangon's development vision to transform the city into "An Attractive International Port and Logistics Hub—A city of Blue, Green and Gold".

Among the CBD redevelopment projects is Yangon's Downtown Conservation project, a heritage and urban regeneration project aimed at increasing Yangon's heritage value. Downtown Yangon, which represents just 2% of the metropolitan area's footprint, houses 10%¹² of its population and roughly half of its commercial establishments. It is also where nearly 3,000 pre-colonial era heritage structures are located. Owing to the severe development pressures that Myanmar has faced since it opened its economy in 2011, some of these buildings are in a derelict state while others have been demolished and replaced by new developments that lack aesthetic value. Infrastructure in the area is in a state of disrepair and the streets clogged by traffic.



Fig. 32: Conservation Area Map for Yangon's downtown and neighbouring precincts, using 3D modelling to better model development outcomes.

Recognising that heritage is a key element in Yangon's identity, and can attract revenue through tourism, the Yangon City Development Committee (YCDC) has taken an integrated urban development and heritage conservation approach.

YCDC is collaborating with several multilateral funding agencies and international and local organisations on various aspects of downtown area redevelopment. Together with the Yangon Heritage Trust (YHT), YCDC has prepared a heritage conservation strategy that aims to conserve and repurpose individual buildings and precincts as well as address traffic woes. To ensure conservation of the downtown area's unique urban pattern and to guide future growth, new zoning guidelines have been introduced. YCDC is working with the Japan International Cooperation Agency (JICA) to upgrade the road network around central landmarks such as the Shwedagon Pagoda and Sule Pagoda. These roads will benefit from improved pedestrian-friendly amenities and landscaping. A GIS-based building usage map detailing site use, site characteristics and built area coverage, which is meant to guide zoning plans and the issuing of new building permits, is currently being planned. Measures are under way to upgrade bus services, supported with online route maps and enhanced auxiliary infrastructure.¹³ In fiscal year 2018, YCDC plans to implement a pay-and-park policy to regulate the entry of cars into the CBD, and it will use a smart card system to collect fares. In addition, a World Bank funded Flood Risk Model is being prepared for all of Yangon, with special focus on a flood protection plan for the downtown area. The strategies are expected to be finalised by the second quarter of 2019.

Bandar Seri Begawan Revitalisation of Kampong Ayer



Bandar Seri Begawan (BSB) is Brunei Darussalam's capital and its largest city.¹⁴ In 2007, to accommodate the growing population, BSB's city boundary was extended from 12.87 km² to 100.36 km². This extension called for careful planning and coordination in order to facilitate planned growth and sustainable development. As a response, in 2011 the Bandar Seri Begawan Development Master Plan (BSBDMP) was launched. One of its catalyst projects is the Revitalisation of Kampong Ayer. Regarded as the "Jewel of Bruneian Heritage" and the "Venice of East", the 600-year-old Kampong Ayer is the world's largest settlement on stilts. The floating village, home to nearly 10,000 people, comprises a network of 42 contiguous stilt villages connected by a 33-km boardwalk. It has 1,451 houses,¹⁵ and community and administrative facilities, all equipped with electricity and supplied with clean water.

Under BSBDMP, an integrated long-term redevelopment plan has been proposed for Kampong Ayer. The plan includes upgrading houses and constructing new utility structures and community amenities while keeping intact the cultural heritage and

→
Fig. 33: New stilt housing development in Kampong Ayer to upgrade the area while retaining its heritage value.



social fabric of the village. The emphasis is on enhancing the heritage value through the introduction of compatible commercial activities and promotion of tourism. The redevelopment plans are synergistic with the other catalyst projects of BSBDMP, namely the Riverfront Eco Corridor and Revitalisation of CBD.

A high-level steering committee led by the Ministry of Development and the Ministry of Home Affairs and involving other relevant ministries and agencies was formed to deliver the strategic outcomes of sustainable environment, competitive economy and high quality of life in an integrated manner. Examples of priority projects included eco-friendly houses.¹⁶ The second phase is focused on the development of smart buildings and infrastructure, and an integrated network of public utilities that feature, among other things, the use of vacuum sewage technology for more efficient waste management. The people of Kampong Ayer are regularly consulted to ensure the project proposals meet their needs, and they are kept updated on the status of the project. In addition, approximately US\$32.7¹⁷ million has recently been allocated for revitalisation, including the construction of 157 new houses, under Brunei's 11th National Development Plan.



The social and civic smart city projects prioritised by the ASCN cities demonstrate that these cities are taking a holistic approach to smart city development, one that seeks to get some of the fundamentals right while exploring the use of smart technology, where feasible. The cities acknowledge that adopting smart technology is not the end goal in itself, but only a tool to help cities achieve balanced urban development, so that all can enjoy those things that matter most to each city's residents.

← **Fig. 34:** Yangon's municipality is looking at ways of improving its downtown while retaining its heritage.



Development Focus Area Health and Well-Being

The UN 2030 Agenda lists “Health and Well-being” as the third of the 17 Sustainable Development Goals (SDG3)—to ensure “healthy lives and promote well-being for all at all ages”. The ASEAN countries, too, have long prioritised health and well-being. By the end of the 2015 target date for the UN Millennium Development Goals, the number of people in ASEAN living in extreme poverty had been reduced from 138 million to 44 million.

Health expenditure per capita has been steadily increasing in ASEAN. As of 2013, the ASEAN governments spent approximately 4% of GDP on health.¹⁸ Average life expectancy in the region reached 73 years by 2012, with Singapore achieving the highest life expectancy at 83, and Laos and Myanmar at 66.¹⁹ Most of the ASEAN countries are working towards Universal Health Coverage, which is mainly limited by financial and labour constraints. However, some cities in ASEAN have attempted to leapfrog conventional healthcare models to deploy innovative technology-aided solutions, such as telemedicine.

Education is an important key to health and well-being. All 10 countries in ASEAN have primary school completion rates of above 95%,²⁰ and adult literacy rates are now at a high of 94.9%, which is a significant improvement from the 74.5% achieved in 1980.²¹ The gap between male literacy and female literacy closed significantly, from 14.2% to 2.8%, as of 2016.²² However, for cities to be able to

← **Fig. 35:** Kuching is looking at ways of improving its environment so that residents can live healthier lifestyles.



adopt smart technologies, they need to go beyond basic literacy. Much more can be done to ensure young people in ASEAN are equipped with solid numeracy, problem-solving skills and ICT skills necessary for digital literacy.

Housing and access to services also contribute significantly towards well-being. With the influx of migrants from rural areas, cities are pressed to provide affordable housing for the new residents who often have no alternative but to live in slums. Cities are now using geospatial data for land surveys and to better plan and site human settlements that would be resilient to hazards and disasters. Those with better ICT infrastructure and digital platforms are using smart technology for the management and administration of land tenure rights, for housing allocation and for rental payments, apart from construction itself.

Smart City Roll-Outs

A number of ASCN cities have plans to undertake priority projects in the health and well-being focus area.

The Myanmar cities of Nay Pyi Taw and Yangon are both looking at focusing on affordable housing. Nay Pyi Taw has set aside 65 hectares for affordable housing, and is inviting private sector partnerships in development and financing and in incorporating smart applications to ensure high levels of service delivery. Yangon has plans to develop the Hlaing Tharyar Township area for affordable housing owing to high housing demand, which has led to the mushrooming of informal settlements there. The township will be built with smart city elements such as smart traffic and safety monitoring systems. The residences will be supported by commercial complexes, administrative offices, a bus terminal and other amenities. In 2017, the government issued over 160,000 smart identity cards to squatters, enabling them to register for low-cost government housing projects.

In regard to education, the Indonesian city of Banyuwangi is looking to develop itself as a *Smart Kampung* (smart village) through the provision of e-education and entrepreneurial

“Wiley strongly supports the ASEAN Smart Cities Network and the Banyuwangi government’s goal in ensuring no one is left behind by rapid urbanisation, especially in the new digital economy. We hope to support Banyuwangi, and ASEAN, in its efforts to close the knowledge gap and economic gap between the rural and urban residents.”

Tan Chor Meng
Director, Wiley Asia

training for youth. Banyuwangi has already teamed up with a local technology company, RuangGuru.com, to provide e-learning for students in 24 villages, and the programme is expected to be expanded to other villages, with improvements after this initial trial period.²³ The e-learning syllabus is based on the nationally standardised syllabus, and involves additional tutoring for students without their having to travel to the city to access such services.²⁴ In July 2018, Banyuwangi signed a Letter of Intent with the publisher John Wiley and Sons at the ASCN Inaugural Meeting in Singapore to explore other e-learning platforms. Manila, too, is prioritising e-learning. It is planning for the development of mobile phone based tutorial applications that would allow students to study or review lessons with tutor supervision. Nay Pyi Taw, for its part, is establishing its first international university, which will be integrated with its Smart City Initiative Project. The university, to be constructed over 101 hectares, is a collaborative effort with South Korea.

The cities of Manila, Banyuwangi and Makassar are deploying technology to provide high quality and inclusive healthcare services. Manila has been digitising its medical records and



← **Fig. 36:** Banyuwangi’s mayor and leaders are actively pushing for e-Education systems to provide equitable access to knowledge.

integrating overseas supervision of its operating rooms. Banyuwangi is working with Go-Jek, an electronic ride-hailing service, to deliver medicines free to those who are immobile or can least afford it, thus improving access to health services and with faster response times. Makassar has among some of the more advanced e-health systems, described further below.

ASCN CITY HIGHLIGHT



Makassar

Inclusive healthcare through centralised health data and decentralised health services

Makassar City, the capital of the Indonesian island of Sulawesi, has a population of 1.8 million (2017)²⁵ spread over 17,577 km². It is the fifth largest city in Indonesia. The city initiated its Smart City Plan in 2014, and has been steadily leveraging technology to create a more sustainable and people-centric city. For example, it created its command centre in 2015 for better decision-making and to address challenges such as radicalisation.²⁶ By 2016, it had introduced a citizen feedback app. And, by 2018, the city had expanded its smart city plan to what it calls a “Sombere²⁷ and Smart City” to ensure that it progresses towards a city that is inclusive and welcoming as well.



→ **Fig. 37:** Makassar’s mayor is pushing for a Smart and Sombere (courteous) city to complement its rapid growth.

Makassar: Sombere & Smart City

Vision	To Create Makassar as a Liveable World Class City for All					
Mission	To Reform Bureaucracy	To Restore City Spatial Plan		To Reconstruct Society's path		
Value	Sombere and Smart City Integrity and Interoperability Responsibility, Agility and Innovation					
Components	Smart Governance	Smart Branding	Smart Economy	Smart Living	Smart Society	Smart Environment
Programmes	IT Governance System	Brand City		Economic Transformation		
	Liveable World City	Public Engagement		Environment Protection		
Drivers	SMART ICT Governance and Management SMART ICT Infrastructure and Security SMART ICT Capacity and Capability					

One of Makassar's smart city target projects is in the area of telemedicine. Makassar is working on bringing healthcare to its citizens through two programmes:

- (i) establishing an inventory of healthcare data digitally and creating a single platform for healthcare;
- (ii) bringing healthcare professionals direct to homes through what is known as Dottoro'ta (mobile health services). Dottoro'ta services include diagnosis, emergency care and follow-up care, and are available 24 hours a day. Vehicles used in the programme are equipped with equipment such as ECG and ultrasound machines and are linked online to 46 health centres, so that health professionals can make sound decisions in real-time.

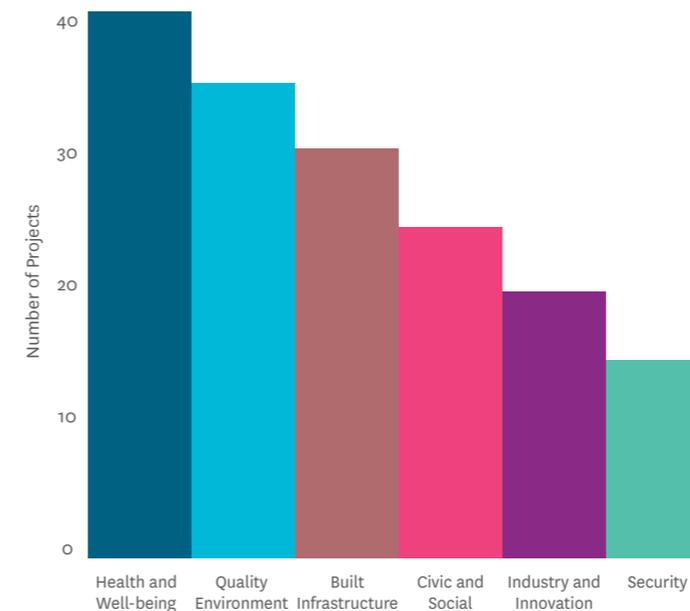
The city is also integrating its healthcare services with wearables and apps, as well as smart cards that are connected with regional data exchanges to provide quick access to medical records and diagnosis.²⁸

←
Fig 38: Makassar's Smart City Plan
Source: Makassar City Hall



→
Fig. 39: Makassar's Dottoro'ta programme is delivering e-health and telemedicine services to rural areas.

Makassar is making bold moves to partner with the private sector to encourage capital investment in the city and accelerate growth. Toward this end, Makassar established the first Public-Private-Partnerships Investment Centre (MPI Centre) in Indonesia in 2015.²⁹ It has also inked Memoranda of Understanding with a Singapore government agency, IE Singapore (now Enterprise Singapore), to expand opportunities in smart city solutions.



↑ **Fig. 40:** The majority of the smart city projects among ASCN cities are in the health and well-being domain



↑ **Fig. 41:** Nay Pyi Taw, Myanmar's new capital, is building high quality affordable housing.

CLC's survey of the ASCN cities highlighted that the health and well-being sector is the most dominant category of projects currently being undertaken by the ASCN cities. As the ASEAN countries grow in prosperity, investments in housing, healthcare and education will naturally increase, allowing also for the deployment of smart technologies to maximise the reach and efficiency of such services. Partnerships between governments, the private sector and civil society groups are key to delivering innovative and appropriate services.

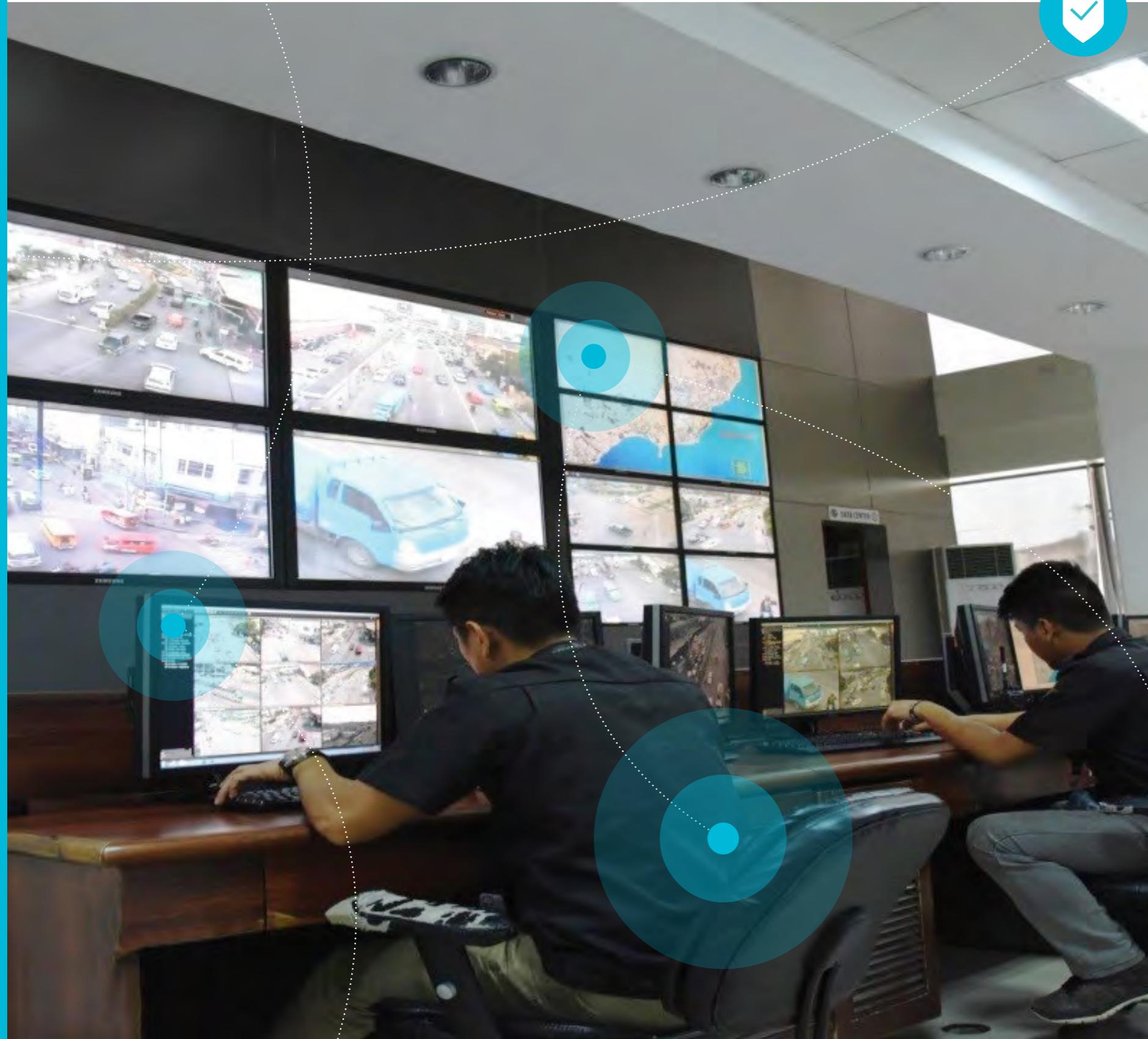


Development Focus Area Safety and Security

As ASEAN develops, the liveability of its cities rests on their ability to tackle the age-old and vital challenge of security and safety. A secure environment is also critical to cultivating investor confidence to fuel the region's economic growth.

In addition to traditional security challenges, the ASEAN countries face non-traditional security threats, such as the natural disasters arising from climate change. ASEAN also faces the threat of international as well as home-grown terrorism arising from the spread of radical ideas through the Internet.³⁰ An increasingly ominous challenge that ASEAN confronts today is that of cybercrime and cyberattacks. The growing pervasiveness of internet use in ASEAN and rapid digitalisation will increase the region's vulnerability to such cyber threats. If left unchecked, cyberspace can be abused to facilitate illegal cross-border transactions and become a conduit for radicalisation.³¹ Securing the region from cyber threats will be especially critical to ASEAN's economic growth, considering one projection that ASEAN's digital economy can potentially increase regional GDP by \$1 trillion over the next decade.³²

← Fig. 42: Davao City's Public Safety and Security Command Centre (PSSCC).



Many of the security threats that the ASEAN states face are transnational and cannot be confined within the borders of individual states. A collective effort is thus necessary to combat security threats, in both the real and virtual worlds.

As the ASEAN countries develop smart solutions in various domains, there are also opportunities for the development and deployment of smart security countermeasures. At a city level, smart technologies can help to boost city-wide surveillance capabilities and create comprehensive real-time information channels to combat pressing security threats. A key strategy for many cities is to ensure integration and interoperability between systems. This allows cities which are just beginning to build technological capabilities to expand and improve on the same platforms to ensure system security and continuity.



↑ **Fig. 43:** Ho Chi Minh City is improving its traffic safety through intelligent transport systems and policies

Smart City Roll-Outs

Many ASEAN cities are embarking on projects to strengthen their overall security capabilities. A common trend is for cities to build upon existing CCTV surveillance systems and emergency hotlines, expanding their coverage and integrating their feeds into comprehensive, unified systems and centres.

Traffic safety and security is another fundamental challenge that ASEAN cities are tackling; Ha Noi, Da Nang, Davao City, Cebu City and Mandalay are undertaking efforts to address this. Through integrated data platforms and traffic sensors, the cities plan to enhance traffic management capabilities, reduce congestion and make traffic flows smoother. Cebu City is adopting technology such as sensors, monitoring equipment and database infrastructure to support the operation of an intelligent traffic control system, improve traffic regulation enforcement and information collection and sharing, thereby also enhancing public safety. The solutions developed will be integrated with other security management systems.

ASCN CITY HIGHLIGHT



Davao City

Converged Command and Control

In the field of safety and security, Davao City is one step ahead of most other cities in the Philippines. It is the only city in the country to have an established Public Safety and Security Command Centre (PSSCC). The PSSCC oversees all undertakings related to safety and security, enabling a high level of coordination and resource efficiency. It takes the reins where incidents extend beyond the usual capacity of individual agencies, ranging from public advisories on unscrupulous characters to city-wide earthquake and tsunami responses. This provides a good foundation for Davao City to reach its goal: a reduction of the crime rate to 10% through the use of modern information technology.

To achieve this goal, the PSSCC adopts a variety of technological capabilities, including a city-wide CCTV surveillance system and real-time data mapped out in GIS. This data is obtained from Central 911 operations, including emergency calls and deployment of responders. Traffic safety also forms part of the PSSCC's responsibilities, with all traffic cameras and signalisation systems coming under its purview. Additionally, the PSSCC is plugged into the Interpol's I-24/7 database through the Philippine Centre on Transnational Crime (PCTC), allowing it to respond effectively to international threats.



→ **Fig. 44:** The Davao City Public Safety and Security Command Centre (PSSCC) is situated in close proximity to emergency departments.

Even so, Davao City is not complacent about its security. The city is driving the development of a Converged Command and Control (CCC) solution, leveraging the already extensive coverage of the PSSCC. Envisioned as an upgrade to the PSSCC, this will improve the collection and sharing of information among different systems. Notably, the PSSCC will be enabled to link easily with other agencies within the city government to obtain near real-time, if not real-time, information from them. By 2021,

surveillance coverage will be expanded, with all key facilities and traffic intersections being monitored by CCTV. These measures will provide critical support in the planning and implementation of mitigating responses to safety and security concerns.

The CCC solution comes with a host of technological upgrades to improve the intelligent and automated capabilities of various systems. In particular, Davao City is exploring the use of video data analytics and management systems, unified communications systems and a unified open platform. Amidst the influx of new technologies and components, the city seeks to maintain the interoperability and integration of all systems within the field. It also hopes for the solution to be readily scalable and adaptable to deal with evolving circumstances and threats.

Davao City has since taken concrete steps to bring its vision to reality. The city has tapped partnerships with local and international entities to obtain funding to develop tangible solutions based on its needs. This process also involves the support of experts from companies such as IBM and Huawei.



Ho Chi Minh City Intelligent Operations Centre (IOC) and Integrated and Unified Emergency Response Centre

Ho Chi Minh City, the largest city in Viet Nam, has made a strong start in its smart city development journey. Its smart city strategy and roadmap (spanning 2017–2020) is well into its first phase and has as its key aim the building of the infrastructure and technology necessary to harness data.

One of the city's goals is to improve emergency response times through access to real-time information. To achieve this, there is a need to solve the more fundamental challenge of data accessibility and integration. For a city as large as Ho Chi Minh City, it remains a challenge to gather datasets from all sectors in the city and to ensure that the data is interoperable, especially when governed by different agencies. Thus far, many information and communication applications have been developed for domain-specific processes, such as transportation, public security, healthcare and education. However, these reside within different government agencies and are not yet linked, resulting in data being collected in segregated databases with inconsistent formats.

To overcome this resource inefficiency, two smart city development projects have been commissioned: an Intelligent Operations Centre (IOC) and an Integrated and Unified Emergency Response Centre.

Envisioned as the “brain” of the city, the IOC will gather data from numerous physical and virtual touchpoints, including city-wide CCTV systems and government operation centres. The subsequent consolidation of data within a single operations centre could improve the availability and accessibility of multi-dimensional information sets. In particular, the IOC will be able to provide real-time information about the city and even perform analysis and forecasting based on current conditions. This would allow executive leaders in the city to make better informed decisions when dealing with cross-cutting issues.

One application area is in improving safety in the city and providing the quickest response possible during emergencies. This can be done by coordinating and integrating the existing three different Emergency Services, each served by a separate emergency hotline, namely, reporting on security issues and disruption to public order; fire-fighting and prevention and search and rescue; and emergency medical services. To this end, the city plans to gather these disparate functions into an Integrated and Unified Emergency Response Centre, allowing for closer communication and cooperation between the Emergency Call Centre and the Emergency Unit Dispatcher.

The Unified Emergency Response Centre will include upgraded features such as automated location and caller identification, GIS for resource management and operation, and an integrated video surveillance system. By 2020, the completed organisation structure and response mechanism is expected to effectively connect the individual command centres.

Ho Chi Minh City has placed priority on technologies and platforms that are receptive to future upgrades and expansions, providing flexibility to improve the projects even during and beyond the implementation stage.

ASEAN's appetite for rapid growth and urbanisation must be supported by consistent efforts to combat evolving security threats. The era of digitisation brings both opportunities and new challenges that increasingly demand the region's attention as a whole. Therefore, ASCN cities must ensure that their systems can adapt to both physical and virtual threats, including those from external sources, and are able to respond to them in the quickest and most effective manner.



Development Focus Area Quality Environment

A quality environment with sustainable and well-managed natural resources is instrumental to individual health and well-being, and to the sustainability and liveability of any city. ASEAN is rich in natural resources. ASEAN alone hosts four out of the world's 34 biodiversity hotspots and three mega-diverse nations, offering invaluable ecosystem services to the cities and their people.³³ Vast river catchments provide ASEAN cities with freshwater resources and development opportunities for industries, agriculture and aquaculture.

ASEAN is also prone to natural disasters. The situation has been exacerbated by climate change, urbanisation and inadequate spatial planning, leading to the increasing frequency and intensity of extreme flood and drought events in the region. From 2000 to 2015, ASEAN suffered economic losses of US\$91 billion as a result of natural disasters.³⁴ Among these, water-related risks and disasters are the most prominent. Thailand suffered over US\$45 billion in economic loss and damage as a result of the prolonged, nation-wide flood in 2011.³⁵ Water demand in the region is expected to rise by one third by 2025, and to double during the latter half of the 21st century, leading to chronic water stress and insecurity across the region.³⁶

← **Fig. 45:** Singapore's Gardens by the Bay applies environmentally-friendly technology and sustainable natural resource management to realise the city's paradigm shift from a "Garden City" to a "City in a Garden".

As the region continues to urbanise, it is important to recognise that urbanisation can only be sustainable if the quality of the environment is addressed. A quality environment strengthens a city’s resilience against the damages wreaked by natural disasters such as floods and chronic resource stresses such as from droughts. The collective efforts of governments, industry and the people are critical for formulating and effectively implementing sensible policy instruments and resource management plans.



↑ **Fig. 46 and 47:** The rapid development of cities such as Da Nang and Siem Reap has made it necessary to adopt smarter waste management systems to ensure that their heritage value and environmental quality are retained.

Smart City Roll-Outs

The smart city mission is about using technology to overcome the challenges of environmental degradation and resource depletion. With the advent of sensors, remote surveillance, and digital platforms, cities are able to better monitor their natural environment, and, more importantly, increase public awareness towards achieving a quality environment.

Water management stands out among the Smart City Action Plans of the ASEAN cities. Bandar Seri Begawan is committed to restoring the water quality of Brunei River through an institutional framework that promotes sustainable waste management practices. Vientiane aims to enhance its resilience against flooding with a drainage system integrated into its master plan and socio-economic development plans. Kuching, a riverfront city located in a low-lying area prone to flooding, has plans to use alerts, sensors and monitoring devices to assess and coordinate efforts through an Integrated Flood Management and Response System. It has also installed infrastructure that will ensure the fast flushing of overflow

into the sea. To improve water security holistically and at lower operational cost, Da Nang city and Siem Reap are planning for Smart Water Management systems that incorporates water supply, drainage and waste water treatment processes.

Luang Prabang and Johor Bahru are both working on strategic directions to improve the quality of their environment and resources. Their efforts are detailed in the box stories that follow.

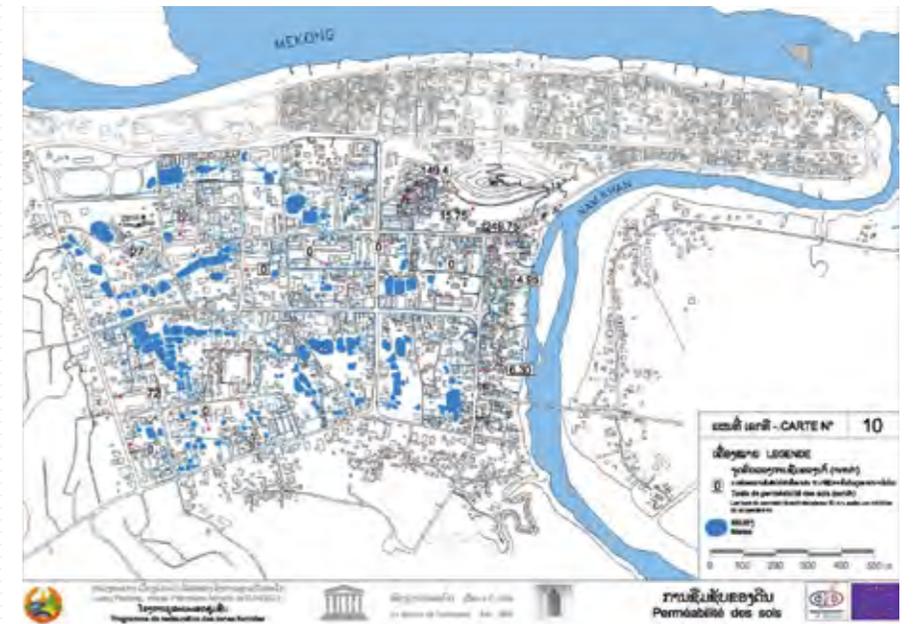
ASCN CITY HIGHLIGHT



Luang Prabang
Heritage Wetland Restoration for City Green Spaces and Habitats

Situated at the confluence of the Mekong and the Nam Khan rivers, Luang Prabang is blessed with 183 ancient wetlands and small ponds. Besides providing important habitats for biodiversity, which is crucial for food production, these wetlands offer protection against flooding in the city.

Today, however, the wetlands are under tremendous pressure from rapid urbanisation in Luang Prabang, with only 20 of the wetlands and ponds rehabilitated. Untreated domestic sewage and solid waste pollute the ponds. Adding to these problems is encroachment by ill-regulated construction activities that concretise ponds or disrupt natural drainage systems.³⁷ The degraded wetland environment has a detrimental effect on the residents’ quality of life and threatens to compromise future water sources for the city, while also subjecting the city to tremendous flood risk during monsoon seasons. The degradation will also have a negative impact on the growing tourism industry.



→ **Fig. 48:** Map showing the 183 wetlands and ponds in the city centre of Luang Prabang.

Luang Prabang is working towards a Master Plan for Urban Drainage and Sewage System to improve the drainage situation, reduce water pollution, enhance the capacity of the wetlands to provide ecosystem services and boost the storm water retention capacity. With efficient drainage, rainwater can be quickly drained off the surface in times of heavy rain and stored in the wetlands, arresting the problem of inundation.



←
Fig. 49: Luang Prabang has remarkably preserved its biological, architectural, religious and cultural heritage within its ancient wetlands.

←
Fig. 50: A restored wetland project in Luang Prabang to support tourism.

The application of smart systems can turn challenges into opportunities. Through this project, the city plans to collect extensive data using sensors and other remote surveillance methods to closely monitor the conditions of its wetland landscape, such as water levels and extent of urban development. It also intends to harness GIS solutions to better inform planning decisions.

A clean and enhanced wetland landscape will offer tremendous opportunities to enhance local ecological diversity and develop eco-tourism. Luang Prabang has plans to connect the wetlands with walking trails to provide comfort and ease to tourists and residents alike.

For the project to be successful in the long run, it has to go hand in hand with solutions that target upstream pollution sources, such as sewage treatment and solid waste disposal systems, and stronger enforcements of building regulations. Considerable capital is also required to acquire the wetlands from individual owners for rehabilitation. With support from industry and sponsors, Luang Prabang can continue to develop in a manner that is sensitive to its rich environmental heritage.



Johor Bahru Integrated Urban Water Management Blueprint

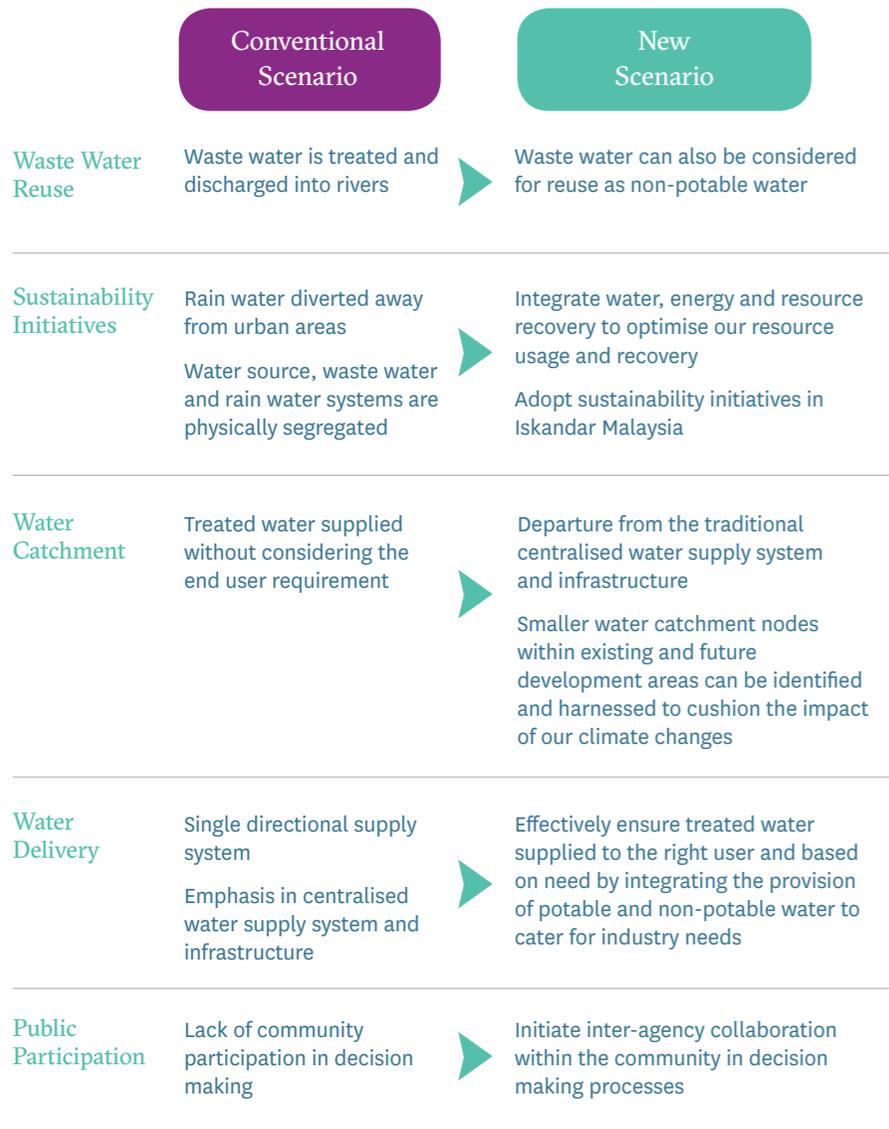
Johor Bahru, a major city within the Iskandar Malaysia economic region, is attracting significant investments in the industrial and commercial sectors, with visions of becoming an international metropolis. New development projects are being introduced continuously. In the meantime, Johor Bahru's population is projected to grow from 1.5 million in 2010 to 2.14 million by 2030.³⁸ Rapid urbanisation has increased water demand for domestic and industrial consumption, which is putting strains on the existing water infrastructure and supply capacity.



→
Fig. 51: Johor Bahru is developing integrated solutions for its water resources.

Additionally, global weather changes have accelerated the water-related problems within the Iskandar Malaysia region. Increasingly, rainfall is observed to fall downstream of the water treatment plants.³⁹ During the dry seasons of 2016 and 2017, the water buffer in the reservoirs supplying the region fell to an extremely unhealthy level of about 5–8%. The 2015 episode of water shortage and rationing along the Iskandar Reservoir supply pipeline highlighted the risk of a greater systemic failure and inadequacy of current measures.

Johor Bahru is re-examining its water management strategies, with an Integrated Urban Water Management (IUWM) Blueprint to comprehensively manage and plan its water ecosystem, strengthening the city's resilience against changing weather patterns and shocks to its water supply.



First, the blueprint aims to explore feasible alternative water supplies for the city. The new system envisions waste water reuse for non-potable needs, using groundwater and water transfer from other catchments, a decentralised water catchment system for rainwater harvesting, and a needs-based water provision system that integrates potable and non-potable uses. With these alternative sources, the city aims to increase its water reserves by 20% all year and reduce its over reliance on surface water.⁴⁰

Second, the blueprint aims to cultivate greater awareness of water sustainability and behavioural change among individuals and firms. With smart water management systems, users can monitor their water usage in real-time through end devices, developing awareness of their consumption patterns. It will also involve upgrading the water infrastructure to improve water conservation.

←
Fig. 52: A comparison between the existing water management system and the envisioned Integrated Urban Water Management concept.
Source: Iskandar Regional Development Authority

Third, the blueprint recognises that effective execution of the project will rely on an enabling environment, appropriate use of management instruments and support from institutions. One potential project identified by the city makes use of integrated GIS-based monitoring and data analytics tools to facilitate timely and informed decision-making on water resource management, such as identifying potential industry locations and need for water infrastructure investments.

Progress has been made. Old cement asbestos pipes have been progressively replaced to reduce water loss since 2005.⁴¹ The city government has made plans to channel water from Sungai Lenggong to the Congkok Dam to address shortages.⁴² It is also currently doing a feasibility study⁴³ of groundwater through tube wells as an alternative water source.⁴⁴

The next step, as the city has accurately pointed out, is to establish a comprehensive framework to bring together the concerted efforts of the federal and state water agencies, civilians and industries to tackle the issue in a holistic manner. The city is actively engaging with solution partners to deliver its ambitious programme.



← A quality environment builds the foundation for productive and sustainable economic development, and safeguards a good quality of life through ecosystem services and protection from the risk of natural disasters.



← **Fig. 53:** Kuching has built a barrage across its main river to address flooding issues
Fig. 54: Battambang has converted its riverfront to public space to address the problem of direct waste disposal into the river and associated flood risks.



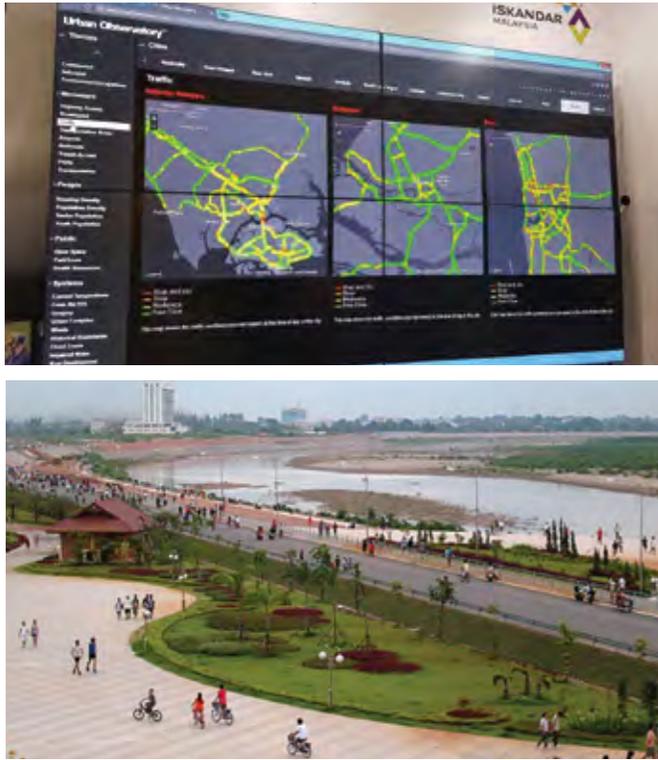
Development Focus Area Built Infrastructure

In 2025, it is expected that 231.8 million people or 62.6% of the ASEAN urban population will live in cities and urban centres with populations under 500,000.⁴⁵ The average annual rate of urbanisation in the region ranges from a rapid 4.9% in Laos to a moderate 2.3% in Indonesia, making ASEAN home to some of the largest and fastest growing cities in the world. To manage this rapid urbanisation and ensure that the growth of cities remains sustainable and inclusive, ASEAN needs to spend a vast amount on infrastructure, estimated at US\$60 billion a year.⁴⁶

With the advent of the 4th Industrial Revolution,⁴⁷ there is an opportunity for local governments to leapfrog development phases through technological innovations in urban planning (such as utilising geospatial tools in planning) and built infrastructure (such as using productivity-enhancing tools and resource-efficient building technology). McKinsey Global Institute found that construction is one of the least digitised industries. It estimated that if the productivity of the sector could be boosted, it could add a potential value of US\$1.6 trillion to the world economy.⁴⁸ Smart solutions could potentially contribute significantly to the productivity of the construction sector.

Given this landscape, there are opportunities for ASEAN to address the challenges brought about by rapid urbanisation, including urban sprawl, congestion woes, and water shortage problems. The effects of these challenges are not only detrimental to economic development, but also to the environment and the quality of life of residents.

← **Fig. 55:** Manila is highly populated and is addressing its infrastructure needs to improve its sustainability and liveability.



“We focus first on improving basic infrastructure, such as water, drainage and roads, then on new modes of infrastructure such as bus rapid transit system to improve public transportation. We then look at the “smartness” of that infrastructure as added value to the services... I think for a government, we should not get distracted by trying to provide a smart city and forget about basic infrastructure.”

Puan Maimunah Jaffar, Head of Planning and Compliance, Johor Bahru, and CSCO, Johor Bahru

← **Fig. 56:** Johor Bahru has built the Iskandar Malaysia Urban Observatory to leverage sensors and data to improve transparency in tracking development and facilitate better decision-making.

Fig. 57: Vientiane is aligning its transport plan with its Master Plan to improve overall mobility and accessibility for its residents.

the same time, to make the efforts more sustainable, the city is looking at the potential for income generation for the people and government from this integrated waste management system.

Effective management of energy transmission and distribution to avoid power disruptions is important for economic productivity and quality of life. Chonburi aims to use its smart grid project towards becoming a self-reliant, energy-efficient city, using renewable energy sources. The project will entail the management of electrical networks, generation systems, transmission systems and power distribution systems, with a systematic energy management and energy storage structure.

One of the major implications of urban sprawl is that it can lead to insufficient public transport infrastructure and services. As a result, a substantial proportion of people in ASEAN cities rely on personal vehicles to commute, leading to congestion woes. For example, the average number of hours that a commuter spends in traffic per year in Bangkok and Jakarta is estimated to be 64 and 63 hours respectively.⁴⁹ More significant is the associated economic cost of congestion. In the case of Indonesia, the total time-related cost of commuting in Indonesian cities is currently

Smart City Roll-Outs

Several cities in ASEAN have embarked on the use of technology in built infrastructure to address their urban challenges.

Collecting and analysing vast amounts of data is increasingly necessary for more informed decision-making and planning. Kuala Lumpur has sought to improve its competitive edge by setting up the KL Urban Observatory, which will collate, update and disseminate social, economic and physical data for planning purposes. Johor Bahru, too, hopes to better inform policy, improve government transparency and monitor development targets with its new Urban Observatory. In the third quarter of 2018, Johor Bahru secured funding from and partnered with the UK Foreign Commonwealth Office for the development of this project.

Battambang, Siem Reap, Kuching and Mandalay are interested in turning their cities into clean, green and liveable cities with sustainable waste management. Kota Kinabalu aims to implement an integrated waste management system from collecting to processing solid waste so as to reduce the generation of waste and toxic emissions from its landfill. At



↑ **Fig. 58:** Kota Kinabalu has developed its 2030 Sustainable Transport Plan, which is to build Bus Rapid Transit (BRT), Light Rail Transit and Bus Lanes.

Fig. 59: Cebu City has plans to deliver its first 15km of BRT by 2021 to provide efficient intra-city mass transportation.

estimated at IDR 498 trillion (US\$37 billion) per year and could increase by over 41 percent in 2020.⁵⁰ To help speed up the development of solutions to the congestion problem, Jakarta has made use of technology to share transport data among all stakeholders, including transport operators, systems providers and citizens.⁵¹

Kota Kinabalu and Kuala Lumpur, too, hope to address congestion and pollution. Kota Kinabalu is working towards a more integrated public transport system. Kuala Lumpur is building infrastructure for convenient and safe commutes for pedestrians and cyclists. This will also contribute to healthier lifestyles. The city is committed to implementing 11 km of cycling lanes through the city centre and is working with private bike-sharing programmes to give added options to residents.

The case of Phnom Penh below illustrates one way that cities in ASEAN are using technology to improve public transport services.

ASCN CITY HIGHLIGHT



Phnom Penh Towards a well-balanced transportation system

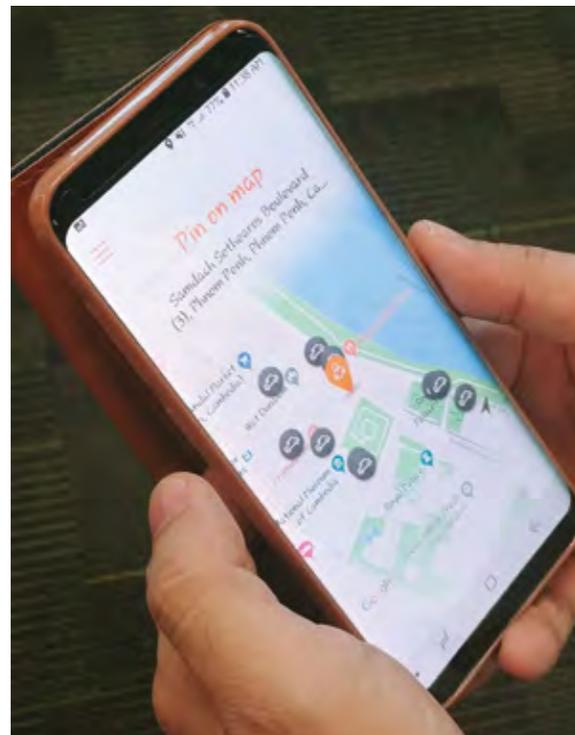
Phnom Penh is Cambodia’s capital and its most populous city. It has witnessed significant urban growth over the past 10 years, with a population now close to 2.8 million residents. The World Bank has identified public transport as one of the city’s urban challenges.⁵² Congestion on the streets of Phnom Penh cost the city an estimated US\$6 million per month in 2015.⁵³

In 2014, Phnom Penh developed the Urban Transport Master Plan 2035 with the support of the Japan International Cooperation Agency (JICA).⁵⁴ The plan is aimed at creating a well-balanced system of public and private transport, with a combination of road, public transport and traffic management, to cater to a projected population of 3 million people by 2035.

A pilot social experimentation project of an 8.5 km public bus service was started in 2001. Today, the bus service provider in Phnom Penh City (City Bus Autonomous) has more than 100 buses, serving 11 routes in the city centre and suburban areas, with an average of 21,000 passengers daily. Public bus service first started in 2015, when the government established the Autonomous Bus Transportation Authority. The goal is for 50% of Phnom Penh’s citizens to choose public transport by 2025.



←
Fig. 60: Phnom Penh is looking to collaborate with public transport stakeholders, including ride-hailing companies, to deliver better mobility options.



←
Fig. 61: Like most of ASEAN, Cambodian cities have embraced e-hailing apps not only for car rides, but also rides involving other motorised vehicles such as *tuktuk* and *motodops*.

As the public bus service grows and covers more areas in the city, there is a need to facilitate the fare payment. Under a partnership between Phnom Penh’s Autonomous Bus Transportation Authority, Wing Specialised Bank and ACLEDA PLC Bank, Phnom Penh developed the City Bus Card in June 2018, which enables electronic payment for the city’s existing eight routes.⁵⁵ There are two types of cards, catering to the needs of various groups. The green card, priced at US\$1, is for general commuters while the blue card allows 180 free rides per top-up for students, the elderly, monks, factory workers, people with disabilities and children under 1 m in height.



→
Fig. 62: Phnom Penh is improving its historic boulevards to improve access and recreation options for pedestrians.

Phnom Penh also has implemented other modes of public transportation. A tramway runs from the city centre to Phnom Penh International Airport. Six water taxis, each with a capacity of 54, ply a distance of 25 km along the Tonle Sap and Tonle Basac rivers linking Prek Phnov (northern part of Phnom Penh) and Takmo (southern part of Phnom Penh). Residents in Phnom Penh can also hail *tuk-tuk* (auto rickshaw) rides through the PassApp Taxi app and taxis through the Grab app.

As part of Phnom Penh’s efforts at creating a smart and sustainable living environment, a pedestrian walk-way for people with disabilities will be built in the city centre under a pilot project, “11 sidewalks Rejuvenation Project”. Phnom Penh also aims to plant 58,860 trees on 38 roads covering a distance of 35 km within three years. A smart lighting project by Minebea Mitsumi of Japan in three main boulevards in the city aims to save energy through wireless dimming control.



↑ **Fig. 63:** Many ASEAN cities, such as Singapore, are integrating cycling infrastructure into sustainable transport plans.

Cities need to evolve their built environment to meet the changing needs of their populations. Infusing smart solutions in built infrastructure can meet these changing needs while also allowing room for private sector innovation and public-private partnerships. Smart solutions can make cities more productive and liveable.



Development Focus Area Industry and Innovation

Innovation is at the heart of ASEAN's smart cities mission as cities use technology creatively in master planning, building infrastructure, managing environmental challenges, delivering essential services to the people, creating economic opportunities, and making urbanisation sustainable. Innovation is also key to the growth, competitiveness and sustainability of industry. It is thus no wonder that Singapore chose "Resilient and Innovative" as the theme of its 2018 ASEAN chairmanship.

The ASEAN region is situated at the confluence of trade routes, with US\$5.3 trillion of global trade passing through each year.⁵⁶ Beyond the exchange of goods, ASEAN is a region with an active exchange of ideas, bolstered too by its multi-ethnic, multi-lingual and multi-cultural communities. While internet penetration in the region is still uneven, connectivity via mobile phones has grown phenomenally. The region has 144.9 mobile phones per 100 persons, which is higher than the United States or Europe, at 123 and 124 per 100 persons respectively.⁵⁷ The high mobile phone penetration rate is particularly noticeable in countries such as Myanmar, where it has grown from 0 just 10 years ago to 95% today.⁵⁸ This growth has triggered changes in how people move, communicate and live.

← **Fig. 64:** Kuala Lumpur has a target of increasing its share of low carbon buildings to 60% by 2030, by innovating in green building technologies.

The relative youth of the ASEAN population and high connectivity suggest that that the region has the potential to capitalise on transformative technologies to improve productivity and competitiveness. Some of the elements to strengthen this development focus area include initiatives for improving business and entrepreneurship, trade, education and upskilling, technology incubation and integrated business research, as highlighted in the ASEAN Smart Cities Framework.

Smart City Roll-Outs

ASEAN residents, businesses and governments are embracing digital technologies, leveraging them for economic and social advancement.

In Jakarta, for example, smart city initiatives include a goal of creating 200,000 new jobs by 2022. This is to be achieved by

- i. linking research institutions and businesses in the hope that breakthroughs achieved by research institutes are developed into business ideas;
- ii. linking graduates with job opportunities, and
- iii. linking entrepreneurial candidates with skills and financing options.

For the latter, the efforts have even attracted international partnerships, including the setting up of Block71, a 1,500m² entrepreneur hive in South Jakarta, set up by the National University of Singapore and Indonesia's Salim Group.⁵⁹

Banyuwangi has created a digital marketplace to support micro, small and medium businesses. Banyuwangi-mall.com serves as a platform for these enterprises to market their products and to extend their reach beyond the city.

Other initiatives have been focused on increasing the sustainability and viability of the tourism industry. Siem Reap is looking at a Smart Tourist Management System to assist in handling the increasing number of tourists who visit the city and affect local residents' amenity. Similarly, Phuket, where the tourism industry contributes to 97% of GDP, is looking at smart solutions so that it can continue to be a tourist paradise.

“Cities are complex ecosystems of people, businesses and infrastructure, and the environment binds them together. The ASCN can help to stimulate and catalyse greater collaboration and connectivity within and among ecosystems for a better world across ASEAN.”

Sam Wong, EY Asean Government and Public Sector Leader, Ernst & Young Solutions LLP



↑ **Fig. 65:** Myanmar's rapid mobile phone penetration has made cities such as Mandalay much more connected and accessible.

Fig. 66: Bangkok's mass rapid transit will serve both the new regional centres of Bang Sue and Pahonyothin.

ASCN CITY HIGHLIGHT



Phuket

Enhancing tourism via Big Data and analytics

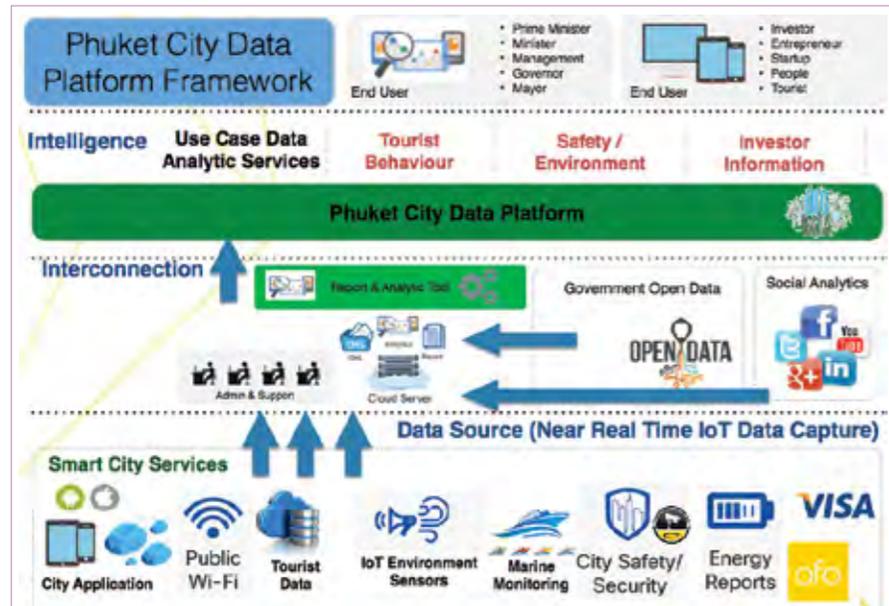
Phuket, an island of 543 km², has a resident population of just under 400,000. The city, however, hosts up to 8 million tourists annually. Catering to the regular influx of tourists has affected the quality of life and the environment of residents and tourists alike. With a goal of increasing tourist numbers to 13 million, efforts are being made to ensure that the tourist industry can grow without detriment to the island's liveability.

Toward this end, the Thai government, under its Digital Thailand 4.0 policy, launched Phuket as its first smart city. It established the Phuket Smart City Vision aimed at boosting tourism, safety, education, healthcare, governance, environment, and the economy. Among its key goals are enhancing the civic and social aspects of tourism to enhance residents' and tourists' experiences, promoting trade and commercial activities, and enhancing security to reduce crime rates.



→ **Fig. 67:** Key elements of Vision Phuket Smart City 2020.

One of its key projects is the City Data Platform, a data integration and analysis platform. The platform aims to understand tourist behaviour collected from Wi-Fi, the Internet-of-Things (IoT) sensors, wristbands, GPS, and social media. For example, data collected on demography and popular locations of tourists as they connect to the free public Wi-Fi is used to ensure their safety. Likewise, data collected from sensors in trash bins can facilitate efficient waste removal and also contribute to understanding the consumption patterns of users. The goal is to build Big Data that can aid the city in more efficient and accurate planning of infrastructure, public utilities, common amenities, etc. To encourage innovation, desensitised and anonymised data will be released as open data to provide valuable insights to businesses and startups.



← Fig. 68: Phuket's City Data Platform uses big data to aid city administration and businesses in planning and decision-making.



← Fig. 69: Phuket's Eagle Eyes project uses CCTV to enhance public and tourist security.

Another key project is the Phuket Eagle Eyes project, which was created to improve safety. Phuket aims to maximise security coverage by incorporating the city's own network of more than 1,000 CCTVs with those of private businesses to make the network more comprehensive. Businesses which cooperate in the project will have access to the pooled data.

Other smart city projects in the works include those to diversify energy sources and enhance the safety of beaches and divers, as well as smart mobility options. Together, these will provide the positive impacts that will ensure Phuket remains a tourist paradise.

Smart solutions are also being applied to improve efficiency and reduce costs for businesses and consumers alike. Jakarta is looking to improve its public transport experience, reduce congestion and reduce travel time in a number of ways, including through the introduction of the OK-Otrip cashless public transit ticketing system. This is an integrated system whereby passengers pay a single fare to take any number of rides to their destinations within a duration of three hours.

The current level of chronic congestion in Jakarta is costing approximately US\$4.48 billion annually, equivalent to 3.3% of Jakarta's GDP in 2015.⁶⁰ Therefore, any improvements in this space would have a positive impact on productivity. Singapore, already reaping the benefits of cashless public transportation, is hoping to extend the productivity benefits of cashless payments to all transactions, as highlighted below.

ASCN CITY HIGHLIGHT

Singapore

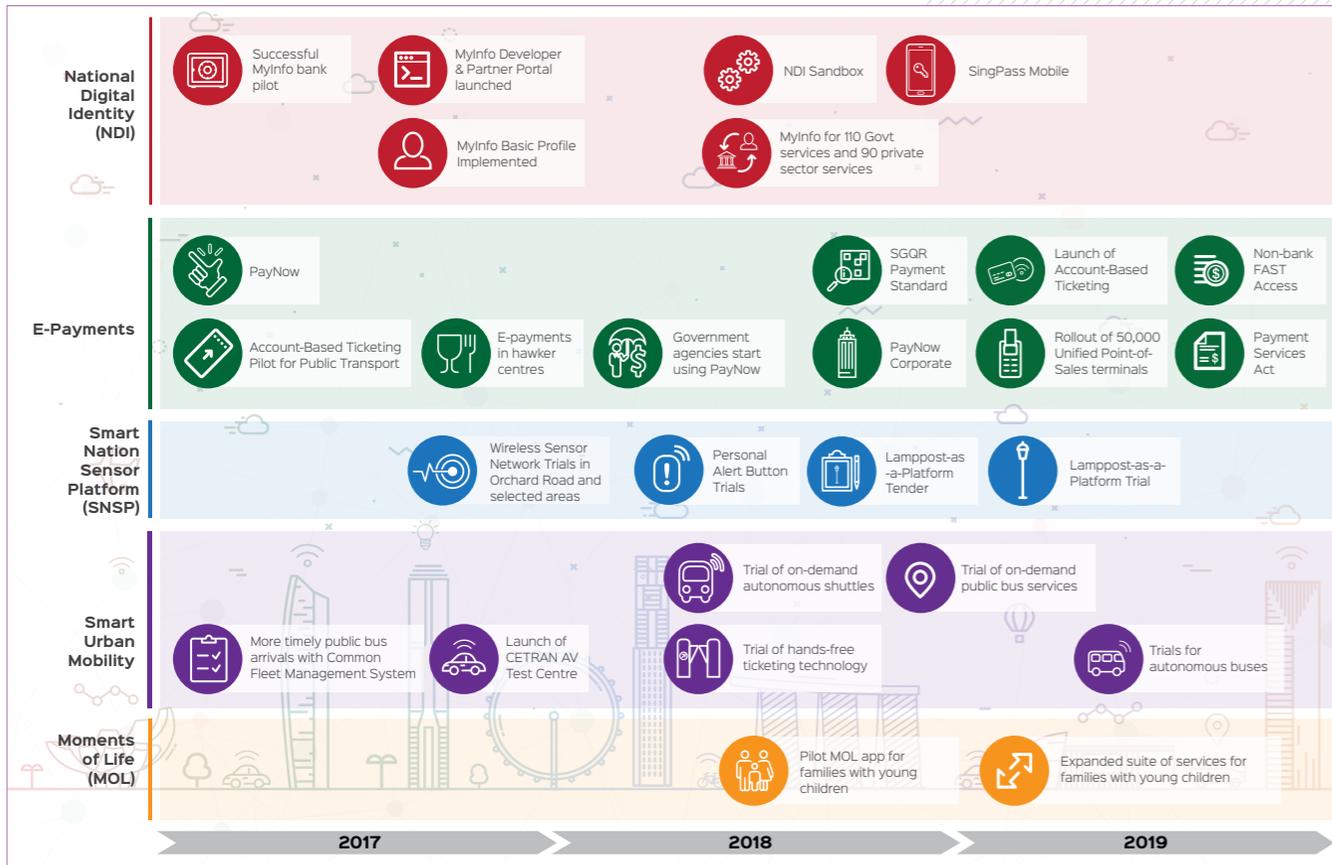
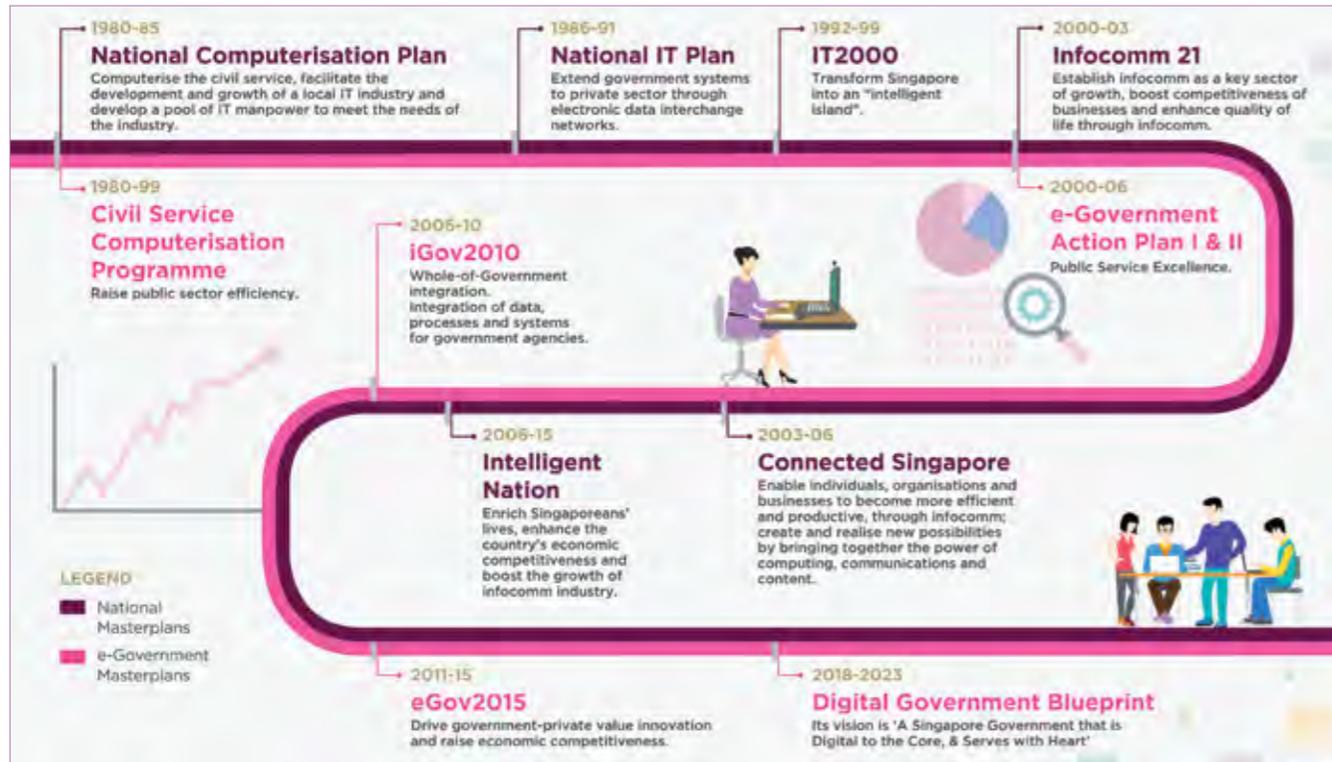
Promoting interoperability and raising efficiency through e-payments



Singapore's e-government journey began with the National Computerisation Plan in the 1980s. Since then, several key master plans, such as the IT 2000 Strategic Plan, iGov 2010, and eGov2015, were introduced to transform Singapore through digitalisation and promote innovation within the government and private sectors. Launched in 2014, the Smart Nation Initiative builds on the foundations of these key master plans and aims to bring convenience to improve people's lives, achieve efficiencies and effectiveness for enterprise, and create new economic opportunities in order to drive Singapore's growth and competitiveness.

To facilitate the adoption of digital and smart technologies throughout the economy and society, the Smart Nation initiative has identified six key Strategic National Projects (SNP)—National Digital Identity, E-Payments, Smart Nation Sensor Platform, Smart Urban Mobility, Moments of Life, and CODEX (Core Operations, Development Environment and eXchange).

The aim of the E-Payments SNP is to provide an open, accessible and interoperable national e-payment infrastructure that would facilitate secure, simple and seamless digital transactions. This would increase convenience and efficiency for citizens and businesses. In 2014, Singapore's banking industry launched FAST (Fast and Secure Transfers), a payment system that enables direct real-time transfers between consumers and businesses even across different banks. With FAST as the foundational infrastructure, PayNow was launched in July 2017 to do away with the need to know an individual's bank account number, enabling instant peer-to-peer transfers between customers of participating banks, simply by entering a mobile or personal identification number. This facility was extended to other organisations in August 2018 through PayNow Corporate, which allows businesses and government agencies to pay and receive funds instantaneously using a Unique Entity Number.



←
Fig. 70: Updated milestones for Singapore's strategic Smart Nation national projects.
 Source: "Technology and the City: Foundation for a Smart Nation". CLC Urban Systems Studies publication.
Fig. 71: Apart from e-Payments and National Digital identity, Singapore has adopted three other national projects under its Smart Nation initiative.

In addition, the Singapore government worked with industry players to launch the Singapore Quick Response Code (SGQR) standard in September 2018. SGQR combines multiple payment QR codes into a single QR code, preventing confusion and making mobile payments simple for both consumers and merchants. In 2019, financial technology (fin-tech) companies in the e-payments space will gain direct access to the FAST system. This will promote interoperability between e-wallets and bank accounts for greater convenience to consumers and encourage competition so that players in the e-payments ecosystem can continue to innovate and offer value-added services to stay ahead of the curve.

Looking forward, Singapore aims to explore cross-border collaborations and linkages for e-payment systems between the ASEAN nations. Detailed discussions are currently under way between Singapore and Thailand to make payments across countries using mobile numbers. It is hoped that this facility will eventually spread throughout ASEAN, reducing the cost of doing business within the region.⁶¹



↑ **Fig. 72:** Jakarta has adopted the OK Otrip card to improve efficiency in ticket payments and reduce travel times.



↑ **Fig. 73:** Singapore is addressing e-payment modes, standards and infrastructure to make transactions simple, swift, seamless, and safe.

Innovation applied to industry has the potential to bring economic prosperity. Prudent government policies which leave room for private sector innovation but also ensure that the benefits of innovation do not widen socio-economic gaps are key to ensuring more liveable and sustainable cities.



Next Steps for the ASEAN Smart Cities Network

ASEAN is a region brimming with potential. Its economies are among the fastest-growing anywhere in the world; its societies are vibrant, young and dynamic; and its people are adaptable and ambitious.

Whether ASEAN can truly fulfil its immense potential, however, and whether it can cement its strategic importance within the fast-evolving global landscape depends on how ready it is for the future. Just as the Industrial Revolution heralded a new world order, the ongoing digital revolution is poised to shake the foundations of our politics, economy and society—in ways we still do not, and perhaps may never fully grasp. If we are to turn disruption into opportunity, and ride the waves of technological change, we must find innovative ways to upgrade our infrastructure, modernise our systems and equip our people.

The ASEAN Smart Cities Network was established with this exact goal in mind.

In these pages, you have witnessed the humble first steps our cities are taking towards their vision for a smart, sustainable and liveable community. They have ventured into many different domains—such as healthcare, environment, education and public safety—each with its own priorities, needs and aspirations. Much work remains to be done, but now that we have arrived at a common framework for smart city development and laid out concrete action plans for our pilot cities, we have sturdy foundations to build upon. ASEAN's

← **Fig. 74:** ASEAN is diverse, and it is hoped that the ASCN will help establish interoperable systems that contribute to Community-building while working towards enhancing the region's liveability.

“With 90 million more people expected to move to cities in ASEAN to 2030, it is crucial that we find smart, sustainable solutions to city growth. The ASCN has an important role to play in making this happen.”

Dr Fraser Thompson,
Director, AlphaBeta



→
Fig. 75: Mandalay, with a population of under 2 million, is one of the many ASEAN “middleweight” cities forecasted to drive 40% of the region’s growth.

Fig. 76: Vietnam’s cities, like all ASCN cities, are leapfrogging conventional technologies and entering the era of Industrial Revolution 4.0.

→
Fig. 77: CSCOs speaking about the ASCN and its potential at the QS Singapore Management University event in October 2018.



External Partners have also launched an encouraging range of initiatives in support of our cities, and we have witnessed high-level statements of political support for the ASCN, such as the East Asia Summit Leaders’ Statement on ASEAN Smart Cities.

The ASCN is also in a unique position to function as a conduit to support and strengthen initiatives promoting smart and sustainable urbanisation in the region. The ASEAN Sustainable Urbanisation Strategy (ASUS), under the Master Plan on ASEAN Connectivity (MPAC) 2025, has identified priority areas and actions for sustainable urbanisation for cities within the ASEAN community. The ASCN will assist to disseminate the toolkits and insights developed under the ASUS and facilitate an inclusive environment that empowers member cities to develop viable smart and sustainable urbanisation projects.

The excitement in the network is palpable. We look forward to watching our cities’ priority projects take off in the next few years, and witness the ASCN’s evolution under the able leadership of our incoming ASEAN Chairs. We call upon all prospective partners—governments, private sector firms and multilateral institutions alike—to hop onboard this thriving and rapidly growing ecosystem. Our cities are eager; their details are easily accessible— all it takes is that first phone call or email. There are endless opportunities for mutually beneficial collaboration and, together, we can help shape ASEAN’s smart city landscape for the benefit of generations to come.



↑ **Fig. 78:** Bangkok has developed mass transit modes to improve access to its famed Chatuchak Park. ASEAN's incoming chair, Thailand, will host the next ASCN meeting in 2019.

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- Mr Fuad Shazly Salleh, Vice President, Planning and Compliance, Iskandar Regional Development Authority
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↑ **Fig. 79:** ASEAN Smart Cities Network team from Singapore's Ministry of Foreign Affairs and Centre for Liveable Cities.

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Appendix 1

ASCN Smart City Priority Projects and Contact Persons

CITY	CITY CONTACT PERSON	SMART CITY ACTION PLAN TOP 2-3 FOCUS AREAS	PRIORITY PROJECTS
BANDAR SERI BEGAWAN	 <p>Haji Ali Matyassin Chairman, Bandar Seri Begawan Municipal Department ali.matyassin@bandaran-bsb.gov.bn</p>	Civic and Social Industry and Innovation Health and Well-being	<ol style="list-style-type: none"> 1. Revitalising Kampong Ayer Floating City 2. Clean River Management Projects
BATTAMBANG	 <p>Soeum Bunrith Deputy Governor Battambang Province</p>	Civic and Social Quality Environment Built Infrastructure	<ol style="list-style-type: none"> 1. Urban Street and Public Space Management 2. Solid and Liquid Waste Management
PHNOM PENH	 <p>Seng Vannak Director, Administration vannak.seng@gmail.com</p>	Built Infrastructure Quality Environment Civic and Social	<ol style="list-style-type: none"> 1. 11 Sidewalks Rejuvenation Project 2. Improving the Efficiency of Phnom Penh's Public Transport Services
SIEM REAP	 <p>Ly Samreth Deputy Governor Siem Reap Province lysamreth@yahoo.com; soplatong168@gmail.com</p>	Civic and Social Safety and Security Quality Environment	<ol style="list-style-type: none"> 1. Smart Tourist Management System 2. Solid Waste and Waste Water Management
MAKASSAR	 <p>Ismail Hajjali Head of Communication and Infomatics Office, Agency of Makassar Government Information and Communication hajjali.ismail2@gmail.com</p>	Health and Well-being Civic and Social	<ol style="list-style-type: none"> 1. Improved Healthcare through Telemedicine 2. Integration of Online Tax Services
BANYUWANGI	 <p>Budi Santoso Head, Informatics, Communication and Encryption Department Banyuwangi Government budio404@yahoo.co.id</p>	Industry and Innovation Health and Well-being	<ol style="list-style-type: none"> 1. Spearheading Industrial Growth through Education 2. Creating Inclusive Economic Growth through Tourism-Based Development

CITY	CITY CONTACT PERSON	SMART CITY ACTION PLAN TOP 2-3 FOCUS AREAS	PRIORITY PROJECTS
DKI JAKARTA	 <p>Dian Ekowati Head, Communication and Informatics Office dianekowati@jakarta.go.id</p>	Industry and Innovation Built Infrastructure Health and Well-being	<ol style="list-style-type: none"> 1. Job Creation through Linking Research Institutes and Potential Entrepreneurs 2. OK O-trip Integrated Transit Cashless Payment
LUANG PRABANG	 <p>Soukan Bounnyong Mayor yenghervacha@hotmail.com</p>	Built Infrastructure Quality Environment Civic and Social	<ol style="list-style-type: none"> 1. Heritage Wetland Restoration for City Green Spaces and Habitats 2. Construction of Concrete Alleyways and Footpaths
VIENTIANE	 <p>Bounchan Keosithamma Deputy Director Public Works and Transport Department Vientiane Capital bkeosith1@hotmail.com</p>	Health and Well-being Quality Environment Built Infrastructure	<ol style="list-style-type: none"> 1. Establishment of Drainage System 2. Sustainable Transport Plan
JOHOR BAHRU	 <p>Maimunah Jaffar Head, Planning & Compliance maimunah@irda.com.my</p>	Civic and Social Quality Environment	<ol style="list-style-type: none"> 1. Iskandar Malaysia Urban Observatory (IMUO) Tool for Decision-making, Stocktaking and Measurement 2. Integrated Urban Water Management Blueprint
KUALA LUMPUR	 <p>Datuk Najib bin Mohamad Executive Director (Planning) tkpr@dbkl.gov.my</p>	Built Infrastructure Industry and Innovation Quality Environment	<ol style="list-style-type: none"> 1. KL Urban Observatory 2. Kuala Lumpur Pedestrian and Bicycle Lane
KOTA KINABALU	 <p>Stanley Chong Hon Chung Director, City Planning Department Dewan Bandaraya Kota Kinabalu stanleychonghonchung@gmail.com</p>	Built Infrastructure Quality Environment	<ol style="list-style-type: none"> 1. Integrated Public Transport System 2. Integrated Solid Waste Management
	 <p>Tantiny Fung Chew Li Town Planner, City Planning Department, Dewan Bandaraya Kota Kinabalu tantinyfung@hotmail.com</p>		

CITY	CITY CONTACT PERSON	SMART CITY ACTION PLAN TOP 2-3 FOCUS AREAS	PRIORITY PROJECTS
KUCHING	 Julin Alen Principal Assistant Director State Planning Unit, Chief Minister's Department, Sarawak juline@sarawak.gov.my	Built Infrastructure Quality environment	1. Smart Mobility—Integrated Smart Traffic Light System 2. Integrated Flood Management and Response System
NAY PYI TAW	 Myo Aung Permanent Secretary Nay Pyi Taw Development Committee myoaung.dda@gmail.com	Civic and Social Quality Environment Built Infrastructure	1. Affordable Housing and Low- cost Housing Project 2. International Comprehensive University
MANDALAY	 Ye Myat Thu Committee Member Mandalay City Development ynt.committee@mcddc.gov.mm	Safety and Security Built Infrastructure Civic and Social	1. Traffic Congestion Management 2. Solid Waste and Waste Water Treatment
YANGON	 Tin Tin Kyi Director, Urban Planning Division and Representative from Yangon City Development Committee tintinkyi86@gmail.com	Civic and Social Health and Well-being Built Infrastructure	1. Conservation of Yangon City Downtown Area 2. Low-cost Rental Housing and Transit-oriented Development
CEBU CITY	 Nigel Paul C. Villarete City Administrator paul@villarete.com	Safety and Security Built Infrastructure	1. Automated Citywide Traffic Control Systems 2. Bus Rapid Transit (BRT) System
DAVAO CITY	 Mgen Benito Antonio T De Leon Head, Public Safety and Security Command Center benito.deleon@davaocity.gov.ph  Rowena Henedine Dominguez-Narajos Information Technology Officer II rowena.narajos@davaocity.gov.ph	Safety and Security Built Infrastructure	1. Converged Command and Control Center 2. Intelligent Transport and Traffic Systems with Security

CITY	CITY CONTACT PERSON	SMART CITY ACTION PLAN TOP 2-3 FOCUS AREAS	PRIORITY PROJECTS
MANILA	 Mario Zapatos Oblefias Head, Electronic Data Processing Manila City Hall erapmail@gmail.com	Safety and Security Industry and Innovation Health and Well-being	1. Command Centre Upgrade 2. E-Education and E-Health
SINGAPORE	 Tan Chee Hau Director (Planning & Prioritization Directorate), Smart Nation and Digital Government Office TAN_Chee_Hau@pmo.gov.sg	Civic and Social Industry and Innovation	1. E-Payments 2. National Digital Identity
BANGKOK	 Chaiwat Thongkamkoon Director-General, Office of Transport and Traffic Policy and Planning cthongkamkoon@gmail.com	Built infrastructure Quality Environment Industry and Innovation	1. Transport Hub Development at Bang Sue Area 2. Smart City Plan of Pahonyothin Transport Centre
CHONBURI	 Seksan Phunboonmee Policy and Plans Analyst, Energy Policy and Planning Office, Ministry of Energy seksan@eppo.go.th	Built Infrastructure Quality Environment Industry and innovation	1. Smart Grid Plan 2. Waste-to-Energy Plant
PHUKET	 Dr. Passakon Prathombutr SEVP, Digital Economy Promotion Agency passakon.pr@depa.or.th	Industry and Innovation Civic and Social Safety and Security	1. City Data Platform 2. Phuket Eagle Eyes— CCTV Safe City based on Big Data Harvesting and Analytics
DA NANG	 Nguyen Quang Thanh Director, Da Nang Department of Information and Communications thanhnq@danang.gov.vn	Civic and Social Health and Well-being Built Infrastructure	1. Intelligent Traffic Control System 2. Smart Water Management

CITY	ASCO	SMART CITY ACTION PLAN TOP 2-3 FOCUS AREAS	PRIORITY PROJECTS
HA NOI	 <p>Nguyen Duc Chung Chairman, Ha Noi People's Committee vanthu@hanoi.gov.vn</p>	Safety and Security Built Infrastructure Health and Well-being	<ol style="list-style-type: none"> Intelligent Operations Centre (IOC) Development of Intelligent Transportation
HO CHI MINH CITY	 <p>Tran Vinh Tuyen Vice Chairman, Ho Chi Minh City People's Committee tranvinhtuyen@tphcm.gov.vn</p> <p>Le Quoc Cuong Deputy Director General, Department of Information & Technology lequoccuong@tphcm.gov.vn</p> <p>Vo Minh Thanh Ho Chi Minh City Department of Information and Communications vmthanh.sttt@tphcm.gov.vn</p>	Civic and social Built Infrastructure Quality Environment	<ol style="list-style-type: none"> Intelligent Operations Centre (IOC) Integrated and Unified Emergency Response Centre

Appendix 2

ASEAN Smart Cities Network

National Representatives and Chief Smart City Officers

COUNTRY	CITY/DISTRICT	NR/CSCO	NAME	DESIGNATION, ORGANISATION
BRUNEI	National	National Representative	Salminan bin Haji Burut	Permanent Secretary Ministry of Home Affairs
	Bandar Seri Begawan	Chief Smart City Officer	Haji Ali Matyassin	Chairman, Bandar Seri Begawan Municipal Board Ministry of Home Affairs
CAMBODIA	National	National Representative	Prum Sokha	Secretary of State Ministry of Interior
	Battambang	Chief Smart City Officer	Soeum Bunrith	Deputy Governor, Battambang
	Phnom Penh	Chief Smart City Officer	Nuon Pharat	Deputy Governor, Phnom Penh
	Siem Reap	Chief Smart City Officer	Ly Samreth	Deputy Governor, Siem Reap
INDONESIA	National	National Representative	Sumarsono	Director General for Regional Autonomy Ministry of Home Affairs
	Banyuwangi	Chief Smart City Officer	Budi Santoso	Acting Head of Communication Infomatics and Crypto Office
	DKI Jakarta	Chief Smart City Officer	Dian Ekowati	Head of Communication and Infomatics Office
	Makassar	Chief Smart City Officer	Ismail Hajiali	Head of Communication and Infomatics Office
LAO PDR	National	National Representative	Thongphane Savanphet	Deputy Minister of Foreign Affairs
	National	National Representative	Viengnam Douangphachanh	Deputy Director General Department of Housing and Urban Planning Ministry of Public Works and Transport
	Luang Prabang	Chief Smart City Officer	Soukan Bounnhong	Mayor, Luang Prabang City
	Vientiane	Chief Smart City Officer	Bounchan Keosithamma	Deputy Director of Public Work and Transport Department, Vientiane Capital
MALAYSIA	National	National Representative	Hajah Rokibah binti Abdul Latif	Director General, Federal Department of Town and Country Planning (PLANMalaysia)
	Johor Bahru	Chief Smart City Officer	Maimunah Binti Jaffar	Head of Department, Planning & Compliance, Iskandar Regional Development Authority (IRDA)

COUNTRY	CITY / DISTRICT	NR/CSCO	NAME	DESIGNATION, ORGANISATION
MALAYSIA	Kota Kinabalu	Chief Smart City Officer	Stanley Chong Hon Chung	Director, Town Planning Department Kota Kinabalu City Hall
	Kota Kinabalu	Chief Smart City Officer	Tantanny Fung Chew Li	Town Planning Officer City Planning Department Kota Kinabalu City Hall
	Kuala Lumpur	Chief Smart City Officer	Datuk Najib bin Mohammad	Executive Director (Planning) Kuala Lumpur City Hall
	Kuching	Chief Smart City Officer	Julin Bin Alen	Principal Assistant Director, State Planning Unit, Sarawak Chief Minister's Office
MYANMAR	National	National Representative	Myo Aung	Mayor of Nay Pyi Taw Development Committee
	Yangon	Chief Smart City Officer	Tin Tin Kyi	Director of Urban Planning Division and representative from Yangon City Development Committee
	Mandalay	Chief Smart City Officer	Ye Myat Thu	Committee Member of Mandalay City Development Committee
	Nay Pyi Taw	Chief Smart City Officer	Myo Aung	Permanent Secretary of Nay Pyi Taw Development Committee
PHILIPPINES	National	National Representative	Rolando G. Tungpalan	Undersecretary, National Development Office II—Investment Programming, National Economic and Development Authority
	National	National Representative	Jonathan L. Uy (alternate)	OIC Assistant Secretary, National Development Office II—Investment Programming, National Economic and Development Authority
	Manila	Chief Smart City Officer	Mario Oblefias	Programme Officer III
	Cebu City	Chief Smart City Officer	Nigel Paul C. Villarete	City Administrator
	Davao City	Chief Smart City Officer	Benito Antonio T. De Leon	Head of Public Safety and Security Command
	Davao City	Chief Smart City Officer	Rowena Henedine D. Narajos	Division Chief, Computer Equipment Maintenance & Systems Engineering (CEMSE)—City Information Technology Centre (CITC)

COUNTRY	CITY / DISTRICT	NR/CSCO	NAME	DESIGNATION, ORGANISATION
SINGAPORE	National	National Representative	Khoo Teng Chye	Executive Director, Centre for Liveable Cities, Ministry of National Development
	Singapore	Chief Smart City Officer	Tan Chee Hau	Director (Planning and Prioritisation) Smart Nation and Digital Government Office, Prime Minister's Office
THAILAND	National	National Representative	Chartchai Tipsunave	Permanent Secretary, Ministry of Transport
	National	National Representative	Ajarin Pattanapanchai	Permanent Secretary, Ministry of Digital Economy and Society
	National	National Representative	Thammayot Srichuai	Permanent Secretary, Ministry of Energy
	National	National Representative	Chaiwat Thongkamkoon (alternate)	Director of Office of Transport and Traffic Policy and Planning
	Phuket	Chief Smart City Officer	Nuttapon Nimmanphatcharin	President, Digital Economy Promotion Agency
	Chonburi	Chief Smart City Officer	Twarath Sutabutr	Director General, Energy Policy and Planning Office
VIET NAM	Bangkok	Chief Smart City Officer	Montean Attajunya	Director of Property Management Center
	National	National Representative	Nguyen Quoc Dung	Deputy Minister of Foreign Affairs and ASEAN SOM Leader of Viet Nam Ministry of Foreign Affairs
	National (Acting)	National Representative	Dương Hải Hưng	Deputy Director General ASEAN Department Ministry of Foreign Affairs
	Da Nang City	Chief Smart City Officer	Ho Ky Minh	Vice Chairperson, People's Committee of Da Nang City
	Ha Noi	Chief Smart City Officer	Nguyen The Hung	Vice Chairperson, People's Committee of Ha Noi City
	Ho Chi Minh City	Chief Smart City Officer	Tran Vinh Tuyen	Vice Chairperson, People's Committee of Ho Chi Minh City

Appendix 3

ASEAN'S External Partners

CATEGORY	COUNTRY
DIALOGUE PARTNER	Australia
	Canada
	China
	European Union
	India
	Japan
	Republic of Korea
	New Zealand
	Russia
	United States
SECTORAL DIALOGUE PARTNER	Norway
	Pakistan
	Switzerland
	Turkey
DEVELOPMENT PARTNER	Germany

Appendix 4

ASCN Solution Partners and Observers

SOLUTION PROVIDER
100 Resilient Cities
3M
ABB
Accenture
Acronis Asia Research and Development Pte Ltd
AECOM
Alibaba Cloud International
AlphaBeta
Amata Corporation Public Co. Limited
American Chamber of Commerce (AmCham)
Ant Financial
ARUP
Ascendas-Singbridge
Asian Development Bank (ADB)
ATKINS
Aurecon
Autodesk
Azbil Corporation
B+H Architects
Black & Veatch (SEA) Pte Ltd
Blackberry
C40 Cities Climate Leadership Group
Carrier Singapore Pte Ltd
Caterpillar
CH2M Hill (Jacobs) Pte Ltd
China Center for Urban Development
China Development Bank
Citrathirza Anugerahjaya, PT
City Development Limited
Consulus Pte Ltd
CrimsonLogic
Danfoss
Dassault Systèmes
Datacom Holdings Singapore
DBS
DELL EMC
DNV GL
EcoDomus Asia Pte Ltd
Eden Strategy Institute LLP
EDF SA
ENGIE
Envision Digital Singapore
ERGAPOLIS
Ernst & Young
Esri Global Inc
Export Development Canada
FCM
Fundacion Metropoli
GE Healthcare
General Electric
Grab
Graymatics
Hexagon Geospatial
Hitachi Asia, Ltd.
Honeywell International Sdn Bhd
HSBC
Huawei International PTE LTD
IBM
Insectta
Institute for Global Environmental Strategies (IGES)
International Finance Corporation (IFC)
ISEAS—Yusof Ishak Institute

SOLUTION PROVIDER

JETRO

John Wiley & Sons, Inc.

Johnson Control

KDI Asia Pte Ltd

Keppel Corporation

Korea Land & Housing Corporation (LH)

Korea Research Institute for Human Settlements

K-water

Lixil Corporation

Lodha Group

MasterCard

MBCCD

McKinsey & Company

Meinhardt Singapore Pte Ltd

Napier Healthcare

NLC

Norton Rose Fulbright

Orissa International Pte Ltd

PTV Asia Pacific Pte Ltd

PwC

Robert Bosch (SEA) Pte Ltd

Rocket Venture Pte Ltd

SAP

Shell Eastern Petroleum (Pte) Ltd

SIEMENS

Silk Road Institute of Digital Economy

Singapore Business Federation

Smart Cities Council

SNC Atkins

SP Group

ST Engineering Group

Surbana Jurong

Temasek Foundation Connects

Temasek Polytechnic

Tencent

TÜV SÜD

United Nations Development Programme (UNDP)

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

Wallezz

World Bank

WSP

YCH Group

Yokohama Partnership of Resources and Technologies

Yokohama Urban Solution Alliance (YUSA)

Y-PORT

Zweec

Appendix 5

Presenters, Panelists and Moderators at the Smart City Governance Workshop

The ASCN team would like to thank all presenters, panelists, moderators and curators of the ASCN Smart Cities Governance Workshop:

FROM THE SINGAPORE GOVERNMENT

Zaqy Mohamad
Minister of State for National Development Singapore

In alphabetical order by agency

Khoo Teng Chye
Executive Director, Centre for Liveable Cities (CLC)

Michael Koh,
Fellow, CLC

Ong Eng Kian
Director, CLC

Lim Teng Leng
Deputy Director, CLC

Nisha Sharda (Curator)
Senior Assistant Director, CLC

Elyssa Ludher (Co-Curator)
Senior Assistant Director, CLC

Zhou Yimin
Senior Assistant Director, CLC

Justin Lee
Senior Manager (Strategic Planning & International)
Government Technology Agency (GovTech)

Ng Bingrong
Deputy Director (Smart Town Research & Planning)
Building & Research Institute
Housing & Development Board (HDB)

Angeline Poh
Assistant Chief Executive, IMDA

Lai Quan Hui
Deputy Director, JTC

Alfred Loh
Manager, Intelligent Transport Systems Operations, LTA

Chua Lin Tiam
Manager, Intelligent Transport Systems Operations, LTA

Borg Tsien Tham
Deputy Director (ASEAN Directorate)
Ministry of Foreign Affairs

Joseph Boey
Project Director (Integrated Waste Management Facility)
National Environment Agency (NEA)

Huang Zhongwen
Director (Digital Planning Laboratory)
Urban Redevelopment Authority (URA)

FROM GOVERNMENT OF THAILAND

Dr Passakon Prathombutr
Senior Executive Vice President
Digital Economy Promotion
Agency (DEPA)

FROM ASEAN SECRETARIAT

Dr Julia Tijaja, Director, ASEAN Integration Monitoring
Directorate

FROM SOLUTION PARTNERS

In alphabetical order by solution partner

Amit Prothi
Associate Director (Asia-Pac), 100 Resilient Cities

Scott Dunn
Vice President (Strategy & Growth and Southeast Asia)
AECOM

Raymond Ma
General Manager, Alibaba Cloud (ASEAN & ANZ)

Dr Konstantin Matthies
Engagement Manager, AlphaBeta

Vanessa Seow
Head of Corporate Affairs, Ant Financial

Yeong Wee Tan
Senior Director, Crimson Logic

Alvin Ang
Vice President Digital, DBS Bank Ltd

FROM SOLUTION PARTNERS

Didier Holleaux
Executive Vice President, ENGIE

Bill Banks
Partner, Ernst & Young

Benjamin Chiang
Partner, Ernst & Young

Andre Toh Sern,
Partner, Ernst & Young

Sam Wong
Partner, Ernst & Young

Annabella Ng
Head of Government Affairs, Grab

Upasana Varma
IFC Senior Investment Officer (Global Infrastructure &
Natural Resources), International Finance Corporation

Kelvin Tan
Deputy Director, National University of Singapore
Enterprise

Nicholas Soon
Head of Strategic Accounts (Smart City Solutions)
Surbana Technologies

Taimur Khilji
Regional Lead for Urbanisation, UNDP Bangkok
Regional Hub

Dr Robert Yap
Chair, YCH

Cecilia Chow
Deputy CEO, Zweec Analytics

The advent of the Fourth Industrial Revolution has enabled ASEAN, home to some of the fastest growing cities in the world, to exploit smart solutions to manage some of the challenges that have emerged owing to rapid urbanisation.

The **ASEAN Smart Cities Network** is a collaborative platform where ASEAN cities can learn from one another's experiences in adopting smart technology, identify solutions and, more importantly, engage industry and global partners as all work towards the common goal of making urban development sustainable and their cities liveable.

This publication provides insights into ASEAN's vision of a smart city, as articulated in the ASEAN Smart Cities Framework endorsed by the 10 ASEAN member states. It highlights some of the smart city action plans that have been formulated by the 26 pioneer cities in the network and, in some cases, already translated into tangible projects for the benefit of generations to come.

"The ASEAN Smart Cities Network provides the sort of open platform needed to drive the smart city agenda. Cities find it quite useful, especially as Singapore has been able to draw in several first rate partners. Different cities are at different levels of development and "smartness" and ASEAN's diversity is well suited for such a network that allows for cities to learn from one another"

TAIMUR KHILJI
UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

