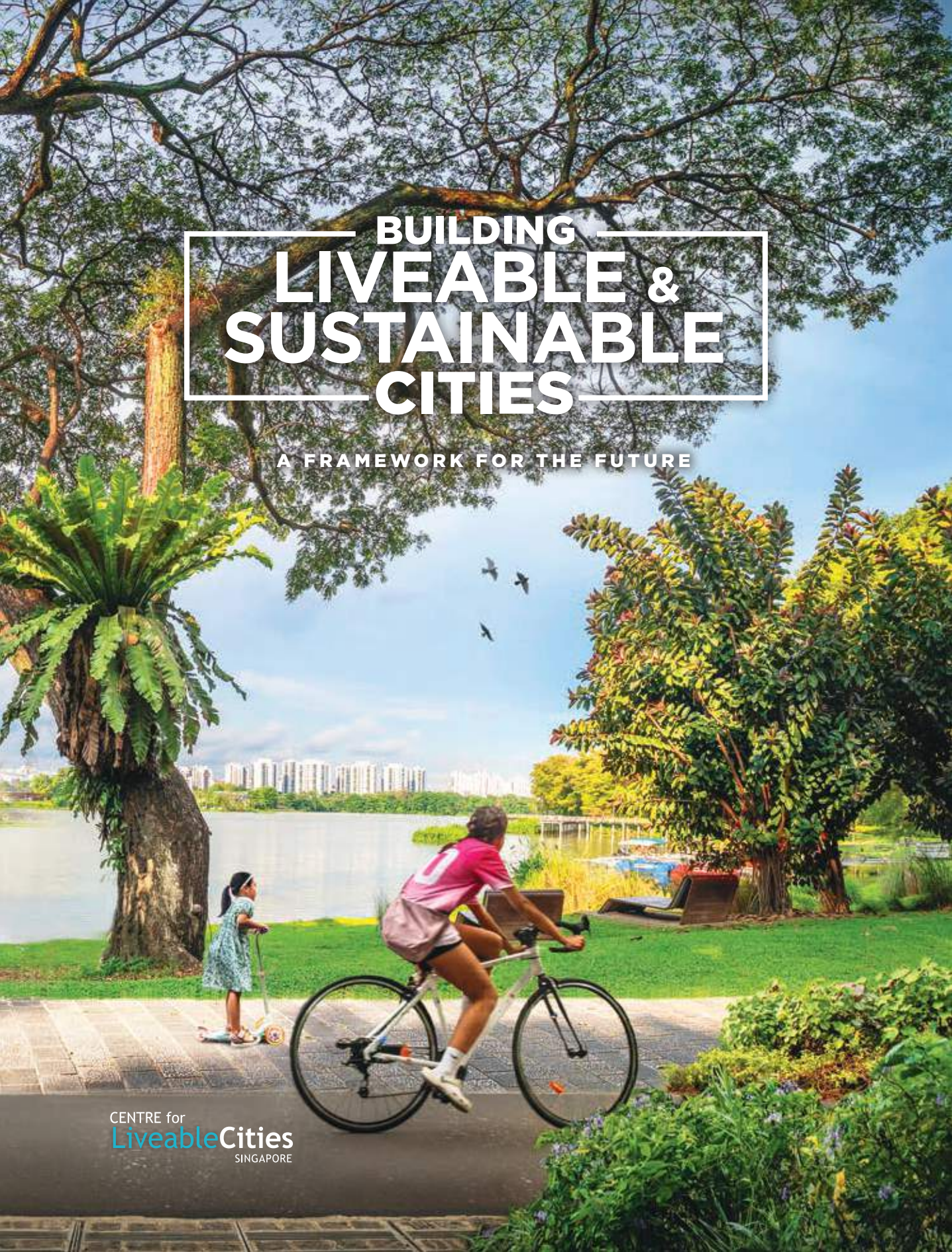




BUILDING LIVEABLE & SUSTAINABLE CITIES

A FRAMEWORK FOR THE FUTURE

CENTRE for
LiveableCities
SINGAPORE

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SINGAPORE

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Set up in 2008 by the Ministry of National Development and the then Ministry of the Environment and Water Resources, the Centre for Liveable Cities (CLC) has as its mission “to distil, create and share knowledge on liveable and sustainable cities”. The CLC’s work spans four main areas—Research, Capability Development, Knowledge Platforms, and Advisory. Through these activities, the CLC hopes to provide urban leaders and practitioners with the knowledge and support needed to make our cities better. For more information, please visit www.clc.gov.sg.

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BUILDING LIVEABLE & SUSTAINABLE CITIES

A FRAMEWORK FOR THE FUTURE

EDITOR'S NOTE

This publication, *Building Liveable & Sustainable Cities: A Framework for the Future*, introduces the refreshed Liveability Framework since the first edition of the book, *Liveable and Sustainable Cities: A Framework*, was published in 2014. Considering today's challenges for cities, this publication proposes an updated understanding of liveability outcomes for cities, as well as the supporting planning, governance and collaborative systems that enable them, while incorporating views from both within and outside government.

Through the digital and hardcopy launches of this publication at the World Cities Summit 2024 and Mayors Forum 2025 respectively, the Centre for Liveable Cities (CLC) hopes that the framework will continue to serve and advise urban leaders and policymakers around the world, as we seek to deliver a more liveable and sustainable life for all who dwell in our cities.



CLICK OR SCAN HERE
FOR CLC'S LIVEABILITY
FRAMEWORK WEBPAGE.

ACKNOWLEDGEMENTS

The editorial team would like to acknowledge the valuable contributions by all our partners and stakeholders involved throughout the review process for the Liveability Framework. We very much appreciate the time and strong support given by various public sector leaders, colleagues from ministries and agencies, as well as individuals from industry and academia.

We would also like to thank our contributors for their opinion pieces, which have helped to add depth and insightful nuance to the book (in alphabetical order): Anupam Yog, Bree Trevena, Lim Eng Hwee, Lim Jui, Lorenzo Petrillo, Melody Hong, Rosa Daniel and S. Harsha. We would also like to thank Cheong Koon Hean, Chairman of our Advisory Panel, for penning the Foreword and Hugh Lim, our Executive Director, for writing the Epilogue.

Finally, we would like to express our gratitude to all current and past CLC colleagues, as well as our interns, who were involved in this project in one way or another.





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FOREWORD

People are attracted to cities because of the promises that they present. Cities are engines of growth, providing economic opportunities, amenities and social connectedness that no other spatial agglomeration can fulfil. However, the surge into urban living also presents many challenges. If not managed well, promises can turn to peril where cities degenerate into unsafe, unstructured and unsustainable urban conditions. The chief preoccupation of city administrators and urban planners therefore is to ensure that our cities are liveable, sustainable and remain vibrant. However, achieving these goals is a dynamic process. Lessons learnt and best practices must continue to evolve under dynamic, and sometimes unpredictable, changing conditions.

First, perceptions of “liveability” may change with socio-economic diversity and as people’s expectations grow. This may mean greater demand on governments to not only provide the basics well, but also be more responsive to emerging aspirations, as well as diverse and sometimes divergent views. At the same time, more cities are experiencing their so-called “third age” and due for rejuvenation. As cities become increasingly built up, planning and developing within more brownfield environments will mean limited land and resources at our disposal to balance contesting needs. Such trade-offs are even more stark for a city like Singapore given its small size and resource constraints.

Singapore also faces the double conundrum of an ageing population and a low fertility rate. In Singapore, 1 in 4 will be 65 or above by 2030. Future seniors with higher levels of education and career attainment may desire to remain productive for longer, while care needs will continue to grow for older seniors. At the same time, Singapore’s fertility rate fell to a historical low in 2023. Maintaining the vitality



First, perceptions of 'liveability' may change with socio-economic diversity and as people's expectations grow. This may mean greater demand on governments to not only provide the basics well, but also be more responsive to emerging aspirations, as well as diverse and sometimes divergent views."

of the economy and ensuring a sufficient workforce size will remain a priority. Preparing for our green transition through the Singapore Green Plan 2030 is also critical to our long-term objective of dealing with climate change threats, but there will be near-term impacts on cost and affordability. All these are occurring during a period of an uncertain global outlook, fast-changing economic and technological trends, and increased competition for talent and businesses. With the greater complexity involved in dealing with urban issues, how should cities begin to think about liveability going forward?

The Centre for Liveable Cities' (CLC's) review of its Liveability Framework is timely to ensure its continued applicability, even as the world changes. The first edition of the framework captured the tacit knowledge of the urban pioneers who led Singapore's post-independence transformation. It has since served as a useful reference not only for local public service officers, but also for international city leaders. The refreshed edition builds on the original framework but offers a more forward-looking lens on how Singapore is preparing for the complexities associated with the quest for liveability in this brave new world.

The publication begins by detailing the review process and findings. To better define and identify challenges to liveability, the CLC engaged more than 50 senior public service officers in Singapore, international city leaders, industry experts and academics through roundtables and interviews. Residents' views on liveability were also sought to complement the more top-down, practitioner-centric view of liveability. This is followed by a holistic presentation of the updated definitions to the city-wide liveability outcomes and principles that underpin how we can better plan, innovate, govern and collaborate to increase our resilience against liveability challenges. The book concludes with a comparative look at demonstrative cities which illustrate that our experience and the principles distilled could also be of relevance to other cities. In preparing this book, we were fortunate to have engaged key senior stakeholders from various sectors who played active roles in the planning and development of Singapore. Their candid insights lend valuable nuance and voice to the narrative.

The refreshed framework comprises four noteworthy features. First, it spotlights the growing intersections between liveability outcomes as possible sources of tensions and synergies. Through illuminating examples, this brings to bear some of the dilemmas, hard choices and innovations necessary to achieve liveability. Second, it foregrounds the concept of "resilience" as a critical factor to sustain good liveability outcomes. Resilience as a concept goes beyond ensuring safety and security, to also include a city's ability to respond, adapt and mobilise its resources. In most cases, there is a premium pegged to resilience and therefore, cost needs to be managed while ensuring good value in return. Third, it highlights that the government alone cannot achieve liveability; it must bring its stakeholders along on the journey. Fostering collective stewardship of issues and co-ownership of solutions will help to facilitate longer term success. The updated framework recognises that building a collaborative ecosystem is foundational to a city's ability to deliver liveability. Finally, it accords due significance to the

role that “Science of Cities” approaches, evidence-based methods and liveability indicators play in augmenting the capacity of planning, governance and collaborative processes to deal with complex urban issues.

The city is not a philosophical concept that is out of reach; it is something tangible that people live, work and play in. It is also not an immovable concept; there are elements with relatively long lifespans, but nothing is static. In its core, this book is a fitting reminder that despite the challenges that we will continue to face, we must remain hopeful for cities because they are hubs of innovation, creativity and diversity. Cities bring people together, fostering collaboration and problem-solving. With their collective will and resources, cities are well-positioned to address pressing issues such as climate change and inequality, and create more resilient communities for a better future.

Although this book’s starting point reflects Singapore’s approach in building a liveable and sustainable city, many of the insights may resonate with other cities who face similar challenges as us. It is in this spirit that we hope this book will serve as a practical compass for city leaders and practitioners to think about the future of cities, and more importantly, spur concrete action to achieve the liveable and sustainable cities we want.

I wish you an enjoyable read.



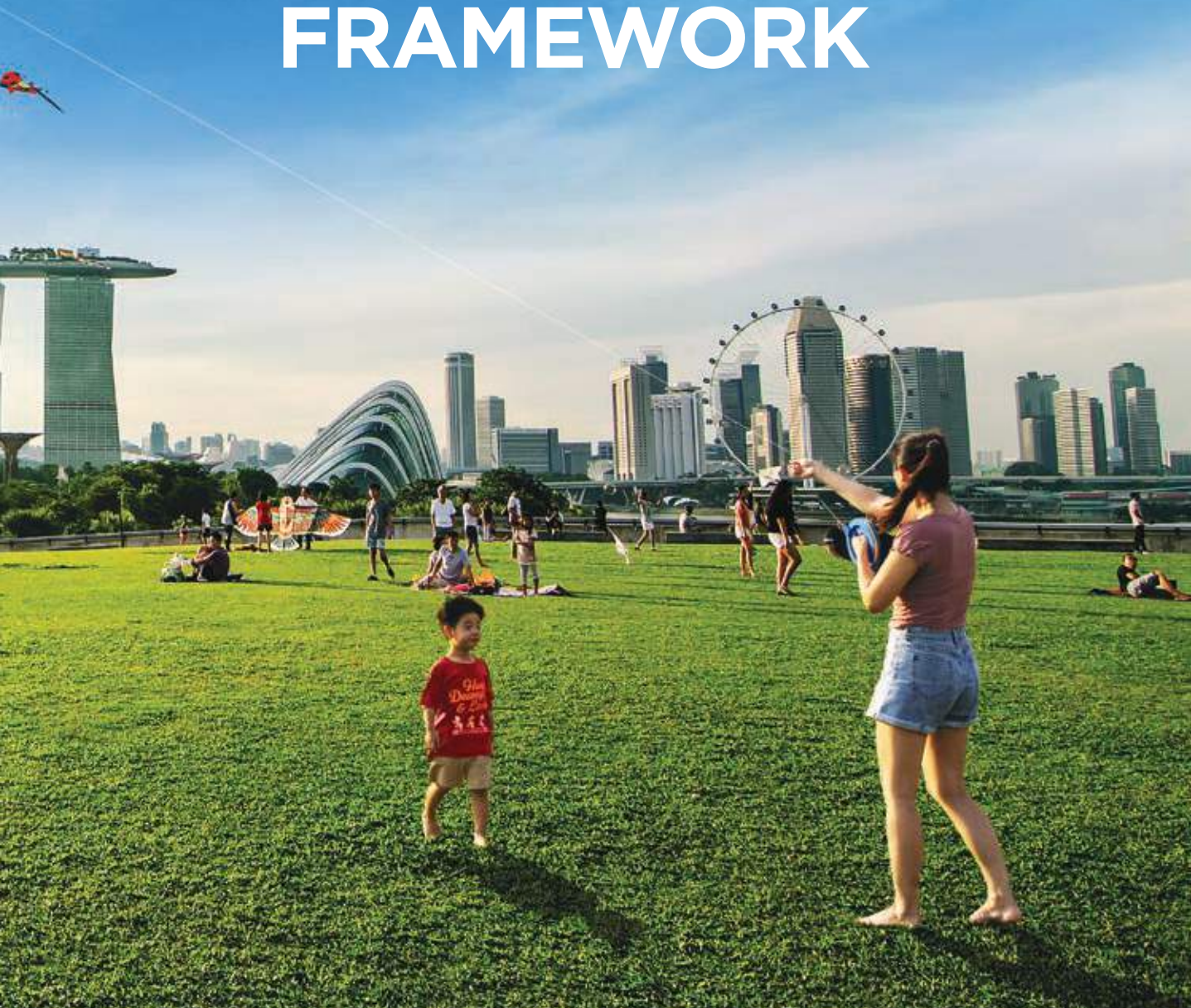
Cheong Koon Hean

Chair, Lee Kuan Yew Centre for Innovative Cities,
Chair, Advisory Panel for the Centre for Liveable Cities,
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[CHAPTER 1]

THE LIVEABILITY FRAMEWORK



INTRODUCTION



Despite being a densely populated and resource-constrained city, Singapore has managed to achieve a high standard of liveability

Photo courtesy of Unsplash

Singapore is a densely populated island city-state with around 6 million inhabitants on just 735 km² of land.^{1,2} Despite this, it has been consistently recognised for its high standard of living on global liveability indices. Unlike most other liveable cities that typically feature a large hinterland, lower rise developments and a more dispersed population, Singapore's post-independence urban transformation into a modern and thriving global hub represents a sustainable development model that combines a compact city structure with a high quality of life.

Singapore's re-invention did not occur overnight. Early on, it faced significant urban challenges not unlike those plaguing other developing cities. These included the spread of urban slums, unsanitary living conditions, a lack of adequate public infrastructure, an unskilled workforce and high unemployment rates. The limited land also meant that Singapore had to continuously plan for a wide range of uses such as residential, economic, defence and utility infrastructure within the confines of its national boundary.

Given its land and resource constraints, Singapore's approach to planning and development has always been to *make the most of whatever it has*. Singapore adopts a long-term planning perspective by integrating knowledge and expertise from multiple sectors, and by upholding good urban governance. Planning for the long term also allows Singapore to better steward its limited land and reserve spaces, and accommodate greater optionality to meet the changing needs of future generations.

In 2010, the Centre for Liveable Cities (CLC) documented key learnings from Singapore's development journey since independence to achieve a high density and liveable urban environment. Distilling tacit and institutional knowledge from Singapore's pioneers, the CLC highlighted enabling approaches and principles, innovative policies and supporting actors that were crucial in achieving and sustaining liveability outcomes. This led to the development of the Liveability Framework, which has since served as a pedagogical reference to guide city leaders and policymakers in their ongoing planning and governance efforts.

The framework identified three interdependent liveability outcomes—competitive economy, sustainable environment and high quality of life—which represent the city-level strategic goals that Singapore's urban development and policy approaches have been delicately balancing. These outcomes were in turn supported by two key systems—integrated master planning and development, and dynamic urban governance—which constitute the critical planning and governance principles that provide the complementary conditions needed to sustain a liveable city.

LIVEABILITY IN COMPLEXITY

Liveability in urban environments is not a static concept—it is a continuously evolving construct that changes with each city’s development phase, is shaped by (and also shapes) shifting individual perceptions and urban lived experiences, and is influenced by dynamic external forces. Singapore’s earlier development trajectory was intrinsically challenging, but also a very specific one. The focus was squarely on ensuring survival and getting Singapore from third world to first.

Given Singapore’s achievements to date, the key challenge moving forward lies in defining the *next bound* of liveability, and how it can be attained and sustained in the face of steep competition and greater uncertainty in the global system. This can only be done by adopting a more forward-looking and anticipatory stance in its approach towards liveability. This involves constantly re-evaluating its composition and existing planning and governance practices, to increase the ability (or “resiliency”) to respond to complex, emergent needs. To better streamline Singapore’s understanding of urban “complexity”, four key areas have been identified that impact liveability:

- Managing Rising Spatial Tensions Amid Urban Redevelopment
- Considering Carbon and Ageing Infrastructure
- Responding to Changing Demographics and Social Diversity
- Navigating Uncertainties in the Global System

MANAGING RISING SPATIAL TENSIONS AMID URBAN REDEVELOPMENT

Over the last 10 to 15 years, it has become clear that Singapore is moving into a markedly different development stage—one that is increasingly characterised by challenges associated with redevelopment (or revitalising existing neighbourhoods) as well as the diminished availability of large greenfield sites to build anew. In short, Singapore’s land constraints have become more pronounced as it has become more built up. This is further compounded by the fact that the effects of its earlier rapid pace of urbanisation and population growth are starting to manifest; for example, through public infrastructure stretched to capacity, public concerns over overcrowding, pollution, the loss of green spaces and rising “not in my backyard” (NIMBY) sentiments. The “complexity” of planning within a predominantly brownfield context is that while a tighter spatial reality with relatively *less wriggle room* presents limitations to optionality and flexibility for solutions, it may also induce greater spatial contestations among overlapping interests in proximity, especially with an increasingly diverse population profile. This in turn engenders demand for more complete solutions for liveability.

Since 2010, Singapore has seen an accelerated rise in spatial tensions within its “tighter” physical reality. They range from tensions between development and (1) heritage conservation, (2) nature conservation and (3) safeguarding of community ties.³ On heritage conservation, an example is the case of the Ellison Building at the junction of Selegie Road and the Mount Sophia Conservation Area. The Ellison Building is a row of 9 2-storey shophouses built in the 1920s with 2 cupolas marking the corners of the street block, which was granted conservation status in 2008.⁴ A corner of the government-owned heritage structure was originally slated for reconstruction to facilitate the construction of the North-South Corridor (NSC), a 21.5-km multi-modal transportation corridor.⁵ In 2016, the heritage community appealed for its preservation.



Built in 1924, the Ellison Building is a colonial-style structure situated at the junction of Selegie Road and the Mount Sophia Conservation Area
G P Reichelt Collection, courtesy of National Archives of Singapore

The Land Transport Authority (LTA) and Urban Redevelopment Authority (URA) then engaged in extensive technical discussions and studies with consultants, heritage groups and conservation specialists to develop a revised plan and engineering solution, which would involve underpinning works, aimed at optimising both the implementation of the NSC and retention of the Ellison Building.⁶ This example highlights the trade-offs and nimble adjustments that planners, engineers and policymakers have to make in managing development and progress, given the increased public focus on heritage conservation.⁷

On nature conservation, the proposed concept alignment of the Mass Rapid Transit (MRT) Cross Island Line directly under the Central Catchment Nature Reserve (CCNR), one of Singapore's

last remaining primary rainforests, sparked intense debate and concerns among environmentalists in 2013. Arising from these concerns, the LTA engaged the Nature Society of Singapore closely through a robust planning and consultation process that lasted six years, involving detailed environmental and technical studies and exploration of alternative alignment options. The direct alignment scheme was adopted in 2019 after considering the environmental impact assessment, technical engineering assessment and planning considerations. Other than benefits yielded in terms of shorter commuter travel times, lower construction costs and lower long-term energy consumption, the decision to proceed with the direct alignment was also supported by mitigating measures to be taken. These include tunnelling significantly deeper than for typical underground MRT lines—with no surface works in the CCNR, locating worksites outside of the nature reserve and optimising layouts to minimise potential environmental disturbance. The process also saw stakeholders from nature groups, heritage groups, residents and grassroots leaders coming together for constructive discussions to address environmental concerns and development objectives. This has helped to sharpen the government's planning and governance processes, laying the foundation for dealing with future cases more effectively.

Finally, while redevelopment does bring about improvements to infrastructure and living standards, the process could result in the displacement of long-standing communities and the loss of social ties. Some recent examples include estates in Tanglin Halt and Dakota Crescent where some residents were relocated. The Housing & Redevelopment Board (HDB) developed comprehensive strategies to support the affected residents through the transition. It implemented thoughtful measures such as priority flat allocation in nearby areas and dedicated support for the moving process. The HDB also preserved familiar landmarks and integrated heritage elements into the new developments to help the residents maintain a connection to their community's history.⁸ Through community engagement sessions and heritage documentation initiatives, the HDB also worked to preserve social memories while helping the residents establish new bonds in their future homes. While the impact on these communities was carefully mitigated, it is safe to say that constant renewal to meet the needs and aspirations of future generations is fast becoming a planning and development reality in modern Singapore.

CONSIDERING CARBON AND AGEING INFRASTRUCTURE

Urban renewal has always been a practical way for land-scarce Singapore to refresh its land and building stock in order to ensure continued growth. As land constraints intensify, the ability to redevelop has become more crucial. So far, this has been largely enabled by the foundational Land Acquisition Act, which helped to secure land for development post-independence, and the supporting leasehold system that governs most new developments. The Selective En bloc Redevelopment Scheme, a housing policy aimed at rejuvenating older public housing estates, is another complementary urban renewal tool that helps to ensure sustainable urban development and continued improvement of living standards in Singapore.



HDB blocks in the Tanglin Halt housing estate were identified for the Selective En bloc Redevelopment Scheme in 2014

Collection of National Museum of Singapore, courtesy of National Heritage Board



HDB blocks in the Dakota Crescent housing estate were identified for the Selective En bloc Redevelopment Scheme in 2014

Collection of National Museum of Singapore, courtesy of National Heritage Board

A strong impetus for redevelopment is the prevalence of ageing infrastructure and buildings that are near the end of their functional lifespans or have become obsolete and are increasingly expensive to maintain. However, given Singapore's commitment towards net-zero carbon emissions by 2050,⁹ complexity arises as balancing its carbon budget imposes potential limitations on more established “demolish and rebuild” redevelopment approaches. On the positive side, redevelopment projects can provide an opportunity to incorporate sustainable design features, energy efficient technologies and renewable energy sources, which can help reduce the overall carbon footprint of the city. However, redevelopment can also have negative impacts if not done carefully. For example, if new developments are not designed with sustainability in mind, they can end up increasing energy consumption and greenhouse gas emissions. Demolishing existing buildings and infrastructure,

especially if they are recently built, can also result in a significant amount of wastage and carbon emissions. The redevelopment of the JCube shopping mall in Jurong East after just 10 years into its lease in 2022 is a case in point. While it was an entirely private business decision undertaken to refresh the development's offerings, the proposal generated some public criticism that it was "a waste of resources and blow to sustainability".¹⁰

Examples like these call for a re-evaluation of how Singapore's built environment can benefit from a mix of its ageing and modern building stock in a sustainable manner. The adaptive reuse of existing buildings can potentially help Singapore to mitigate the environmental impacts of climate change, support urban renewal and enable policymakers to rethink how the built environment can align with environmental goals while retaining cultural heritage and



SDE1 and SDE3 at NUS's School of Design and Environment are successful examples of adaptive reuse that contribute to Singapore's net zero goals
Photo from Centre for Liveable Cities

local identity. In support of the Singapore Green Plan 2030, the URA introduced the Strategic Development Incentive Scheme in 2019 to encourage the rejuvenation of older buildings in strategic central areas into more sustainable and innovative mixed-use developments that will positively transform the surrounding precincts.¹¹ These developments are required to adopt enhanced Construction Industry Transformation Map standards, which include attaining, at a minimum, Green Mark (GM) Platinum Super Low Energy or any other equivalent standard under the prevailing GM Framework.¹²

Adaptive reuse is a strategy Singapore employs to contribute to sustainable consumption by extending asset lifespans and retaining embodied carbon, while at the same time preserving the nation's history and culture.

Some successful recent examples of adaptive reuse include the SDE1 and SDE3 buildings at the National University of Singapore (NUS) where low carbon and super-low energy strategies were utilised,¹³ and the former Bukit Timah Fire Station which was envisioned as a mixed-use community hub by the Singapore Land Authority and URA to promote healthy living, community interaction and integration with nature, while featuring environmentally sustainable urban solutions. The Bukit Timah Fire Station project is a testament to how historical buildings can be retrofitted to support sustainability outcomes through implementation of new systems and thoughtful programming—in this case, renewable solar energy systems, water and energy conservation fittings, low-carbon mobility initiatives, farm-to-table experiences, health and wellness activities, and community gardens.

Finally, Singapore's net-zero transition will also require more land to be set aside for new large-scale green infrastructure, some of which may impose sizeable health and safety buffers on surrounding uses. Considering this holistically, it is safe to suggest that there will be greater constraints imposed on the pace at which Singapore can recycle and optimise land to meet future needs. Cities will also need to go beyond sustainability to adopt regenerative design where development brings about a net-positive effect on both nature and humans.¹⁴ Balancing all these factors simultaneously will involve addressing complexity at play.

RESPONDING TO CHANGING DEMOGRAPHICS AND SOCIAL DIVERSITY

A good city is not just a collection of buildings and infrastructure, but a place where people can lead fulfilling lives, have access to amenities and opportunities, and be part of a community. A truly good city adapts seamlessly to the evolving needs and aspirations of its people and ensures a liveable environment that goes beyond the provision of necessities—it actively supports their need for purpose, achievement and meaning.

As Singapore navigates its future, a demographic shift is unfolding. The city-state is witnessing a rapidly ageing population, a decline in birth rates, smaller family units and an increasingly diverse society. While these shifts pose challenges, they also present unique opportunities such as the potential to establish purposeful longevity, enabling healthy seniors to contribute more actively to society, and the prospect of harnessing social diversity as a driver for creativity and innovation. At the same time, given the nation's constraints and development history, residents are generally pragmatic about prioritising “hard factors” such as security, affordable housing and job access, which bolster the nation in times of adversity. However, nurturing a thriving economy and cohesive community demands equal attention to the aspirational elements that draw talent and foster a collective spirit of belonging.

The complexity here is not just about addressing diversity in population profiles, but also how needs, perceptions and concerns can evolve along an individual's life course and across generational cohorts. Since Singapore is planning for a diverse population, there cannot be “one-size-fits-all” approaches.

The challenge ahead lies in how the government can better communicate the trade-offs to the larger community that is increasingly more educated and vocal, so that they can be brought along on the journey to help shape Singapore's collective future. To enable this, the ability to be in touch with the public pulse, identify emergent social issues, and embrace knowledge drawn from social and behavioural science will become increasingly important. A strong social compact where the city's diverse population can rally behind shared goals and objectives will also be a most valuable asset.



Addressing the challenges of an ageing population requires Singapore to embrace a comprehensive, whole-of-nation approach to ensure that its citizens can age in place productively, healthily and gracefully

Photo courtesy of Green Nudge

The Forward Singapore (Forward SG) exercise was launched in June 2022, engaging residents from all walks of life on how Singapore should refresh its social compact for the road ahead. Forward SG builds on the ideas gathered and partnerships developed across various engagements in recent years, including the Singapore Together Emerging Stronger Conversations, the Conversations on Singapore Women's Development, and the Long-Term Plan Review, among others.¹⁵

“Forward Singapore represents the ambitions of our generation. It expresses our resolve to keep our society strong and united; to share the benefits of progress with all, not just some; to uplift all Singaporeans, and not just a few. Younger Singaporeans in particular have spoken clearly... They want a refreshed Singapore Dream—one that is not defined by material success alone, but also offers meaning and purpose in their careers and their lives.”¹⁶

Lawrence Wong

Prime Minister (2024–present)

Consider also Singapore’s ageing population—a demographic shift that has heightened the need for senior care and health facilities. Singapore has responded by emphasising “ageing in place”. This involves promoting well-being and inclusivity in developments like Kampung Admiralty, a pioneering vertical village that champions active ageing. This model will soon be replicated with the integrated Heart of Yew Tee development, further embedding senior care and multi-generational living into the city’s high-density landscape.

At the same time, future seniors who are better educated and might aspire to remain productive for a longer time have the potential to become valuable assets in Singapore’s localised economies, especially amid constraints on foreign labour. For youths, smaller households and rising singlehood could increase demand for more affordable and flexible housing. Looking for greater flexibility, younger workers may seek a better work-life balance or integration, further shaping the future of urban life.

Finally, Singapore must not only maintain its allure as a global talent hub, but more importantly, remain a place where people want to sink their roots and form thriving communities. To do so, it will be increasingly important to ensure equitable distribution of opportunities and benefits, create a more compassionate system of meritocracy, and foster inclusive growth. All these call for whole-of-society efforts to forge a strong social compact, one that can withstand the pressures of growing social inequalities, and cultivate community stewards who go beyond self-interest to actively help others who may not have had the same opportunities as themselves. This will be crucial not only to attract talent to drive Singapore's economy, but to retain its local core that will continue to define its identity and help to maintain its relevance as a small island city-state.

NAVIGATING UNCERTAINTIES IN THE GLOBAL SYSTEM

The highly dynamic and uncertain global environment injects another layer of complexity into Singapore's quest for liveability. Given its highly open economy and extensive international networks, Singapore has experienced the impacts of external disruptions more sharply in recent years.

For example, COVID-19 underscored the importance of public health and social well-being in urban planning. Singapore is now investing even more in healthcare infrastructure, digitalisation and building community resilience to better respond to future health crises. In light of climate change, Singapore is also prioritising sustainability and resilience in urban planning and infrastructure development by investing in green spaces, renewable energy sources, more efficient water management systems and sustainable transportation.

Taken together, external forces compel Singapore to continually re-evaluate its brand of liveability—including its make-up and how it is conceptualised, perceived and experienced within its specific urban context, in order to recalibrate, adapt and innovate its approaches towards liveability.

BOX STORY

IS DENSITY DESTINY? MAKING DENSITY WORK FOR CITIES

BACKGROUND

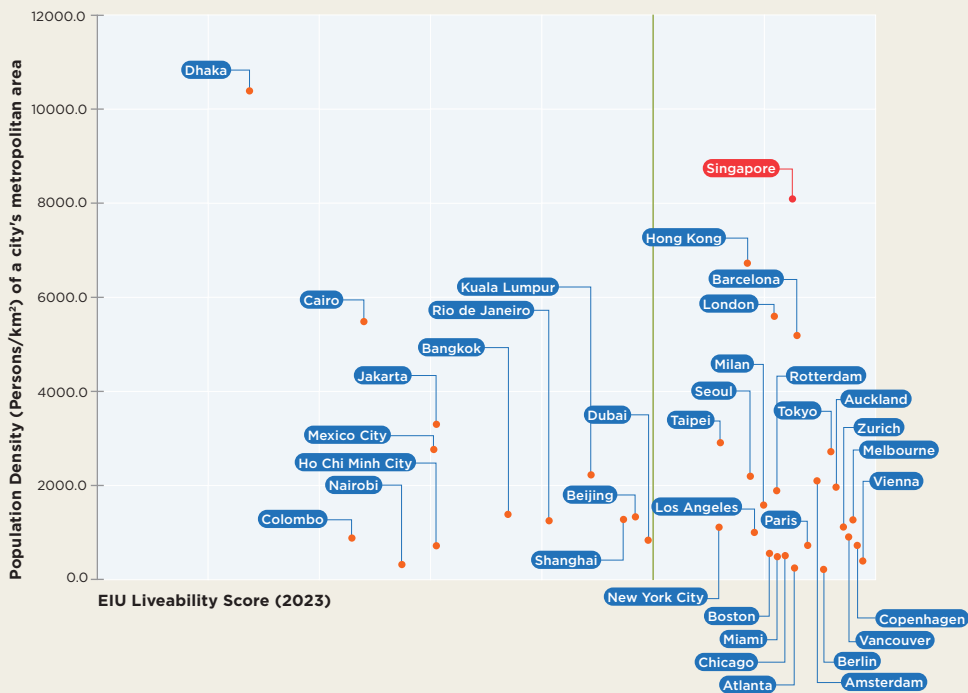
Many cities around the world have the advantage of being part of larger countries which extend beyond the limits of their city boundaries, allowing them to move certain infrastructure or land uses out to suburban areas. For instance, New York City's water supply is sourced from a 5,180-km² watershed located upstate, with some sections being up to 200 km away from the city.¹⁷ Commuter towns have also developed around cities like Melbourne, and their residents make the daily trip into the city for work. In contrast, as an island city-state, Singapore has little choice but to accommodate all its needs within its limited land.

Over the past 20 years, Singapore's population density has increased to 8,207 persons per km².¹⁸ Although the city continues to explore new approaches to increase its capacity through land reclamation and in more recent years, underground planning, there are inherent constraints to these strategies.

Singapore is not the exception and as the pace of urbanisation intensifies globally, other cities will also become increasingly denser. In contrast, some cities will grapple with depopulation, sometimes affecting multiple cities within the same country. However, built-up cities often evoke images of concrete jungles and over-crowdedness. Density is also typically associated with urban challenges such as congestion, housing inaccessibility, greater crime risk, social isolation, and an overall strain on the city's infrastructure. A high concentration of residents in any one area amplifies the demand for urban services like healthcare, transportation and essential utilities. This in turn may lead to a rising cost of living and social tensions.

Despite the conventional view that urban density erodes liveability, there are cities that have bucked the trend and are able to mitigate the negative impacts of high-density living. In 2024, CLC updated its Liveability Matrix by plotting metropolitan population densities against total liveability scores from the EIU Global Liveability Index. These scores focus on five categories: Stability, Healthcare, Culture and Environment, Education, and Infrastructure.

LIVEABILITY MATRIX 2023



The CLC Liveability Matrix plots cities' population densities against liveability scores derived from the Economist Intelligence Unit's (EIU's) Global Liveability Index; Singapore is one of a few high-density cities that scored well in EIU's Global Liveability Index 2023
Image from Centre for Liveable Cities

The resulting Matrix showed that Singapore was one of a few high-density cities that came out ahead in the EIU rankings. Other dense cities in the survey that were identified as more liveable included Hong Kong, Barcelona and London. These cities have undertaken a variety of strategies to manage urban density while balancing liveability outcomes.

DEALING WITH DENSITY CREATIVELY

For built-up cities that deal with mostly brownfield developments, it is crucial to ensure that each parcel of land is used optimally. This calls for long-term planning to anticipate future needs, as well as innovation to make the most of available space. Besides building higher, planners can optimise land use by adopting atypical strategies such as building underground, constructing over water, and utilising air rights.

A notable example is Hong Kong, which has made significant strides in leveraging the potential of underground space. Despite spanning 1,100 km², only about 25% of the city's land area has been developed due to its hilly terrain.¹⁹ This means that the actual population density is much higher than the city-wide average of 6,900 persons per km².²⁰ To free up surface land for more human-centric activities, Hong Kong has put infrastructure like utilities and emergency facilities underground. The city also turned its challenging geology into an advantage through its 2016 Cavern Master Plan, which identified multiple sites that could accommodate new uses including data centres, warehouses and columbariums.²¹

In addition to maximising land, it is equally important for planners of high-density cities to keep residents in mind and design human-centric environments that do not feel overcrowded. One way is to integrate nature into the city. This not only helps to visually break up the urban fabric, but it also provides respite to city dwellers and offers space for social interaction. A study by the Nanyang



Rooftop greenery in Singapore

Photo courtesy of Unsplash

Technological University has shown that vertical greenery is also able to act as stress buffers in cities.²² Additionally, landscaping delivers environmental benefits, such as combatting the urban heat island effect which dense cities are prone to. With many other competing uses within a city, planning for green and blue spaces cannot be an afterthought. Instead, these considerations need to be incorporated upstream such as through zoning decisions, designation of green belts and building controls.

Singapore is a city that has prioritised the provision of pervasive greenery, which is central to its goal of becoming a City in Nature. On top of conserved nature reserves, nature areas, parks and park connectors, pockets of vegetation can be found along pavements,

road dividers and sheltered walkways.²³ Overcoming the pressures of land scarcity, Singapore also emphasises skyrise greenery where plants are incorporated onto rooftops and vertical spaces.²⁴ This is facilitated through urban design guidelines and green building certification requirements. There are also initiatives like the Landscaping for Urban Spaces and High-Rises programme which promotes the replacement of greenery lost due to development with vertical plantings, as well as the Skyrise Greenery Incentive Scheme which co-funds installation of eligible projects.^{25,26} This softens harsh building façades and contributes to Singapore's green cover of around 40%.²⁷

Even with these measures in place, dense cities will continue to grapple with the effects of heavy traffic and pollution. Hence, cities should make a paradigm shift towards sustainable urban systems that enable more efficient use of resources and reduce the generation of negative externalities. For example, cities that have attained a higher public transport modal share are able to move more commuters over longer distances, producing lower levels of carbon emissions with fewer cars on the road. Accordingly for cities like Tokyo and Hong Kong that have been growing their rail networks, there has been a decreasing trend of emissions arising from the transport sector.^{28,29} Cities can also deploy district-level infrastructure like cooling and pneumatic waste collection systems which can capitalise on the economies of scale of densely populated areas, while minimising disamenities like noise and visual clutter.

Barcelona has the highest car density of any city in the European Union at about 6,000 per km², leading to concerns regarding air quality, safety and congestion.³⁰ To address this, the city pioneered the concept of combining nine blocks into one “Superblock” (Superilla) and transforming the roads within into pedestrian-priority streets.³¹ Building on this urban structure, Barcelona is

also creating Green Streets which will be scaled up to distribute benefits linearly across the city through traffic calming, greening and new public spaces.³² There have been concrete improvements to liveability as a result of these efforts. For instance, traffic in the Sant Antoni Superblock dropped by 17% on average and localised pollution decreased by 40%.³³ Researchers have also estimated that the Barcelona Superblocks could generate further benefits to health, including the prevention of almost 700 deaths annually and an increased life expectancy of about 200 days among residents.³⁴



Superblocks are about 400 m by 400 m each, and have been implemented in neighbourhoods across Barcelona

Photo courtesy of Unsplash

Cities are complex systems where each person acts as an individual agent who interacts with other people and the environment in different and unpredictable ways.³⁵ As cities become denser, this complexity is further compounded. Planners and policymakers must consider the interplay among these various components. Technology is a powerful tool that can support both the management of services and infrastructure as well as better decision-making. Examples of applications range from installing sensors to track real-time data to having digital platforms for residents to report municipal issues, enabling more informed responses to the challenges that dense cities face.

This can be seen in the case of London, where an interactive virtual reality digital twin of the Square Mile was designed. Covering 2.9 km² of the financial district, this innovative technology aims to assist developers and city officials in visualising how a project could affect its surroundings by mapping detailed features like lamp posts and windows to an accuracy of 2 cm.³⁶ Such capabilities are especially valuable in dense cities to optimise space and simulate scenarios without impacting existing operations. Moreover, the digital twin translates technical plans into simpler models for stakeholder consultations. The city has continued to ramp up its investments in this aspect and has also produced digital twins to guide climate mitigation initiatives.³⁷

Every city has its unique set of circumstances, considerations and priorities. These strategies showcase how there are diverse approaches to ensuring liveability in high-density settings. With the right planning and governance to alleviate adverse effects, a high concentration of people can also boost vibrancy in cities.

WHEN DENSITY WORKS

In *Triumph of the City*, leading economist Edward Glaeser noted that “cities speed innovation by connecting their smart inhabitants to each other”.³⁸ He argues that this is true for developed cities in the Western part of the world but even more so for emerging markets. Indeed, with compact and heavily populated areas, close proximity encourages collaboration and the sharing of ideas. Dense cities are thus likely to evolve into economic gateways that attract global talent. Alongside that, density cultivates cultural diversity as people bring their distinctive traditions, customs and practices with them to new places.

These qualities are reflected in the Global Power City Index (GPCI) by the Institute for Urban Strategies at the Mori Memorial Foundation. The GPCI evaluates 48 cities in terms of their magnetism, or “power to attract people, capital, and enterprises from around the world”. Looking at Hong Kong, Singapore, Barcelona and London, the four cities fall within the top half of the overall ranks in the 2024 edition of the index.³⁹ Specifically, they excel in measures such as World’s Top Universities (Hong Kong ranked 2nd), International Freight Flows (Singapore ranked 3rd), Number of International Conferences (Barcelona ranked 7th) and Number of International Students (London ranked 1st).⁴⁰

However, these outcomes are only possible because the cities have established a firm grasp on dealing with their density-associated challenges, while also seizing the potential positives. As urbanisation intensifies globally, the need to reshape density from an obstacle to an engine for sustainable growth and liveability will become even more pertinent, and cross-learning from cities that have worked well with density can only benefit all.

CONTEXT FOR A LIVEABILITY FRAMEWORK FOR THE FUTURE

Considering the layers of complexity that give rise to the critical context helps in fully appreciating the CLC's refreshed framework for building liveable and sustainable cities of the future.

As Singapore advances towards its next bound of liveability, it is important to acknowledge that it is henceforth operating within, and attempting to balance, a much “tighter” equilibrium than before. Planning within predominantly brownfield environments with overlapping, competing interests leaves little room for straightforward solutions. This also requires more comprehensive and holistic planning studies, and at times, the imposition of new technical requirements to address stakeholder concerns. This may in turn translate to a more protracted planning process and impact the ability to respond in time to the needs of new developments.

Furthermore, Singapore's success over the years has made it an attractive global hub for businesses, investments and talent, which has inadvertently led to a higher cost of living. While this highlights Singapore's competitiveness, it is also useful to appreciate the different baseline (higher land, development and business costs) that it is starting at now, compared to before. It is no wonder that over the last decade, Singapore has consistently ranked high on global cost of living indices, often earning the title of the world's most expensive city.⁴¹ If there is a limit to how much it can manage overall costs moving forward, based on the understanding that Singapore is unlikely to revert and compete purely on a cost basis, then it must ensure that the value Singapore provides continues to justify the higher costs incurred.

“Singapore is seen as high cost by companies, but for good reason—high cost for trust, resiliency and confidence they receive in return. Our cost represents resilience in transportation, logistics and finance. There is assurance that our government will support companies to do business in Singapore. It is all in that premium.”

Grace Fu

Minister for Sustainability and the Environment (2020–present), and
Minister-in-charge of Trade Relations (2024–present)

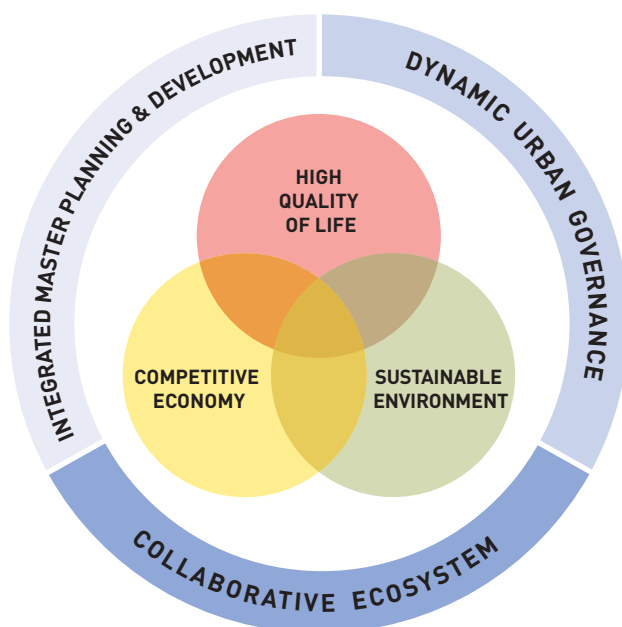
Next, it is clear the “hard factors” for survival (for example, access to food, housing and energy, safety from crime and climate impacts) remain highly important to liveability. However, these factors are becoming more expensive to provide due to Singapore’s shrinking availability of resources, and hence there is an increasing need to establish resilient supply chains amid global uncertainties. To secure continued and reliable access to resources, Singapore must focus on investing in resilience. This includes “resilience” in three key aspects—resource, planning and governance, and social. Today, most of these would incur a premium to provide, especially where it involves complex and large-scale infrastructure to be built and maintained (such as new technological and data network systems), and where it helps to address climate change impacts, ageing infrastructure, population growth and public health emergencies. Some of these also refer to the governance systems (institutions, people and ecosystem) that Singapore has cultivated in-situ since independence that support its liveability outcomes and are not so easily replicated by other cities.

Finally, it is important to recognise that the government alone cannot achieve and sustain liveability outcomes. Increasingly, many of the policies to achieve liveability and sustainability goals will require cross-sector buy-in and innovation, as well as shifts in lifestyle and consumption behaviour from the community. This depends heavily on how well Singapore can nurture collective stewardship of issues among the public, forge transformative partnerships with both the people and private sector, and build social resilience through a bona fide, effective collaborative ecosystem. While the above are all challenging contextual considerations worth highlighting, they also suggest that only with awareness can Singapore be better placed to anticipate issues and make necessary adjustments in the way it plans, governs and collaborates.

UNDERSTANDING LIVEABILITY THROUGH THE FRAMEWORK

Guided by the new complexities and contextual circumstances that govern the future urban landscape, the Liveability Framework serves as a reference for city leaders, policymakers and planners in planning for liveable and sustainable cities. While the refreshed framework adopts a future-oriented approach, it is built upon the body of work by Singapore's urban pioneers. Just as there were instances where the city underperformed, this framework provides the opportunity to get it right the next time and history will be the judge of how Singapore performs henceforth.

The Liveability Framework diagram depicts the three critical liveability outcomes which are represented as intersecting circles. Surrounding these is a “ring” structure consisting of the three complementary systems which provide the enabling conditions to achieve and sustain the outcomes. The diagram reflects a shift from traditional hierarchical models to a non-linear, systems-oriented relationship between systems and liveability outcomes.



The Liveability Framework
Image from Centre for Liveable Cities

The circular and open design is forward-looking and flexible, with each system given equal importance. The critical interdependencies among the outcomes are highlighted through the intersections, especially in the context of managing limited resources wisely. The overlaps represent the potential synergies and necessary trade-offs between the outcomes. The space between the outcomes and systems serves as the operational environment, which is supported by enablers, guiding sustainable urban development effectively.

OUTCOMES

OUTCOME 1 COMPETITIVE ECONOMY

A competitive economy goes beyond offering opportunities for economic security to include spaces for innovation, creativity, sustainability and vibrancy. It underscores the significance of an accessible educational system and an inclusive workforce system as being essential for economic resilience through various pathways and skillsets. It also calls for the development of a well-stocked talent pool.

OUTCOME 2 SUSTAINABLE ENVIRONMENT

A sustainable environment means grappling with a new reality characterised by heightened climate change impacts, including rising sea levels and temperatures leading to flooding and heat stress. Addressing these risks demands a whole-of-society approach, integrating physical and social infrastructures to enhance resilience and resource sustainability through nature-based solutions.

OUTCOME 3 HIGH QUALITY OF LIFE

A high quality of life encompasses a balance of all the positive economic, social, environmental, emotional and physical aspects of urban living. Beyond essentials like safety, food, housing and healthcare, there is also a growing emphasis on inclusivity, social cohesion, well-being, mental health and purpose in life.

SYSTEMS

SYSTEM 1 INTEGRATED MASTER PLANNING AND DEVELOPMENT

Integrated master planning and development departs from traditional top-down approaches to embrace more adaptive strategies that enhance urban resilience and flexibility, and avoid rigid, “locked-in” solutions. It actively seeks out “win-win”, cross-domain opportunities, and emphasises close coordination and systemic innovation for effective implementation of integrated solutions.

SYSTEM 2 DYNAMIC URBAN GOVERNANCE

Dynamic urban governance refers to responsive and adaptable approaches towards managing urban areas, especially when things do not go according to plan. It is broadly characterised by visionary yet pragmatic leadership, high levels of trust, the presence of sound institutions, strong citizen engagement, and transformative private sector partnerships to deliver and sustain shared objectives.

SYSTEM 3 COLLABORATIVE ECOSYSTEM

A collaborative ecosystem involves collective stewardship of issues and co-ownership of solutions, including lifestyle and behavioural shifts, to ensure long-term success. It also seeks to forge strong partnerships across different scales of engagement—including local, regional and international—to mobilise resources, cross-domain knowledge and expertise to tackle and overcome wicked problems.

In addition to the three supporting systems, enablers to liveability encompass various tools and methodologies that contribute to and support the processes required to achieve liveability outcomes. Among these, the roles of “Science of Cities” approaches, evidence-based methods, and liveability indicators are paramount in augmenting the capacity of planning, governance and collaborative processes to effectively address complex urban issues. By leveraging data-driven insights, advanced analytics and scientific methodologies, these approaches provide a deeper understanding of urban dynamics and enable informed decision-making and strategic interventions (see Chapter 4 for elaboration on Science of Cities approaches and methods as enablers for measuring and sustaining liveability).

BALANCING THE LIVEABILITY OUTCOMES

The intersections between liveability outcomes spotlight increasing tensions and more apparent trade-offs that must be navigated to achieve desired results. However, there are also synergies between these liveability outcomes if cities can think innovatively and consider integrated solutions, or even explore unconventional policy nexuses. This will allow for the identification of opportunities where multiple liveability objectives can be addressed simultaneously, leading to more holistic and effective urban development strategies.

Ensuring Singapore’s liveability involves striking a balance among the three key outcomes. Over-emphasising one at the expense of the others could result in unintended consequences. While the framework describes the three as discrete outcomes, the reality reveals a degree of interdependence and overlap among them, which has become more pronounced as Singapore grapples with greater dilemmas and tensions.

For instance, it has made the tough decision to prioritise the implementation of stringent pollution control measures, even at the risk of turning away certain industries. This decision reflects the government's commitment to safeguarding the environment and ensuring that industrial activities do not compromise the cleanliness and sustainability of the city.

By upholding these standards, Singapore demonstrates its dedication to maintaining a clean and green environment, which in turn contributes to its attractiveness as a place for investment and business, with pleasant living conditions for residents. Similarly, as Singapore prioritises the outcome of a sustainable environment by implementing a carbon tax, potential trade-offs could result from higher costs for businesses, which might in turn impact the competitiveness of its economy. However, it also ensures that future development aligns with the city's commitment to sustainability and liveability as it presents an opportunity for Singapore to strategically position itself as a second mover, allowing it to fully capitalise on the opportunities that come its way.

Addressing urban challenges holistically can inadvertently create opportunities to contribute to multiple outcomes. For instance, Singapore's efforts in strengthening water resilience have sparked the growth of a specialised sector focused on water reclamation and desalination, creating thousands of jobs and boosting the economy with significant contributions and government investment in research. Additionally, the Active, Beautiful and Clean Waters Programme has transformed concrete drains and canals into naturalised streams and rivers that not only provide recreational spaces, but improve environmental sustainability and enhance residents' quality of life. This comprehensive approach to liveability demonstrates the effectiveness of such integrated solutions, and proves that the whole is indeed greater than the sum of its parts.

CONCLUSION

Achieving holistic liveability outcomes is never easy or straightforward. Singapore has been grappling with such challenges since its early days. Singapore's urban pioneers devised practical and systematic approaches to planning and governing for liveability that have served it well.

As Singapore continues to develop and transform, the challenges will become increasingly complex, revealing not just new tensions and trade-offs, but also opportunities for synergistic outcomes. The key is to build on its solid foundation, and continue to work towards more integrated and systemic solutions to cross-domain problems. This responsibility does not lie solely on the government—it will “take a village” in the form of a truly collaborative ecosystem of local stakeholders, with each pulling their own weight.

Given the current global context, in which cities face increasingly complex and interconnected challenges, the concept of a collaborative ecosystem also goes beyond local partnerships to encompass new connections with other cities around the world. Singapore's journey for resilience, sustainability and liveability in the face of these challenges can be supported by learning from and working with such partners.



We learn what not to do by watching other cities and also what to do from watching good cities. There is nothing new that you can think of that has not been tried by thousands of other cities.”⁴²

Lee Kuan Yew

Prime Minister of Singapore (1959–1990)

Some of these approaches which have been ingrained in its development journey are not unique to Singapore. These can also be found in many successful cities such as Bilbao, New York City, Suzhou and Medellín—laureates of the Lee Kuan Yew World City Prize. While their success stories highlight the universal applicability of this framework (see Chapter 5), it must also be recognised that these approaches cannot be applied as a one-size-fits-all blueprint; they must be adapted and referenced against each city’s unique sociopolitical and economic contexts. Singapore’s commitment to learning from other cities has enabled it to find and implement strategies that have proven successful in diverse urban environments. Singapore has learnt from the experiences of others, and by leveraging this knowledge, will continue to refine and improve its development path towards the next phase of liveability.

[CHAPTER 2]

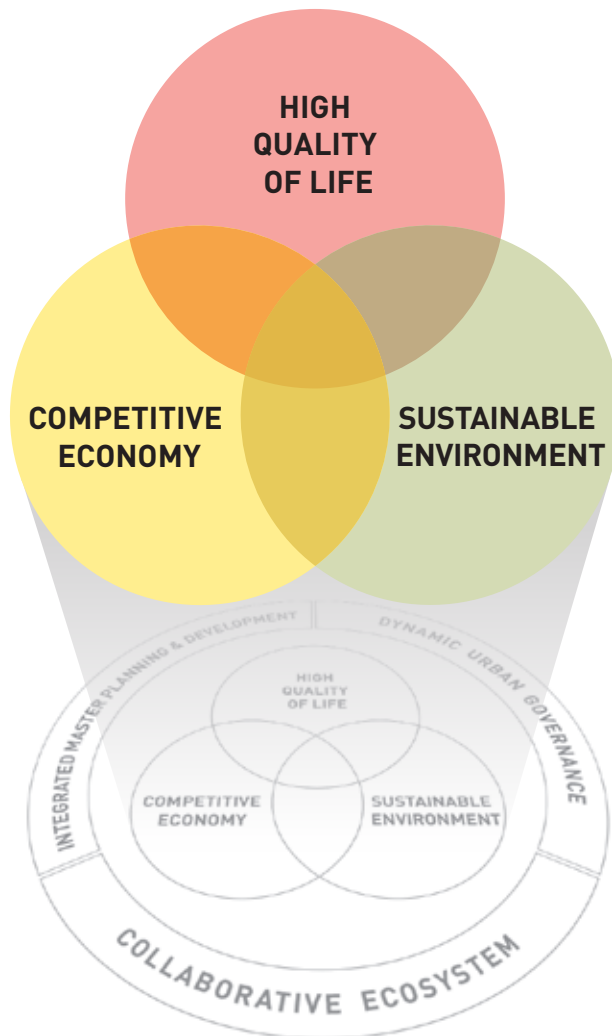
THE LIVEABILITY OUTCOMES





INTRODUCTION

The Liveability Framework outlines three desired outcomes for a liveable and sustainable city:



The philosophy behind the three liveable city outcomes has remained consistent throughout the decades of Singapore's development. As it turned out, this was not far from what was posited at the United Nations Conference on Environment and Development in 1992—while the social, environmental and economic needs of a country must be met, this must be done while being in balance with one another and taking into account existing and new constraints within the larger operating system. If the environment is abused and resources are overconsumed, people suffer and economies decline. Likewise, if people are poor and national economies are weak, environmental protection is likely to be compromised too. In the Liveability Framework diagram, these three outcomes are represented by three equally sized, intersecting circles that suggest not only their comparable significance with each other, but also their inter-dependencies and the delicate equilibrium that needs to be maintained between them.

Collectively, these three outcomes establish a holistic urban ecosystem that contributes to overall liveability in a city over the long run. Yet as the world continues to evolve, so will public expectations, urban priorities and citizen aspirations. This means that cities need to constantly re-assess what it means to be “liveable” within their unique circumstances. For Singapore, given its perennial land and resource constraints, managing and balancing the different outcomes will only become more challenging going forward. This chapter explores the shifting contexts that affect how these outcomes are perceived, defined and achieved, as well as the emerging synergies and tensions faced in delivering a more liveable and sustainable Singapore.

Outcome 1

COMPETITIVE ECONOMY

CONTEXTUAL CONSIDERATIONS

The economic vitality of a city plays a pivotal role in shaping and supporting the lives of its residents. A city thrives with economic growth and access to good quality jobs, which in turn pave the way for an improved standard of living and enhanced liveability.

A healthy economy must do more than just function—it needs to be competitive. This means that an economy needs to efficiently allocate resources, foster innovation and produce goods and services to compete in both local and international markets. The economic strength of a city fuels investments in vital infrastructure that are integral to supporting liveable communities, such as an efficient transportation network, healthcare facilities and educational institutions. A competitive economy also serves as a catalyst for innovation and entrepreneurship to inculcate sustainable practices. Furthermore, economic competitiveness and opportunities provide the financial means for individuals and communities to invest in and support the development and preservation of culture, which nurtures a sense of belonging and cohesion among residents.



Coworking spaces have become more prevalent with changes in the way people work

Photo courtesy of Zairon (CC BY-SA 4.0) / Wikimedia Commons

EMERGING TRENDS IN THE ECONOMIC CLIMATE

Cities are susceptible to shifting trends that can disrupt and impact economic structures and conditions. For instance, industrialised and developed economies are currently experiencing demographic shifts due to ageing populations. In a city like Singapore which is heavily dependent on human capital, an ageing population, combined with a dwindling total fertility rate, may pose a challenge as its workforce will likely shrink in the future.

The global competition for talent is also intensifying as workers become more mobile due to improving digital connectivity and changing work patterns. The COVID-19 pandemic in particular altered the way people work, especially for those in knowledge-based sectors where hybrid and fully remote working arrangements are being widely embraced. The demand for global talent has increased more than ever, as highly skilled workers in fields such as technology and sustainability are being competitively sought out.⁴³ Expectations of workers are also changing, with many opting for jobs that offer greater work-life balance, better compensation packages, increased flexibility and a more inclusive work environment.⁴⁴



Singapore's Energy Market Authority is working closely with both private companies and public agencies to maximise the deployment of solar energy and address challenges encountered in harnessing solar power⁴⁵

Photo courtesy of Deom12 (CC BY-SA 4.0) / Wikimedia Commons

The globalised economy is vulnerable to external shocks and has to be well-prepared to deal with unforeseen challenges ahead. For example, when the pandemic led to the closure of borders, supply chains were disrupted and businesses had to pivot their working arrangements and business models to adhere to health protocols. Heightened uncertainties have impacts on the economic competitiveness of individual cities, especially when plans and policies take time to implement. There is therefore greater impetus for cities to equip themselves with the instinct for recalibration and agile responses to better navigate a more volatile external environment.

Emerging technologies like artificial intelligence (AI) and robotics will also change ways of working. In extreme cases, they could even render certain jobs obsolete. If cities and industries do not adapt accordingly to restructure, they face the risk of falling behind. Those that are able to remain nimble and catch these technological waves will have an advantage in competing on a global stage.

Similarly, as industries face increasing pressure to become more environmentally sustainable, the shift towards renewable energy, energy-efficient technologies and sustainable practices is creating new economic possibilities. For example, Singapore's transition towards a low carbon economy presents opportunities for businesses in areas such as green finance, carbon services and trading, as well as sustainable tourism.⁴⁶ However, this transition also presents challenges such as the need for significant investment in new infrastructure and the potential displacement of legacy industries. Successfully navigating these changes will be crucial for cities to harness the full potential of a low carbon economy while ensuring inclusive and sustainable economic development.

Competition for global talent, changing work patterns, the emergence of green growth sectors, and shifts in the geopolitical landscape serve as driving forces that are reshaping the global economy and the environments where people work. These trends are compelling governments and cities to adopt holistic and resilient approaches to building economies that emphasise both vibrancy and sustainability alongside competitiveness.

OUTCOME DEFINITION



[The economy] I think is a lot more complex today. It's not just about being competitive, it's also about being vibrant and sustainable. Sustainable in two senses. One, to ensure that economic growth and development is sustainable...not just over the next few years, but in the long run. [The second] is sustainability from the point of view of the environment..."

Gan Kim Yong

Deputy Prime Minister (2024-present), and
Minister for Trade and Industry (2021-present)

The concept of a competitive economy goes beyond conventional economic measures to encompass diverse factors that speak to dynamism and resilience. Fostering an innovative and inclusive business environment that is welcoming to different cultures and lifestyles is essential to enhancing well-being and satisfaction of workers and their families. Being competitive not only involves attracting global talent and continually creating good job opportunities, but constant investment in workforce development through educational pathways and training programmes that equip workers with relevant skills to withstand future economic shifts. As emerging industries and the demand for highly skilled workers continue to grow, it is crucial for Singapore's workforce to remain competitive by having essential skills as well as opportunities for continuous learning and skill development.

Singapore's workforce will also need to remain inclusive, with both employees and employers feeling empowered and valued for their skills. Singapore's commitment to developing the capability of its workforce was seen with the rollout of SkillsFuture Singapore (SSG) in 2015. The SkillsFuture Movement aims to promote a culture of lifelong learning and skills development, providing Singaporeans with opportunities to develop their fullest potential throughout life, regardless of their starting points.⁴⁷ SSG has introduced numerous initiatives that cater to Singaporeans looking to improve their skillsets—whether early in their career or in their silver years. In 2024, about 550,000 individuals, and employees from 24,000 enterprises, participated in SSG-supported programmes.⁴⁸ For jobseekers who are involuntarily unemployed, the SkillsFuture Jobseeker Support scheme that was launched by Workforce Singapore in mid-April 2025 provides temporary financial support to lower- and middle-income involuntarily unemployed jobseekers while they take part in meaningful job search activities.⁴⁹

To grow its economy, Singapore also ensures that businesses can access the talent that they need, by building a high-quality foreign workforce that complements the local workforce. In January 2023, the Ministry of Manpower launched the Overseas Networks & Expertise Pass (ONE Pass) to attract global talent and rainmakers who transform businesses and create opportunities in Singapore. As of 1 January 2024, nearly 4,200 ONE Pass applications have been approved.⁵⁰

The intangibles of Singapore's economy, such as cultural and social offerings, are also important in attracting and retaining both local and global talent. While Singapore is a vibrant city with a rich multi-cultural heritage expressed in its cuisine and architecture, it also attracts global pop star acts and hosts meetings, incentives, conferences and exhibitions for a diversity of sectors including technology, business and health.⁵¹



[I]t's about people, right? And if the people are rooted to the place, that's how you can help ensure that there's a certain robustness to it and even for those who are foreigners...the liveability and vibrancy are important...To the extent that we can root them through clustering of knowledge and people and like-minded activities, we will do that."⁵²

Beh Swan Gin

Managing Director, Economic Development Board (2008–2012)

OPINION

OUR COMPETITIVE EDGE— HARNESSING EMERGING TECHNOLOGIES FOR A RESILIENT AND SUSTAINABLE SINGAPORE

By Dr Lim Jui

Chief Executive Officer, SGInnovate

Singapore has long served as a global case study for cities and countries looking at integrating innovative technology-driven urban solutions on the path towards growth and resilience. Our momentum on this journey has been a result of deliberate planning, strategic investments and a robust Research, Innovation and Enterprise (RIE) strategy that aligns government, industry and academia in a shared vision for development that focuses on impact and fosters adaptability.

In our pursuit of liveability, sustainability and a competitive economy amid 21st-century challenges such as resource constraints and climate change, new vistas of growth and models of innovation are needed. Many agree that new, emerging technologies ranging from quantum computing to cell-based agriculture and nuclear fusion potentially hold the key to moving forward, but how can we ensure that Singapore is ready to build and support the innovators translating these innovations into real-world solutions?

LEVERAGING OUR KEY INNOVATION ENABLERS

Fundamentally, we can attribute the development of Singapore's innovation ecosystem to a combination of five key enablers, the first of which is our strong government support for research and development. This is best exemplified by our RIE plans which are laid out every five

years, charting the course for all translation, commercialisation and innovation strategies at a national level. Identifying these strategic technology domains has enabled Singapore to respond quickly to new priorities and seed capabilities in a steady and sustained manner.

Our relative political and economic stability have served as a bedrock to build a hub for startup investments. With over 500 venture capital firms and more than 220 incubators and accelerators, Singapore is now one of the top destinations for funding and startup development, accounting for nearly 70% of all venture capital raised in Southeast Asia.⁵³

This, together with other factors, namely our progressive regulatory approach, robust IP protection frameworks and world-class talent, has helped to maintain our competitive edge. Our openness to new ideas and technologies, from cell-cultured meat to FinTech sandboxes, has earned us a global reputation as an ideal place for testbedding and enabled a strong culture of innovation to take root.

INNOVATION DISTRICTS AS STRATEGIC INFRASTRUCTURE

Complementing this, Singapore's approach to strategic infrastructure planning saw the development of innovation districts like one-north and Singapore Science Park, which are purposefully designed to co-locate research institutes and universities, multinational companies, venture capitals and incubators to foster innovation and academic-industry synergy for high-value sectors.

For example, take the co-location of the National University of Singapore's Global Research and Innovation programme with BLOCK71 at one-north, which was intended to facilitate the cross-pollination of ideas, seamless collaboration and lower costs through shared access to resources. Such a set-up has supported the growth of numerous startups within the immediate innovation ecosystem, such as lithium-ion battery recycling company NEU

Battery Materials. The startup benefited from ready access and close proximity to venture-building support, mentorship, industry connections and potential investors. As a result, in 2023, it successfully raised an oversubscribed S\$4.9 million seed round led by SGInnovate.

Building on the impact of such hubs, our government recently announced that it will commit S\$1 billion to refresh our biosciences and medtech infrastructure at one-north, and build a new national fabrication facility for research and development that will offer access to industry-grade prototyping tools. These continued investments ensure our innovation ecosystem remains agile and able to support the needs of all stakeholders in the vicinity.

PRIORITY AREAS IN EMERGING TECHNOLOGIES

Many lessons can be drawn from today's biggest disruptors and challengers, who have completely upended traditional business models, making us rethink how we use and interact with technology. For instance, ride-hailing applications have reshaped the way people and goods move in urban environments, while mRNA vaccines have transformed the way we combat emerging infectious diseases, as they deliver more targeted immune responses and can be developed quickly for mass production. To help Singapore prepare for the next chapter of its innovation journey, strategic roadmaps are in place to offer a longer-term perspective on the development of key emerging technologies, and to shape initiatives aimed at nurturing our own generation of disruptive companies.

For instance, Singapore's work to build expertise in the quantum domain, which began in 2002, was recently given a S\$300 million shot in the arm as part of the National Quantum Strategy to cover various ambitions from building our own quantum processors to quantum sensing. Notable startups like Horizon Quantum, SpeQtral and Atomionics have since emerged, driven by support from

SGInnovate, with Horizon Quantum en route to establishing a first-of-a-kind quantum computing hardware testbed by 2025.⁵⁴ Similar promising companies have established themselves in other priority sectors. SunGreenH2 has developed proprietary nanostructured materials for hydrogen electrolyzers, capable of higher hydrogen output while consuming less energy, all without the need for expensive platinum group metals. Such a game changer for wide-scale green hydrogen adoption will be a key enabler of our National Hydrogen Strategy and a linchpin for many countries to meet their decarbonisation targets.



SGInnovate has supported quantum tech startups like pQCee, who developed inoQulate—a software application that adds a layer of quantum authentication to any Adobe PDF document

Photo courtesy of SGInnovate

CULTIVATING PEOPLE FOR A COMPETITIVE, DEEP TECH ECOSYSTEM

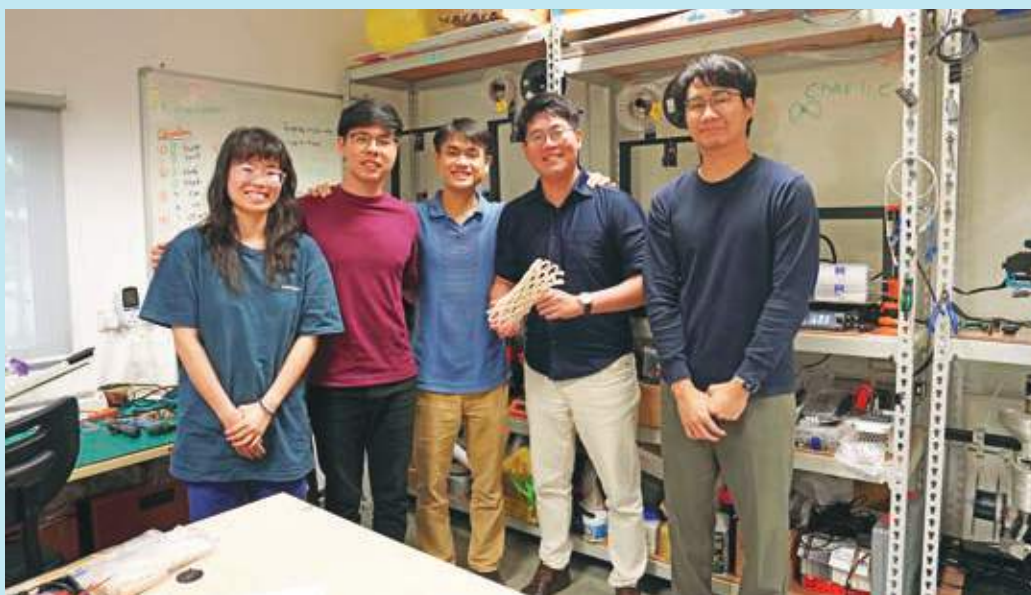
While we can facilitate innovation and research to build these great companies, having the right people will always be a major factor in the success of these endeavours. Just as deep tech companies are building solutions for global problems, the competition for the corresponding talent and skills required in areas such as AI, quantum computing and biotechnology is similarly global. Such challenges are especially acute for early-stage companies, and with such products and solutions themselves being very nascent, the people equipped with both the technical and business know-how to grow such a company—and ability to do it again—are in extremely short supply.

Talent is one of the biggest limiting factors to growing any innovation ecosystem, and Singapore has largely approached this challenge in two ways—by building a sustainable pipeline of local talent through high-quality education, training and upskilling, and supplementing this by attracting world-class global talent.

Coordinating and facilitating the flow of talent into local emerging tech startups at different stages needs to be approached with an ecosystem-level perspective. SGInnovate curates and consolidates these efforts by working with public sector agencies and national platforms, such as the National Robotics Programme and the National Quantum Office, to avoid cannibalisation and duplication. For early exposure to startups, platforms such as the Summation programme collaborate with partners to place STEM students into apprenticeships at local deep tech startups to work on technical projects alongside mentors. At the same time, mentorship, business support services and resources for founders such as Tech@SG are increasingly available to help develop more senior-level talent. Jointly administered by the Singapore Economic Development Board and Enterprise Singapore, Tech@SG aims to help fast-growing tech companies access the global talent they

need to grow and scale their businesses in Singapore and the region.⁵⁵ This is complemented by new initiatives such as ONE Pass that strengthen Singapore's ability to attract leading innovators and technical experts.^{56,57} Another example is the Tech.Pass visa, which allows established tech entrepreneurs and technical experts from around the world to come to Singapore to perform frontier and disruptive innovations.⁵⁸

Tracking the impact of such interventions is still in its early days, but an ecosystem-level platform such as Deep Tech Central could offer a more complete picture of the data. This would also allow SGInnovate and our partners to better understand the movement of people and skills at various stages of their career, and across different institutions and sectors. With time, the insights gained can provide a much clearer perspective on the gaps our startups face, and in turn help to coordinate our responses nationally.



Mentoring Summation apprentices at local medtech startup Customize, a spinoff from the Singapore University of Technology and Design

Photo courtesy of SGInnovate

COLLABORATIONS AND PARTNERSHIPS—A BLUEPRINT FOR A SUSTAINABLE, FUTURE-READY CITY

Over 97% of deep tech ventures contribute to meeting one or more of the United Nations' Sustainable Development Goals,⁵⁹ often by merging innovations from diverse fields in unique ways. This cannot be achieved without close collaboration from all players in the ecosystem, and Singapore's ability to assemble people and activate resources quickly is, after all, one of our unique strengths.

Numerous initiatives have been announced or are currently underway at the national level—including plans to train talent in the quantum and nuclear fusion space, as well as platforms such as the National Graduate Research Innovation Programme to nurture deep tech startups from across all research performers in Singapore. Together, these collaborative efforts are aimed at fostering relationships between industry and academia, and greater alignment across institutions to not only sharpen Singapore's technological edge but also shed light on our path towards net zero emissions.

Our journey towards building a sustainable and competitive city is an ongoing process, and the interconnectedness of our startup ecosystem remains key to this vision. The groundwork has already been laid, all that remains is to realise the potential of what we have built.

An environment that is business-friendly, efficient, safe, stable and trustworthy, with resilient infrastructure to support the economy, builds confidence for investors. With this mindset, Singapore has established itself as an attractive business destination, recognised as an economic powerhouse and of strategic value to others. Singapore continues to remain a global economic hub because of its vibrant startup ecosystem, research facilities and progressive policies. For instance, Startup SG was established in 2017 to make avenues of support more accessible for startups and ecosystem partners through various initiatives and programmes.⁶⁰ Singapore has also consistently developed multilateral relations with countries in the region as well as the rest of the world. Over the years, Singapore has implemented 27 free trade agreements which have helped it in its global economic activity.⁶¹

For Singapore to bolster itself as a place with economic heft, it is imperative for its businesses, including local small and medium enterprises (SMEs), to expand their presence overseas and compete on the international stage. For example, the Market Readiness Assistance Grant from Enterprise Singapore (ESG) provides financial support for SMEs venturing abroad by covering expenses related to international expansion, market promotions and business development.⁶² Additionally, the Partnerships for Capability Transformation (PACT) scheme, jointly implemented by the Singapore Economic Development Board (EDB) and ESG, aims to foster productivity enhancements, knowledge transfer and innovation for local companies, particularly SMEs, by facilitating collaborations with multinational corporations.⁶³ PACT encourages joint product development and consortium partnerships, empowering SMEs to embrace specialised technologies and pursue mutual business opportunities. Aiding Singapore's SMEs in their global expansion reinforces the competitiveness of the nation's economy through their growth and resilience.



Capturing the vibrant spirit of the city, i Light Singapore is a festival where art, innovation and sustainability converge to illuminate the cityscape

Photo courtesy of Jorge Cortell (CC BY 3.0) / Wikimedia Commons

OPINION

FROM ADDITIVE TO MULTIPLICATIVE GROWTH—SPARKING VALUE AT NEW INTERSECTIONS OF PEOPLE, PLACES AND PRODUCTION

By Melody Hong

Senior Vice President and Head of Strategic Planning,
Economic Development Board

A competitive city attracts workers, entrepreneurs and companies with the opportunity to create more income with less effort than an alternative location would.

For the first 50 years of Singapore's history, this was about leap-frogging other countries in the region by providing first world quality at third world cost to attract multinational investments. This meant providing affordable housing and education for the workforce, the allocation of land and facilities for industrial use, and transport networks to enable the easy flow of people and goods internationally. Today, multinationals in Singapore make high value products that are shipped across the world—pharmaceuticals, specialty chemicals, semiconductors, laboratory equipment and industrial machines.

Looking ahead, the basis for competitiveness is changing. First, the open multilateral trading environment that enabled Singapore's growth through most of our history has changed. The global economy is now much more complex with the resurgence of national strategic competition and industrial policy.

Singapore cannot compete with larger countries on cost and industrial subsidies. Instead, we need to double down on providing speed and efficiency, and the quality of our ecosystem both locally and regionally. Second, Singapore is already a mature economy and cannot be sustained by catch-up growth alone. We need to innovate our way forward, and combine the building blocks of our economy in new ways to deliver value for our region and the world. The way we do so must facilitate emergence—the ability of the economy to reinvent itself in keeping with the times. Third, the aspirations of our people are shifting. More are looking for opportunities with outsized impact and purpose, whether in leadership positions, or creative roles with scope for greater agency and autonomy such as new venture creation, product development and the like.

What does this mean for how we redefine the basis of competitiveness in the next lap, and how will our conception of a liveable city change alongside it?

REGIONALISING OUR ECONOMY

The fragmentation of the global economy means that our immediate region is an important ballast for growth, as is Singapore's role connecting our region to the world.

The region's relevance is growing as a production base as multinationals seek to diversify their supply chains from China, and as an attractive and relatively open market in its own right. Southeast Asia is already the world's 5th largest economy, and has a rapidly growing middle class that is expected to double from a quarter of the population today to more than half in 2030. The size of the middle class will reach 300 million, exceeding that of the United States' 200 million, and be disproportionately young, urban and digital.

What remains unchanged is Singapore's role in the region—with manufacturing and services as twin engines of growth and development. Our manufacturing sectors enable us to sell to markets far away and give our people and the region's companies the chance to work with globally leading businesses, best-in-class management practices and cutting-edge technology. Our services sectors largely serve the region and give us the potential to play the role of innovator to bring our global know-how to address the unique needs of our region. Up until now, the twin engines have run independently by and large, enabling Singapore to diversify our economy, but the increasing development and sophistication in our region also means that they can now come together in synergistic ways—for example, by harnessing family wealth in the region to invest in digital and sustainable product development in Singapore which will in turn catalyse the region's growth trajectory; by tapping on the know-how of our factories and supply chain teams to help multinationals orchestrate local supplier development and technology transfer in the region; and by repurposing our research and development capabilities to serve the region's needs, such as the application of our bio-manufacturing capabilities to green a variety of industries in the region, from textile dyeing to biofuels.

As our role in global manufacturing value chains and regional innovation grows, we will come up against resource constraints—for example, land for new manufacturing investments. We will need to re-imagine Singapore as a liveable city not just of 600 km², but connected and integrated with our region of 4.5 million km² and its rich, diverse and complementary ecosystem.



Collectively as a system, Singapore's air, land and sea transport serve as critical hub infrastructure to enhance its connectivity to the rest of the world

Photos courtesy of Unsplash, Land Transport Authority, Teo ZhiYi

CREATING VALUE AT THE INTERSECTIONS OF INDUSTRIES

Singapore is a mature economy. Over time, our growth has been powered by the addition of new pillars of strength—in electronics, chemicals, biomedical sciences, and information and communication technologies. Much of this growth has been capital-intensive, requiring significant amounts of land and electricity, and in return generating outsized GDP and productivity growth for Singapore and a world-class reputation for quality. There are natural limits to this type of additive growth, and Singapore must move past this focus.

To be vibrant and innovative, we need to think in terms of multiplicative growth. This means earning supernormal profits not just from dominating a single industry or value chain, but seeing the opportunity to create new value from the intersections of existing industries, networks and flows. This represents a shift from industrial policy paradigms of picking preferred sectors to grow, to thinking much more in terms of network economics—in LinkedIn for example, the most valuable person is not necessarily the one with the largest physical network, but the one that has the highest chance of making unique and value-adding connections for others in the network—by virtue of having the most connections, being connected to the most influential individuals in the network, or serving as a bridge between communities which otherwise would not have been connected. The ability to combine elements in a unique way is how a company like Finnish energy giant Neste established the world's largest production facility for sustainable aviation fuel in Singapore by tapping on processing capabilities in Tuas South, and Changi Airport as an aviation hub. This example illustrates that we are able to understand the needs of customers beyond our shores, and apply the world's best technologies to design and make physical products that serve real-world needs.



The one-north development is a mixed-development project designed to support the growth of an innovation and commercialisation community anchored around research, science and infocomm technology; it consists of 8 district projects, houses over 400 leading companies, 15 public research institutes and 50,000 knowledge workers, and has hosted more than 1,300 tech start-ups

Photo courtesy of JTC

Singapore is unique in being a densely built-up city-state, with an outsized concentration of sophisticated decision-makers and a great diversity of industries. If urban design can re-imagine how different parts of our economy come together physically to foster a density and quality of business interactions between makers, innovators and financiers across a variety of industries, we can make Singapore the best place to “make the impossible, possible”, and create the future rather than being disrupted by it.

BUILDING INCLUSIVE GROWTH

A successful city must serve the needs of multiple constituents within its resident population, while also catering to visitors who bring economic benefits and additional diversity. Together, these people power the vibrancy of the city, and the way that they interact with one another impacts its liveability.

This in turn is influenced by the job structure of the economy and its impact on social equality, mobility and how we treat people in different occupations. Throughout Singapore's history, we have relied on foreign labour to keep costs low, as we competed internationally to catch up on growth. This has led to disparities in our economy and a widening wage gap across different occupations, from nursing to plumbing.

For us to move past our history of catch-up growth, we will need to compete not on costs, but on skills, technology, service and innovation. This means making innovation pervasive, and not just the preserve of certain sectors, firms or entrepreneurs. It means making it worthwhile for

individuals to upgrade and professionalise their skillsets in every occupation, especially in technical, service and community care roles. The implication would be consumers having to pay more for certain goods and services in order to raise the wages of those providing them, but at the same time, embracing innovation and higher productivity would lead to increased wages for consumers, allowing these higher costs to be bearable. This paradigm shift, as Mr Ravi Menon lays out in his IPS (Institute for Policy Studies)-Nathan lecture series, is a necessary move towards a new Singapore synthesis—an Innovative Economy, an Inclusive Society and an Inspiring Nation.

Over the long term, the foundation of a competitive economy for Singapore will rest not on dollars and cents, but the ability of our city to bring together people who believe they have broadly equal opportunity to move up in life, and are inspired by purpose and to keep innovating to be relevant in the world.

Note: The views and opinions expressed in the above article are solely those of the author's and do not necessarily reflect the official policy or position of the EDB.

CONSIDERING THE ROLE OF PLANNING AND GOVERNANCE IN SUPPORTING ECONOMIC GROWTH

Singapore's systems, characterised by comprehensive and forward-looking urban planning approaches and coupled with good governance, have been crucial in achieving its economic development objectives. This includes the allocation of land and infrastructure for industrial use, as well as the establishment of efficient transportation networks.

The strategic allocation of land has facilitated the creation of industrial parks in Singapore, which play a great role in supporting its economic landscape. Jurong Industrial Estate, Tuas Industrial Estate, Changi Business Park, one-north and the Woodlands Industrial Park are home to a wide spectrum of industries such as manufacturing, logistics, technology, and research and development. These industrial parks serve as places for innovation, production and business activities, contributing significantly to Singapore's economic and commercial prowess.

Singapore's comprehensive transportation infrastructure has laid the foundation for fostering a competitive economy by connecting Singapore to the rest of the world via land, air and sea. Changi Airport offers extensive flight options and amenities for travellers, supporting international business activities as well as tourism. The ports of Tanjong Pagar, Keppel, Brani, Pasir Panjang, Sembawang, Jurong and Tuas also serve as important global connections, solidifying Singapore's status as a world-leading hub for container transshipment.⁶⁴ Its land transport, including rail and bus networks, not only connects Singapore to nearby countries like Malaysia, but facilitates domestic connectivity, ensuring easy access to workplaces for employees as well as efficient movement of goods and services across the city, providing businesses with good access to markets.

Singapore's transportation networks are thus important in supporting its economic growth through international and domestic connectivity, and by enabling business ecosystems to take root and thrive.

CONCLUDING POINTS

As the cycles for economic growth and infrastructure development are not necessarily in sync, Singapore must continue navigating the challenges around its scarcity of land in order to build for resilience while also being responsive to emerging needs. Sound institutions will allow adaptations to be adopted in a timely manner, thereby fostering effective and efficient policymaking to support the growth of Singapore's economy.



An aerial view of Resorts World Sentosa, an integrated resort and popular tourist attraction in Singapore

Photo courtesy of Andrew @ Redbean

Outcome 2

SUSTAINABLE ENVIRONMENT

CONTEXTUAL CONSIDERATIONS

A sustainable environment is a fundamental goal that Singapore has consistently pursued. Despite prioritising economic development in its early years, Singapore’s leaders did not adopt a “develop first, clean later” approach. Instead, environmental sustainability was integral from the outset of its development journey in order to ensure the long-term availability of vital resources for the nation’s survival.



Parks and greenery in Singapore are within easy reach of the community
Photo courtesy of Unsplash

Considering Singapore's limited land area and scarce natural resources, any damage done from having a single-minded focus on development would have resulted in fewer resources left to clean up later. Therefore, prioritising clean air, clean water and green cover was integral to city planning.



Our founding Prime Minister Mr Lee Kuan Yew believed that if Singapore can manage our physical environment well, with clean streets and clean food, we can attract foreign investors and tourists to Singapore. Economic growth and a clean environment go hand in hand!"

Grace Fu

Minister for Sustainability and the Environment (2020–present), and
Minister-in-charge of Trade Relations (2024–present)

More importantly, there was a strong commitment to the concept that environmental protection was not at odds with economic development. Instead, the government saw that having a clean and green city was critical to position Singapore as a well-run country—helping to attract tourists as well as foreign investment.

The Garden City vision, introduced by then Prime Minister Lee Kuan Yew in the 1960s, aimed to transform Singapore into a city abundant with greenery and a clean, litter-free environment.⁶⁵ Its focus on rapid greening was achieved through park provision standards and codes for roadside landscaping, which were incorporated into the urban planning process.⁶⁶

The 1971 Concept Plan—Singapore's first strategic land use and transportation plan—incorporated environmental considerations into planning through zoning. Industrial sites were strategically zoned to minimise long-term negative impacts on the environment, including considerations of wind patterns to ensure that activities from industrial estates in the western parts of Singapore would not result in air pollution for the rest of the city.

Measures were also implemented early on to enhance sanitation and hygiene, including controlling pollution through legislation and by separating sewers from drains. One of the key projects was the clean-up of the Singapore River which kicked off in 1977, overhauling it from a polluted and foul-smelling waterway to a beautiful destination for locals and tourists alike.⁶⁷ These early initiatives laid the groundwork for the country's future environmental policies and set the stage for more comprehensive sustainability efforts.



Completed in 2012, Gardens by the Bay offers a prominent green space in the heart of the city, attracting residents and tourists

Photo courtesy of Unsplash

With the 1991 Concept Plan, the Urban Redevelopment Authority (URA) envisioned the future city to be one where nature and the urban environment coexist seamlessly.⁶⁸ The launch of Clean and Green Week exemplified this approach and aimed to create greater awareness about the environment among residents.



By the 1990s, Singapore can become a green, shady city filled with fruits and flowers, a city worthy of an industrious people whose quest for progress is matched by their appreciation for the beauty of nature.”⁶⁹

Lee Kuan Yew

Prime Minister of Singapore (1959–1990)

In the late 1990s, Singapore began its transition from a Garden City into a City in a Garden, aiming to further integrate greenery into the urban landscape and residents’ daily lives. This was exemplified by initiatives such as the Park Connector Network (PCN) which linked up many of Singapore’s parks and gardens via green corridors. A prominent feature of the City in a Garden transformation was Gardens by the Bay, which was completed in 2012. With its award-winning design and architecture, it is an iconic feature of Singapore’s urban landscape and a significant green space in the heart of the city—drawing tourists from all over the world, providing habitat for native fauna, and offering numerous recreational options for local residents.⁷⁰

Developers were also encouraged to incorporate greenery into urban infrastructure, such as through green walls and green roofs. For example, the Oasia Hotel Downtown, which features a striking façade covered in lush greenery, incorporates extensive vertical gardens that not only enhance the visual appeal of the structure but contribute to the local ecosystem and air quality. These efforts contributed to the city’s reputation as having a green and liveable environment, and evolution towards a more nature-centric urban landscape.



Bishan-Ang Mo Kio Park provides residents with access to green and blue spaces amid urban living

Photo courtesy of AtelierDreiseitl (CC BY-SA 3.0) / Wikimedia Commons

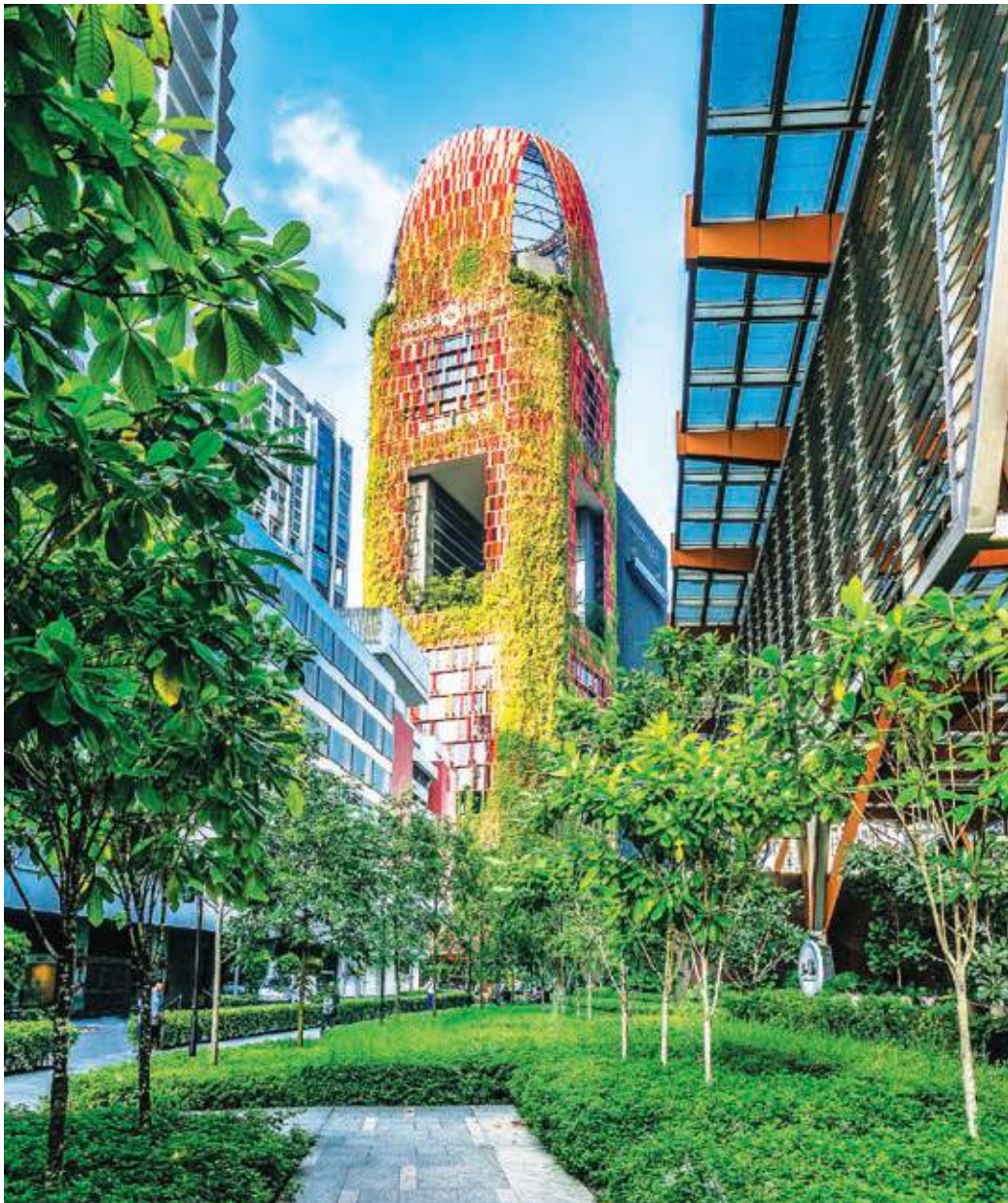
Beyond conservation and integration of green spaces into urban development, Singapore began to re-imagine its waterways with the launch of the Active, Beautiful, Clean Waters (ABC Waters) Programme in 2006. A key initiative by National Water Agency, PUB, the ABC Waters programme transforms Singapore's stormwater drainage infrastructure by creating vibrant green spaces along waterways. While the extensive and robust drainage network continues to primarily support flood management through the conveyance of stormwater to reservoirs, the ABC Waters Programme unlocked new possibilities for Singapore's waterbodies, transforming waterways and reservoirs into places for community enjoyment.⁷¹

Today, Singapore is navigating a new environmental reality, marked by more frequent and intense impacts from climate change. In particular, the rise in sea levels poses an immediate threat due to the country's low-lying topography, and is expected to continue to accelerate.⁷² Heightened weather variability, including droughts leading to potential water supply disruptions and intense rainfall overloading the drainage system, presents risks for water resource management. Rising temperatures can impact ecosystem processes, exacerbate vector-borne diseases and increase the occurrence of heat stress.⁷³ Projections suggest that there will be an increase in very hot days by the end of the century, and record high temperatures are already being observed.⁷⁴ Given the urban heat island effect, cities are particularly at risk from high temperatures and this will likely result in an increased demand for energy-intensive cooling. This will pose a challenge for Singapore, which relies heavily on imported energy and has limited renewable energy options.

Finally, while Singapore has actively pursued a mix of strategies and policies to ensure food security, its high dependence on food imports makes the nation vulnerable to global food supply and price fluctuations caused by climate-related events, geopolitical decisions and disease outbreaks.⁷⁵ Addressing these challenges requires not only reducing carbon emissions, but implementing measures to ensure social resilience so that Singapore can cope with these impacts.



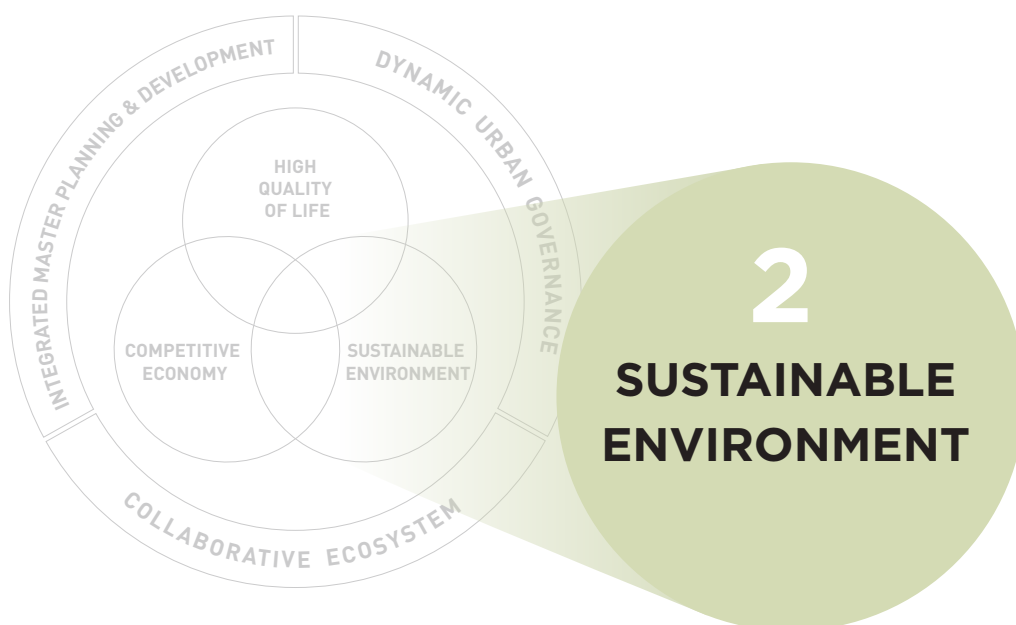
Climate change will bring about more frequent and intense rainfall
Photo courtesy of PxHere



The Oasia Hotel Downtown seamlessly blends modern architecture with lush greenery

Photo courtesy of 100pss (CC BY-SA 4.0) / Wikimedia Commons

OUTCOME DEFINITION



A sustainable environment encompasses environmental protection and emphasises responsible use of resources. In Singapore, it involves actively conserving its natural ecosystems, protecting its biodiversity and promoting the long-term health of the environment. Singapore is simultaneously working to ensure a reliable supply of essential resources and building resiliency so that it can withstand and recover from disruptions, adapt to changing geopolitical realities, and maintain essential functions in the face of climate change. Achieving a sustainable environment requires not only safeguarding its natural resources but also actively enhancing and re-imagining what it can do with them given Singapore's land constraints. Balancing competing land uses will be an ongoing challenge, requiring careful decisions regarding land allocation that place value on both conservation and development.

As the next bound to actively promote a green, liveable and sustainable environment for residents, and building upon Singapore's earlier greening and conservation efforts, in 2020 the Ministry of National Development (MND) introduced the vision for Singapore to become a City in Nature. This vision aims to further integrate nature into the urban landscape in order to promote biodiversity and enhance the overall well-being of Singapore's communities. The transition into a City in Nature involves strategies to naturalise its gardens and parks through biophilic and nature-based design.⁷⁶ Conserving and connecting natural habitats is another significant aspect of the City in Nature vision, and Singapore plans to establish an additional 200 hectares of new nature parks by 2030. Nature parks are green spaces on the edges of Singapore's nature reserves which act as buffers from development, offering complementary habitats for biodiversity and providing alternative green spaces for public enjoyment.⁷⁷

Key strategies behind the City in Nature vision involve intensifying planting efforts to incorporate greenery into residents' daily lives, with the added benefit of cooling the urban environment.⁷⁸ Ecological connectivity is also being enhanced through a network of ecological corridors called nature ways, which facilitate the movement of birds and butterflies by linking nature reserves and other green spaces across the island.⁷⁹ By 2030, the goal is to establish 300 km of nature ways.⁸⁰ Through the City in Nature vision, Singapore is working towards creating a sustainable and resilient urban environment that prioritises the conservation of nature while meeting the needs of its residents.



Featuring native plants, the Bedok Nature Way along Bedok South Ave 1 creates a connection between the green spaces at Bedok Reservoir Park and East Coast Park

Photo courtesy of National Parks Board

A sustainable environment also involves maintaining resource security. This includes ensuring access to water, food and energy for residents. Being one of the most water-stressed countries in the world, Singapore has developed the Four National Taps—local catchment, imported water, NEWater (recycled water) and desalinated water—to diversify its water sources. Leveraging innovative methods for harnessing and reusing water, and through public and private partnerships, Singapore has successfully grown a robust and diversified water sector.⁸¹ These proactive measures underscore Singapore's commitment to ensuring a sustainable and secure water supply, despite the challenges posed by its geographical constraints and the impacts of global climate change.

Food security is another primary focus for Singapore, given that it is a small and open economy that imports more than 90% of its food. A multi-pronged approach has been adopted to safeguard food resilience, such as by diversifying import sources and boosting local production. To help local farms become more productive and resilient, Singapore is availing land and infrastructure for farming, facilitating regulatory clearances for farm construction, improving energy efficiency and productivity, and encouraging demand offtake. Ultimately, these efforts aim to strengthen Singapore's food security while overcoming the constraints of having limited space for agriculture and aquaculture.



Through the strategic use of technology, research and development, and the optimisation of agricultural land, Singapore aims to enhance its food production capabilities

Photo courtesy of Kandl Studio / Adobe Stock



The Sembcorp Tengeh Floating Solar Farm is one of the world's largest inland floating solar farms

Photo courtesy of Sembcorp

Finally, energy is a critical resource for which Singapore has implemented various initiatives to ensure security. Whether derived from primary sources such as gas, oil and solar, or through secondary sources like electricity, energy is not just essential to liveability but holds an indispensable role in Singapore's economy.⁸² As with other resources, Singapore faces the complex task of navigating trade-offs inherent in the trilemma of striving to balance economic competitiveness, environmental sustainability and energy security.⁸³ The energy landscape has undergone significant changes in response to Singapore's evolving priorities and challenges, encompassing efforts to ensure a reliable and accessible power supply, improve energy efficiency and address expected impacts from climate change.⁸⁴

In line with global efforts to reduce carbon emissions, Singapore has elevated its national climate targets to reach net-zero emissions by 2050.⁸⁵ To achieve this, Singapore is transitioning its industry, economy and society towards low carbon. This will require the decarbonisation of its energy sector as it simultaneously ensures that this critical resource remains secure. Singapore imports nearly all of its required energy due to limited renewable energy options, but is trying to tap into its high levels of solar irradiation by exploring solar photovoltaic (PV) as a potential energy option. This is not without its challenges, such as limited land availability and intermittency due to cloud cover and urban shading. Despite this, Singapore is targeting to have at least a 2 gigawatt-peak of solar energy by 2030. It is investing in research and development to improve solar PV system performance and integrate it into the urban environment.⁸⁶

The EDB and Housing & Development Board (HDB) have launched the SolarNova initiative to expedite the implementation of solar PV systems. So far, the programme has helped to stimulate and consolidate the demand for these systems to achieve cost efficiencies and drive the growth of Singapore's solar industry.⁸⁷ HDB's Green Towns Programme focuses on creating sustainable and environmentally friendly public housing estates.⁸⁸ As part of this initiative, the HDB has been actively installing solar panels on the rooftops of high-rise public housing developments.⁸⁹ The PUB and Sembcorp Solar Singapore have also partnered to build a 60 megawatt-peak floating solar PV system on Tengeh Reservoir, tapping on available reservoir space to harness solar power in land-scarce Singapore.

In addition to ensuring resource security, Singapore is emphasising circularity in resource usage. Circularity minimises waste, reduces consumption of raw materials, and promotes efficient use of resources by closing the loop and reusing, recycling and repurposing materials. This approach helps conserve natural resources, reduce environmental impact, mitigate the strain on ecosystems, lower carbon emissions, and foster a more sustainable and resilient economy. The Tuas Nexus exemplifies this approach by integrating PUB's Tuas Water Reclamation Plant (TWRP) and



Infographic on Tuas Nexus which demonstrates how the closed-loop system would work to maximise resource efficiency and minimise waste

Image courtesy of National Environment Agency

the National Environment Agency's (NEA's) Integrated Waste Management Facility (IWMF) to co-locate water reclamation, solid waste treatment and energy recovery processes. This creates a closed-loop system that optimises resource efficiency and minimises waste.⁹⁰ It is scheduled for completion in phases from 2027 onwards and expected to result in an annual reduction of over 200,000 tonnes of carbon emissions.⁹¹

STRENGTHENING SINGAPORE'S RESILIENCE FOR THE FUTURE

Greater resource, climate and social resilience has become increasingly imperative in the face of mounting environmental challenges and global uncertainties. Singapore must anticipate more disruptions to supply chains which, as it saw during the COVID-19 period, can significantly impact liveability and leave residents more personally and acutely impacted by resource insecurity. It is therefore crucial to enhance resilience at the individual, community and systemic levels. Greater resource resilience is essential to ensure sustainable access to vital resources such as water, energy and food, while climate resilience is crucial for mitigating the adverse effects of extreme weather events and environmental degradation. Social resilience is equally vital, encompassing the capacity of individuals and communities to withstand and recover from shocks. Strengthening resilience across these interconnected domains is essential for building a more sustainable, adaptable and equitable future for all.

“ But with climate change, we know for sure sea levels will rise. The only uncertainty is whether they rise a few decades earlier, or a few decades later. Therefore, we will implement our climate change plans progressively, and keep them flexible.”⁹²

Lee Hsien Loong

Prime Minister of Singapore (2004–2024)

Singapore is also strengthening its resilience against both inland and coastal flood risks. The PUB conducts long-term planning for coastal protection measures against sea level rise and continuously upgrades drainage infrastructure to better mitigate inland flooding. For instance, the PUB has been promoting the adoption of flood mitigation infrastructure and strategies, including flood-proof buildings, elevated structures, flood gates and water-sensitive urban design.^{93,94}

Addressing climate-related risks and achieving sustainability necessitates a comprehensive approach to bolster social resilience, in part by mobilising the community in Singapore's sustainability journey. This involves education and introduction of policies and feasible measures to encourage more sustainable consumption patterns and lifestyle changes. Launched as part of the Singapore Green Plan 2030 and involving all schools from primary to pre-university, the Eco Stewardship Programme will enhance sustainability education within the curriculum and through school initiatives.⁹⁵ Another example is National Parks Board's (NParks) Greening Schools for Biodiversity Programme, which enables schools to cultivate indigenous flora and establish habitats for diverse wildlife.⁹⁶ This brings students closer to nature and fosters their stewardship of Singapore's natural habitats and biodiversity.



Protecting the environment ensures that wildlife can continue to thrive in their natural habitats

Photo courtesy of Unsplash

Nonetheless, while there is a growing demand for sustainability and green products among consumers, consistent behaviour that supports sustainability is not always practiced by the public. This is often due to inconvenience, such as having to bring reusable cutlery or recyclable bags to restaurants or on shopping trips, or choosing public transport over the comfort and convenience of a private car.⁹⁷ Government policies can help to incentivise sustainable choices and changes in behaviour. For instance, since 3 July 2023, larger supermarket operators are required to charge at least five cents for each disposable carrier bag provided to customers at their physical stores. It has also promoted behavioural change through incentives and rebates, such as the Climate Vouchers available under the enhanced Climate Friendly Households Programme that is managed by the NEA and PUB. The Climate Vouchers encourage households to switch to more energy- and water-efficient household products. In doing so, households can reduce their energy and water consumption, lower their utility bills, and help to tackle climate change. In April 2025, the programme was expanded to include private households to encourage wider involvement in climate action.⁹⁸



Promoting active mobility contributes to Singapore's sustainability goals

Photo courtesy of Unsplash

OPINION

ENERGY, SECURED—WHY GRID RESILIENCE IS KEY TO SINGAPORE'S CLEAN ENERGY TRANSITION

By S. Harsha

Managing Director, Sustainable Energy Solutions (Singapore),
SP Group

As an island with scarce natural resources, Singapore relies on energy imports to keep the lights on. However, we will need more, given that our electricity demand is expected to grow between 3% and 5% annually over the next decade.

A conundrum facing Singapore today is to reconcile our rising energy needs with a commitment to sustainability. The power sector currently contributes around 40% of our carbon emissions, necessitating a shift towards cleaner energy sources. This leads us to two crucial questions we need to address as we stride towards our ambitious goal to reach net-zero carbon emissions by 2050: how do we continue to green our energy mix, and how do we maintain a reliable supply of clean electricity imports?

At the Singapore International Energy Week 2024, Deputy Prime Minister Gan Kim Yong outlined three pillars that will shape the Republic's approach to clean energy transition—resilience, reliability and responsiveness. But our focus on incorporating renewable energy must also be complemented by improving energy efficiency today to support carbon emissions reduction.

TOWARDS A GREENER, MORE ENERGISED CITY

With a small land area and high urban density, Singapore is geographically restricted when it comes to scaling up renewable energy infrastructure. Natural limitations such as low wind speeds and the lack of fast flowing water to generate wind power and hydropower, respectively, also hinder our efforts to harness alternative energy. As such, our pathway to drive decarbonisation involves four switches—natural gas, solar, regional power grids and low-carbon alternatives. Here is where energy imports come to the fore as we pursue a greener energy mix.

Singapore is targeting 6 gigawatts of low-carbon electricity imports from regional power grids by 2035. Plans are already in motion—the Republic has announced a slew of conditional licences and approvals to import low-carbon electricity from countries like Indonesia, Cambodia and Vietnam.

While this will be key to a sustainable future for Singapore, renewable sources of electricity can often be impacted by unpredictable weather, which will be intensified by climate change. So how should Singapore ensure grid stability, when there are, for instance, already proposals in the pipeline to increase local solar deployment and import other forms of renewable energy such as solar or wind-generated electricity from around the region?

INNOVATE TO PROTECT

Pairing sustainability with energy security requires Singapore to build robust physical and digital infrastructure to ensure our electricity supply can always meet demand. This augments our already strong grid resilience—in 2023, the city achieved 0.15 minutes under the System Average Interruption Duration Index for electricity, meaning that each customer experienced an average of only 9 seconds of interruption the entire year.



SP Group has deployed rooftop solar panels on substations island-wide, with a total installed capacity enough to power more than 4,500 four-room HDB flats for a year

Image courtesy of SP Group

As the national grid operator, SP Group is the guardian of our grid, offering technical expertise to maintain our power supply and facilitate green energy imports. For instance, we have deployed rooftop solar panels on substations across the island to green the grid, and battery energy storage systems to ensure a quick response when solar installations are affected by cloud cover.

In order to harness these distributed energy resources to enhance grid stability, SP Group and the Energy Market Authority will be developing a Virtual Power Plant, or VPP. This digital platform will aggregate distributed energy resources to provide energy and ancillary services such as contingency reserves and frequency regulation to balance and stabilise the grid when required. This will form part of Singapore's Future Grid Capabilities Roadmap, which envisions the enhancement of our grid reliability through a combination of research and development, pilot projects and deployment efforts.

The VPP also ties in with another prong of the Republic's grid resilience efforts—demand response. This relatively new approach helps to balance the energy supply by encouraging consumers to voluntarily reduce their electricity consumption via their electricity retailers. By drawing less power from the grid, the network is stabilised during peak demand periods and by allowing greater flexibility in integrating more renewable energy sources that may be susceptible to aberrant weather.

At the same time, the Grid Digital Twin, comprising the Digital Asset Twin and Digital Network Twin, represents a pre-emptive approach that ensures our grid infrastructure's long-term performance. Using virtual replicas of our grid network and assets, we can identify and prioritise maintenance and renewal to prevent avoidable operational failures.

GREATER EFFICIENCY, LOWER CARBON FOOTPRINT

Even as we buttress our grid to incorporate more renewable sources into our energy mix, we must also proactively reduce our carbon footprint by ensuring energy efficiency.

According to the Building and Construction Authority (BCA), air conditioning consumes about half of a building's total energy usage. That could increase in the coming years as the National Environment Agency reported that the last ten years (between 2014 and 2023) were Singapore's warmest decade on record, and temperatures are expected to rise further.



With its various sustainable features, Labrador Tower is expected to use 40% less energy annually compared to other conventional similar-sized buildings

Image courtesy of SP Group

For commercial and industrial building owners, SP Group developed a suite of green digital solutions that integrates different building systems and diverse data sources, combined with artificial intelligence and the Internet of Things, to reduce wastage and lower both electricity consumption and carbon emissions. These solutions have been deployed in places like Republic Plaza and the Singapore Institute of Technology, resulting in energy savings between 18% and 30%. They have also been deployed at Labrador Tower, which contributed to its certification as a Green Mark Super Low Energy building by the BCA.

Enabling green mobility is another priority. SP Group currently operates one of the largest charging networks across the island to meet the growing demand for electric vehicles (EVs). Doubling down on transport electrification will see us take a big step towards decarbonisation, with the Land Transport Authority estimating that EVs produce half the emissions of internal combustion engine vehicles.

Amalgamating these efforts is the Distributed Energy Resources Management System, an integrated system that runs simulations on how Singapore can manage the increasing number of renewable energy assets while also optimising their performance through real-time monitoring.

These solutions highlight Singapore's proactive stance to safeguard energy security on the road to net zero. And while we have reached significant checkpoints, there is capacity to do more.

PARTNERING WITH THE GOVERNMENT

As Dr Tan See Leng, Minister for Manpower, emphasised in his speech at the Association of the Electricity Supply Industry of East Asia and Western Pacific CEO Conference 2024, power grids play a critical role in enabling the shift to sustainable energy. This is where the power sector and the government must work as one. Collaborations between the two have long been a game changer in Singapore's clean energy transition and boosting energy efficiency, both of which contribute to carbon abatement.



The Marina Bay district cooling network has achieved zero downtime since operations began in 2006

Image courtesy of SP Group

One example is the Marina Bay underground district cooling system—the world’s largest—which is supported by the URA. Designed, built and operated by SP Group, the system uses centralised chiller plants that optimise energy consumption to cool buildings efficiently. The system reduces carbon emissions by up to 20,000 tonnes annually, which is equivalent to removing more than 17,000 cars from our roads. Today, the network serves 24 developments in the surrounding area, and its connection could be expanded to 38 in the coming years.

The URA has also offered incentives to developers who establish or join district cooling networks. Under the initiative, these buildings would gain additional floor space that could be repurposed for commercial uses.

Maintaining this public-private synchronisation will ensure that Singapore is fully aligned with global sustainability standards, and reinforces our commitment to strengthen energy security. This means laying the foundation for an efficient electricity grid powered by clean resources.

We cannot create a sustainable future out of nothing. The onus is on us—from individuals to corporations and the government—to realise Singapore’s vision for a greener tomorrow.

CONCLUDING POINTS

To achieve a sustainable environment for the future, Singapore is evolving into a City in Nature, emphasising environmental conservation and further integration of greenery into the urban landscape. This shift not only projects a clean and green image externally, which helps Singapore to maintain a competitive economy, but also supports liveability for residents.

In response to the changing global context and heightened climate change impacts, Singapore's approach to sustainability has also incorporated the understanding that integrating nature into its urban fabric is important for ecological and climate resilience. For instance, development should prioritise regenerative design principles that mutually benefit both nature and humans, such as through nature-based solutions and adaptive reuse of ageing buildings.



Singapore is a city that co-exists in harmony with its natural environment
Photo courtesy of Unsplash

While government policies can help to promote sustainability and support the transition towards a net-zero future, individual behavioural change will also be crucial in mitigating climate change and ensuring the sustainable use of resources. Therefore, fostering a collaborative ecosystem involving the public, private sector and government is essential to bring people along on this sustainability journey.



Users of the Sentosa Skywalk enjoying the views and lush greenery in the area

Photo courtesy of Andrew @ Redbean

Outcome 3:

HIGH QUALITY OF LIFE

CONTEXTUAL CONSIDERATIONS

Quality of life is an expectedly broad concept with diverse perspectives on what it entails. For one, the World Health Organization defines it as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”.⁹⁹ Some cities and countries have also come up with ways to measure the quality of life of their residents. In Canada’s case, they have a Quality of Life Framework and elaborated that it “refers to the wealth and comfort of individuals, communities and society based on both material and non-material factors that are important to people’s lives, such as health and social connections.”¹⁰⁰ The individual components of various definitions may differ but most sources are aligned in focusing on the well-being of people.

Thus, a high quality of life is a vital liveability outcome to have alongside a competitive economy and a sustainable environment. For Singapore, it prompts the need to keep residents at the heart of everything that it does and is a reminder that the city cannot be developed at the expense of livelihoods and welfare. As Singapore continues to build its economy, it will need to consider how inclusive growth can be achieved. While it conserves nature and the environment, it also needs to prioritise housing, healthcare, transport and education for the benefit of its residents. Given that the needs for individual and collective well-being will also evolve over time, Singapore’s city leaders and planners need to be well plugged in to ensure liveability now and in the future.

Challenges like climate change, pandemics and technological shifts will undoubtedly impact the way people live, work and play, highlighting the importance of being prepared for disruptions even as Singapore provides for the needs of its residents to achieve a high quality of life.

COVID-19 is an example of a major disruption that underlined the significance of resilience. During the pandemic, cities around the world had to manage complex problems which included not only the public health crisis but also supply chain disruptions. In the 2021 edition of the Economist Intelligence Unit's Global Liveability Index, it was reported that the global average liveability score dropped by 7 points compared to 2020, partly because of the strain on the healthcare sector.¹⁰¹

Being a city-state with limited space and natural resources, Singapore is highly dependent on global trade. While its experience with the severe acute respiratory syndrome (SARS) epidemic had reinforced the importance of adequate stockpiles of food and medical supplies for times of emergencies, COVID-19 presented new challenges resulting from travel restrictions and manufacturing slowdowns that affected the movement of goods into Singapore. Coupled with panic buying, this led to temporary retail shortages during the early days of the pandemic.¹⁰² Although Singapore has done well in providing the essentials for urban living, COVID-19 is a stark reminder not to take anything for granted.

By 2030, it is expected that 1 out of 6 persons worldwide will be 60 years old or older.¹⁰³ Many mature cities are now facing ageing populations, and Singapore is no exception. Given its increasing life expectancy and declining fertility rate, it is projected that about 25% of Singapore's citizens will be aged 65 or older by 2030.¹⁰⁴ The ageing of the resident population is influencing how Singapore plans. Catering to its changing demographics, it is preparing for an age-friendly city both in terms of its hardware and its software. In parallel, Singapore is experiencing other emerging trends in its society. Notably it is seeing the rise of smaller resident households, with the proportion of those living alone having



People relaxing at Bedok Reservoir Park

Photo courtesy of Unsplash

increased from 9.5% in 2012 to 15.5% in 2022. Out of this segment, the largest jump was in those younger than 35 years, where there was an uptick of 9.3 percentage points from 7.1% in 2012 to 16.4% in 2022.¹⁰⁵ This indicates that the preferences of the population, especially of the youth, are becoming more multifaceted, and that quality of life ambitions call for a more holistic approach to meet the changing needs of a more diverse society.

Talent is also more mobile than ever before due to greater global connectivity and breakthroughs in technology. A 2023 survey conducted by the Institute of Policy Studies in Singapore showed that 44% of respondents would move overseas to work if given the opportunity.¹⁰⁶ At the same time, more countries like Germany and South Korea are offering digital nomad visas to attract remote workers. Many cities are able to function and run well; the ones that also offer opportunities for personal growth and life satisfaction will have an advantage in attracting and retaining talent.



As talent becomes increasingly mobile, cities need to ensure that there is a favourable economic environment and a good quality of life, to meet the aspirations of residents and stand out as a desirable place to both live and work.”

Desmond Lee

Minister for National Development (2020–2025)



Singapore is a vibrant cultural melting pot

Photo courtesy of Unsplash

OUTCOME DEFINITION



According to Maslow's hierarchy of needs, basic physiological needs must be satisfied before people can look to meeting higher-order needs. Likewise, what constitutes a high quality of life in a city can generally be differentiated into two tiers of basic and higher-order function.

Firstly, the fundamental provisions for quality of life have to be in place. These are aspects of liveability that are critical to keep residents safe and healthy and enable them to live comfortably. For instance, this includes having the right infrastructure, utilities and public services to meet day-to-day needs. Good education and a stable economy also play an important role in connecting people with opportunities in their schooling and careers. At the same time, planners and policymakers must aim for accessibility, affordability and resilience in the provision of these necessities for all.

Secondly, a mature city has to go beyond the basics to provide for the higher-order needs of its residents. These build upon the essential components of quality of life and often encompass the softer dimensions of a cosmopolitan lifestyle, such as sports, recreation, religion, arts and culture, as well as social and community assistance. In an era of technology, services like high-speed digital connectivity are seen as indispensable. These are the things that allow a city to thrive and contribute towards residents' happiness, fulfilment and sense of belonging.

IDENTIFYING SOME CORE TENETS OF QUALITY OF LIFE

Safety refers to low crime rates and protection from both internal and external threats, including societal tensions and terrorism. A safe environment allows people to lead their everyday lives with peace of mind. In Singapore, this is achieved through systems and institutions, rule of law, and with the trust and support of the people.

“Safety is not just about safety from crime. People are also concerned about safety from physical harm caused by natural disasters and climate impacts like sea level rise, floods and heat. Securing access to critical resources like food and water is also important.”

Stanley Loh

Permanent Secretary of the Ministry of Sustainability and the Environment (2022-present)

As the world becomes increasingly volatile, uncertain, complex and ambiguous, Singapore cannot be complacent and will need to constantly refine its policies to keep the city safe and secure. Ensuring safety thus extends beyond just crime prevention. For instance, climate change is a disruption that will affect not just the health of the planet, but also the way residents experience the city.

Singapore's built landscape lends itself to the urban heat island effect where the absorption and emission of heat, even after the sun sets, is intensified by the density of buildings and other structures. Combined with global warming, the consequent rise in temperatures is amplified significantly. The intense heat can affect residents' enjoyment of the outdoors, reduce their ability to stay outside for long periods and even cause illnesses or worsen certain medical conditions.¹⁰⁷ This can in turn affect sectors like construction, tourism and recreation, impacting Singapore's economic competitiveness in the longer term.

Singapore is often perceived to be an expensive city due to its high ranking on indices like the Mercer Cost of Living City Ranking. These lists are often made to calculate the allowances that companies should offer expatriates and may not reflect the average expenses of local residents. Yet, being a small economy, Singapore is a price taker and exposed to the dynamics of the global market. Rising costs are often disproportionately felt by those in the lower socioeconomic strata and within marginalised communities. Therefore, support measures have been made available, especially for lower- to middle-income households. In 2025, the Singapore Budget included vouchers and rebates as well as funds for skills development and training for workers.¹⁰⁸ Other measures are focused on affordability, such as the Budget Meals initiative where participating coffee shops in the heartlands offer meals for S\$3.50 or less.¹⁰⁹ To foster a more inclusive city, it should thus be underscored that affordability remains paramount.

UNDERSTANDING THE ASPIRATIONS THAT HELP TO ELEVATE QUALITY OF LIFE IN CITY LIVING

As a city-state, Singapore has had to tap on the strength of the whole of society in responding to problems. People-centric urban design, public spaces and community programmes can encourage social interaction among residents, which in turn generates greater social capital and cohesion in the city. To build community resilience, there also needs to be alignment among public agencies, engagement with local stakeholders and collaboration with non-governmental organisations and experts.¹¹⁰

OPINION

URBAN ALCHEMY—SMILES OVER DOLLARS IN PLACEMAKING TRANSFORMATIONS

By Lorenzo Petrillo

Founder, LOPELAB

In contemporary discussions about urban development and sustainability, the dialogue often gravitates towards economic indicators and physical infrastructure. However, achieving true vibrancy and enhancing the quality of life in cities, especially through the lens of placemaking, demands a broader perspective—one that prioritises the emotional and social outcomes of public spaces. Placemaking is not just about creating economically viable spaces; it is fundamentally about designing places that foster human connections, happiness and a sense of belonging, which are essential components of liveability. This holistic approach involves integrating the foundational pillars of hardware, software and orgware, each playing a crucial role in transforming public spaces into vibrant, sustainable and emotionally enriching environments that directly contribute to the liveability of a city.

HARDWARE: WORKING WITH THE PHYSICAL AND NATURAL ENVIRONMENT

In placemaking, hardware refers to the physical and natural environment of a space. This includes the architectural elements, landscaping, urban furniture and infrastructure that make up the physical surroundings. Effective placemaking ensures that the hardware not only serves functional purposes but also enhances aesthetic appeal and environmental sustainability. For instance, incorporating green spaces, pedestrian pathways and versatile public areas that can adapt to different activities and times of day ensures that urban spaces can cater to a diverse range of



The Urban Jungle by LOPELAB, a series of parklets that bring nature back to our streets, 2021
Photo courtesy of Lorenzo Petrillo

uses and users. The design and physical quality of these spaces directly influence how people feel and interact within them, making hardware a critical component of placemaking.

I am continually surprised by how today's urban furniture is still represented only by lampposts, trash bins, benches, bus stops and little else. There are sporadic examples of innovative urban design, but I am convinced that much more can and should be done. In 2018, in collaboration with the URA, LOPELAB tried to develop this concept and inspire people with the Urban Design Route—a temporary project where we worked with a dozen different partners including architects, graphic designers, artists, urban planners, engineers and students. Each partner created and developed with us an interactive urban element, either completely new or by revisiting existing ones. This initiative gave birth to wonderful ideas that undoubtedly changed the image of the neighbourhood where they were installed, bringing a breath of

fresh air, curiosity and fun for residents. This project exemplifies how urban furniture can go beyond its traditional roles and become a catalyst for community engagement, curiosity and enjoyment, thus playing an essential part in the placemaking process. By pushing the boundaries of conventional urban design, we can transform everyday spaces into vibrant, interactive and inclusive environments.

SOFTWARE: TAPPING ON PROGRAMMING AND SERVICES

Software in placemaking encompasses the programmes, activities and services that animate public spaces. This aspect of placemaking strategy breathes life into the hardware, turning static areas into dynamic hubs of activity. From cultural festivals and art installations to interactive workshops and community-led events, the software component ensures that public spaces are more than just visually pleasing—they are vibrant centres of community life.

Regular programming tailored to the needs and interests of the community helps foster a strong sense of belonging and attachment to the space, encouraging repeated and sustained engagement. An example of this is the work we have done for the Raffles Place Alliance in Singapore. By adding a lot of fun and movable chairs in Raffles Place Park, an open space in the financial district that was previously characterised by fleeting foot traffic, we activated this underutilised area by transforming it into an inviting space for people to sit, rest and work. These same chairs, coupled with an existing advertising screen, were then used for free movie nights under the stars, enhancing community engagement on weekends and evenings.

ORGWARE: CONNECTING STAKEHOLDERS

Orgware, often the most overlooked aspect of placemaking, involves the organisational and governance structures that support the ongoing management of public spaces. This includes the relationships and collaborations between various stakeholders such as city planners, local businesses, community groups and residents. Effective orgware ensures that these diverse voices are heard and integrated into the placemaking process, fostering a sense of ownership and mutual responsibility among all parties involved. Moreover, orgware facilitates the adaptation and resilience of public spaces by enabling responsive management and maintenance systems that can address changing community needs and challenges.

DESIGNING FOR DAY AND NIGHT, WEEKDAY AND WEEKEND

An effective placemaking strategy ensures that public spaces are not only inclusive and engaging but also versatile. It is essential for these areas to be active during the day and night and bustling with life both on weekdays and weekends. This approach prevents spaces from becoming dormant and underutilised, which can contribute to urban decay.

For instance, a well-designed public square might work as a social meet-up point, offering users and passers-by a place to rest, have a meal or host an informal meeting with colleagues. By night, the same space can transform into an open-air cinema or a venue for performing arts, drawing different crowds and fostering a multifaceted cultural atmosphere. Similarly, ensuring that these spaces are vibrant during the weekdays and on weekends helps cater to different demographics, including working professionals, families and the elderly, each looking for spaces to relax, interact or be entertained outside the usual nine-to-five weekday routine.

In conclusion, I believe that the transformative power of placemaking in creating vibrant and enjoyable urban environments hinges on cultivating a profound sense of ownership among residents over their public spaces. Just as one cares for their home by cherishing and maintaining it, I envision a future where citizens treat communal spaces with the same reverence and responsibility. This shift in perception—from seeing these spaces as mere backdrops to our daily lives to embracing them as integral parts of our personal and communal existence—is fundamental.



The Growroom, an open source project part of the Singapore Urban Design Route, 2018

Photo courtesy of Lorenzo Petrillo

To achieve this, it is essential that individuals feel empowered to activate and utilise these spaces in ways that reflect their needs and desires. When people see public spaces as extensions of their own homes, they naturally contribute to their upkeep and vibrancy. This sense of ownership not only fosters a deeper connection to the space but also encourages a culture of respect, stewardship and community involvement.

Enabling residents to shape their environment ensures that these spaces are not only maintained but are vibrant and dynamic. These elements are what make cities fun and exciting places to live. The “secret sauce” to creating such environments is ensuring that public spaces are seen not as realms managed by faceless entities but as communal living rooms where everyone is welcome to contribute, innovate and engage.

By fostering this mindset, we can transform our cities into places where the urban fabric reflects the diversity and vibrancy of its people. This approach does not just beautify spaces or make them more functional—it enlivens cities, making them places of joy, interaction and community. In such cities, public spaces become places where memories are made, where community ties are strengthened and where the heart of urban life beats the strongest.

OPINION

ARTS AND HERITAGE—THE SOUL OF A CITY WITH A NATION'S HEARTBEAT

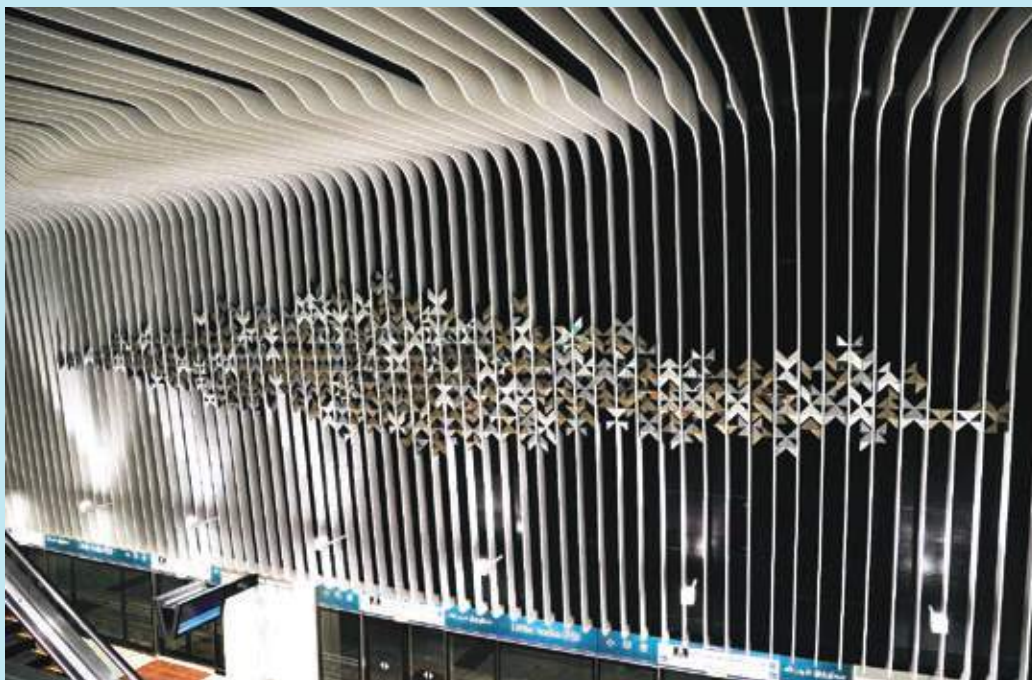
By Rosa Daniel

Dean, Culture Academy

In 2025, Singapore celebrates 60 years of nationhood since achieving independence in 1965 as a city-state. An old soul in a new nation, Singapore has a multicultural heritage rooted in ancient Asian civilisations, and is situated in the vibrant region of Southeast Asia at the confluence of trade, investment and people flows.

With a tiny land size of just over 730 km², Singapore has more than 75 monuments, 62 museums, 1 UNESCO World Heritage Site at the Singapore Botanic Gardens and more than 7,200 conserved buildings. These capture the essence of our rich past while reflecting our modernity in creative uses of built heritage and commemoration of intangible heritage.

Across our Mass Rapid Transit (MRT) network, several stations have designs and public art which reflect distinctive characteristics of their cultural precincts such as in Little India, Kampong Gelam, Chinatown, and the Civic District. Singapore's diverse intangible cultural heritage—including food, social practices, festivals and crafts—is embedded within our built heritage, some in the form of heritage businesses. Today, Singapore's hawker culture and the traditional kebaya, the latter of which was nominated for inscription through a multinational effort, are recognised on UNESCO's Representative List of Intangible Cultural Heritage. These efforts bear testimony to Singapore's sustained commitment for over six decades to infuse arts into the city and preserve our cultural identity while balancing the needs of present and future generations.



Located at the Little India MRT station, Woven Field by Grace Tan is a glimmering installation made of aluminium; inspired by traditional Indian saris, the tessellated triangular patterns also integrate the notion of weaving—interlacing the architecture and artwork to form a single entity

Photo courtesy of National Arts Council

VALUE OF ARTS AND HERITAGE TO A CITY'S LIVEABILITY

In the 2023 Population Survey on the Arts conducted by the National Arts Council (NAC), 75% of Singaporeans surveyed indicated that the arts and culture improve our quality of life. Close to 80% felt that the arts and culture give them a greater sense of belonging to Singapore. In the 2024 Heritage Awareness Survey commissioned by the National Heritage Board (NHB), 90% of respondents affirmed the importance of heritage buildings and sites in contributing to the

country's unique identity. These findings suggest that Singapore is a unique global city where the arts and heritage have contributed to building a distinctive and endearing home anchored with treasured memories, emotions, connections and identity.

Beyond its immediate intrinsic value, there has also been much research on the value of the arts in health and wellness, as seen in the 2019 evidence report on the arts and health by the World Health Organization.¹¹¹ The report includes a scoping review which maps the evidence of arts and health under two themes: prevention and promotion, and management and treatment. It presents findings that demonstrate the beneficial role of the arts in the care sector, such as in supporting child development, preventing ill health, providing care for people with acute conditions, and assisting with the management of noncommunicable diseases. These are dimensions that contribute to the quality of life in a city, and ultimately to its liveability.

NAC has laid strong foundations over the past 20 years to significantly widen access to the arts. Today, high quality public art can be enjoyed in commercial and community spaces beyond the walls of museums and galleries. Notably, the PAssionArts Festival hosted by the People's Association (PA), and ArtsEverywhere@CDC presented by the NAC and PA, in collaboration with Singapore's Community Development Councils (CDCs), have brought arts experiences to communities where they live, work and play. The large diversity of inclusive and accessible programmes is enjoyed by all segments of society, bringing communities together and forging a strong sense of identity.

INTEGRATIVE UPSTREAM PLANNING FOR OPTIMAL OUTCOMES

To preserve our built heritage as tangible representations of our history and cultural identity while allowing our cityscape to evolve, there has been upstream integration of heritage considerations in

Singapore's land use planning. Since 2019, the NHB has worked with the URA to identify sites of heritage significance and put in place safeguarding and mitigation measures where these are affected by development plans. The NHB also works with the HDB to conserve the identity of estates in their built environments. For instance, artefacts from the memorial garden of the former cemetery in the redeveloped Bidadari Estate have been integrated into the estate's new scenic parklands. Likewise, four historical buildings from the Old Police Academy will be conserved within a new housing estate, contributing to its distinctive characteristics.

To enhance current efforts in preserving our heritage, upstream integration of the arts would be a significant next step to further enliven our spaces and engage residents. While dedicated arts spaces have significantly expanded to almost 94,000 m²,* upfront design of townships and precincts can unlock more space through identification of suitable sites which can be enhanced through the arts.

Innovative space design for multiple uses, including the arts, is another sustainable response to land scarcity for a growing population which has attained a high standard of living. While developers may have concerns that such designs would incur time delays, additional costs and trade-offs with other potential use cases, we have seen both locally and internationally that this is feasible and impactful for the communities involved. Here at home, the Botanical Art Gallery, housed within the Singapore Botanic Gardens' Gallop Extension, enhances the beauty of the Gardens and highlights the important role that art plays in the scientific documentation of plants.

*Sum of gross floor areas of arts housing spaces and performance venues, and diversified arts spaces tracked by NAC in 2023. This excludes other arts spaces which exist in private and commercial spaces. Diversified arts spaces refer to spaces under the purview of other agencies and landowners utilised for the arts.

In Melbourne, Library at The Dock offers multi-purpose spaces for meetings, performances and community workshops, cementing itself as a destination for locals and visitors alike. Of a larger scale in Tokyo is the Roppongi Hills Mori Tower, a mixed-use skyscraper which houses the Mori Art Museum on its 53rd and 54th floors. The tower, together with the larger Roppongi Hills development, was opened in 2003 after 3 years of construction to the cost of ¥270 billion (S\$4.32 billion). Since then, the museum has proven a worthy investment which has transformed and uplifted Roppongi as an international cultural destination, boosting footfall which in turn benefits local businesses such as restaurants, cafes and shops.

In commercial and private spaces, support for community and cultural spaces has been incentivised by offering an increase in gross floor area allowance. Beyond this approach, there is potential to reap further benefits by implementing guidelines that require the inclusion of social and community activities especially in the arts and heritage. Existing examples are Funan Mall and Bugis+ which today already house major arts organisations. The expansion and activation of everyday spaces, coupled together with strong arts and heritage programming, will allow for a more vibrant and culturally rich environment, enhancing the overall liveability of Singapore.

ENGAGING HEARTS AND MINDS TO BUILD A HOME

Our current infrastructure and town planning processes already incorporate time and space for extensive public consultation and engagement. A strong case can be made to further leverage the arts and heritage for meaningful engagements that can appeal to every segment of society beyond professional and expert stakeholder groups. In particular, with Singapore's shifting demographics, our youths are more socially engaged and our senior citizens are contributing more actively to society. Citizen feedback from a range of voices across our society on what they desire for cultural pursuits will allow greater accessibility to the

arts and heritage. The creativity of our people can be unlocked to inspire designs of our urban architecture that can relate beyond the physical dimensions to the intangibles of emotions, memories and aspirations. This process is a means to give the population a sense of agency, ownership and belonging to the towns they live in.

Ultimately, a high quality of life requires purposeful and integrative thinking to ensure that the intangibles of identity and culture differentiate a city and enhance the sense of belonging for its residents. The arts and heritage can respond to the next lap of Singapore's development as a liveable city that is also a loveable home.



Volunteers paid visits to heritage businesses such as Haji V Syed Abu Thahir Trading for interviews during the NHB Kampong Gelam Citizen Engagement Project, in which heritage businesses were documented in a digital map and booklet

Photo courtesy of National Heritage Board

A liveable city actively provides opportunities for everyone to reach their full potential. Singapore has conventionally excelled in its quality of education and academic outcomes. But success is not defined by a single standard, and it can continue to nurture a wider array of passions and skillsets. Hence, besides the integration of flexibility where students can take subjects based on their interests and capabilities, Singapore also has specialised schools that focus on areas like arts and sports.¹¹² This unlocks more pathways for people to reach their goals and pursue meaningful careers. Underpinning this “compassionate meritocracy” is a strong sense of unity and inclusivity in diversity, which needs to be constantly tended to in order to inculcate social cohesion—whether through targeted social policies to help overcome natural tendencies to form social tribes, or the provision of free and accessible community spaces throughout the city to encourage everyday interactions and bonding.

A liveable city is one that is able to harness the strengths of its population diversity, harmonise a wide range of views, and balance different needs. The Forward Singapore exercise, which seeks to refresh the social compact, is an attempt at building stronger social resilience to tackle future challenges. Singapore is not perfect, but it has always tried to not only do more, but do better. One example is in its development of social policies to ensure that Singaporeans will be taken care of at every life stage, and that no one is left behind. Beyond broad-based schemes that support all Singaporeans, targeted programmes such as ComLink+, which provides targeted and longer-term support for lower-income families with children, help prevent a permanent underclass and ensure children have full opportunities early in life. Through ComLink+, these families are connected with other programmes such as KidSTART, which equips parents with knowledge and skills to support the development of their children, from pregnancy until the child turns 6 years old.

HOUSING A NATION

Singapore's housing policy is one of its building blocks of liveability. After the Second World War, many lived in overcrowded, dilapidated slums and squatter settlements with poor sanitation. One of the densest areas had almost 83 people living together in a single shophouse.¹¹³ Singapore's public housing programme was thus quickly launched to resettle people into HDB units. The HDB had its first five-year building programme spanning 1960–1965, helping to break the backbone of Singapore's housing problem.¹¹⁴ Fast forward to present day, it has a one-of-a-kind system which provides public housing for 80% of its residents, 90% of whom own their home.¹¹⁵ While providing citizens with good homes, the high ownership rate also encourages people to have a stake in the country.

Over the years, the HDB has improved its housing offerings in response to growing standards of living and aspirations. This includes flats with a range of layouts and sizes as well as some that are designed with smart and sustainable features. Various schemes and flat types have also been introduced to address the gap in senior housing options. For example, assisted living public housing flats were announced in 2020 for elders that wish to live independently. Named Community Care Apartments, these flats are incorporated with senior-friendly fittings like grab bars and slip-resistant flooring. In addition, residents can enjoy recreational programmes held within their block and tap on customisable care services such as housekeeping or medical transport.¹¹⁶



The first Community Care Apartments were launched as a pilot in Bukit Batok in 2021

Photo courtesy of Housing & Development Board

On a larger scale, the HDB aims to develop pleasant residential environments. Proper estate management plays a critical role in keeping Singapore's living areas clean and well-maintained, which in turn cultivates pride and a sense of ownership by residents. Since the 1980s, the maintenance of common properties in HDB towns were progressively decentralised to Town Councils or autonomous legal entities to oversee. In 2014, the Municipal Services Office (MSO) was set up as a division in the Ministry of National Development to supplement the estate management ecosystem by coordinating multi-stakeholder efforts to tackle municipal issues—many of which straddle the domains of different government agencies¹¹⁷ (also see Chapter 3 for a box story on the MSO).

Singapore's housing estates and towns are self-sufficient with amenities like markets, hawker centres, libraries and transport hubs within walkable distances. Going forward, the HDB will continue to tailor its provision of housing according to changing lifestyle preferences by taking a long-term approach to land use planning and stewarding Singapore's land carefully.

Rising costs of living have been a perennial challenge for many global cities including Singapore. Public housing has been kept affordable for residents because it is sold by the government at highly subsidised prices or with housing grants when purchased on the open resale market—such as the Proximity Housing Grant which is available to eligible flat buyers who will live near their parents or children.¹¹⁸ For lower-income households, the Public Rental Scheme is in place as a social safety net. This allows flats to be rented at further subsidised rates and is paired with efforts to facilitate a transition towards home ownership. These moves also help to integrate lower-income families in public housing neighbourhoods, and promote social mixing.

From the second half of 2024, Singapore adopted a new national housing framework where new housing projects will be re-classified as Standard, Plus, and Prime flats. This new classification reflects Singapore's collective ideals to keep homeownership affordable, maintain a good social mix across different parts of the island, and keep the system of allocating subsidies and support fair in attractive and central locations.¹¹⁹ Enhanced grants are also provided to support first-timer families and singles in purchasing a home.

CULTIVATING A CITY FOR HEALTH AND WELLNESS

Singapore's health outcomes are a result of deliberate planning of the city and environment, good urban governance, and collaboration between different stakeholders. For instance, Singapore's healthcare services are delivered through three regional health clusters. Distributed geographically with the National Healthcare Group for the central region, Singapore Health Services for the eastern region and National University Health System for the western region, each cluster provides comprehensive and accessible facilities, capabilities, services and networks. In 2022, the Healthier SG strategy was launched to transform the healthcare sector and highlight the need for preventive care.¹²⁰ These strategies have laid the groundwork for Singapore to have a healthy population.

With the fast pace of life and crowdedness of living in dense cities, mental health has been an escalating concern worldwide. This is compounded by other elements like the heightened use of social media.¹²¹ To tackle this issue, the Singapore government has taken a strong stance to prioritise mental health. Set in motion in 2023, the National Mental Health and Well-being Strategy outlines concrete plans to expand the capacity of mental health services, enhance the capabilities of service providers for early identification and intervention, promote mental health and well-being, and improve mental health and well-being within Singapore's workplaces.¹²²

Like many cities with an ageing population, Singapore must be prepared for the growth of dementia which is estimated to affect 152,000 individuals by 2030.¹²³ In anticipation of this, the Agency for Integrated Care (AIC) started the Dementia-Friendly Community initiative to equip residents and businesses with the skills needed to support persons with dementia. This involves a network of Dementia Friends who can lend a hand as community lookouts, and designated Go-To Points for lost persons with dementia to seek help from staff.¹²⁴ More work has also been done by the AIC, together with the CLC and the Singapore University

of Technology and Design, through a pilot study at Yio Chu Kang to test dementia-friendly neighbourhood infrastructure like sensorial gardens and wayfinding installations.¹²⁵ Such programmes champion the independent living of Singapore's seniors and allow them to age safely in their own homes and communities for as long as possible.



Dementia-friendly neighbourhood infrastructure includes floor wayfinding markers that guide those living with dementia along key routes

Photo courtesy of Agency for Integrated Care and Centre for Liveable Cities

To boost health and wellness through the physical environment, Singapore also injects spaces where people can take respite from their daily routines. A key aim as it works towards becoming a City in Nature is to ensure that every household is within a 10-minute walk to a park by 2030. It will also continue to weave blue spaces into the environment through its ABC Waters Programme, further bringing nature into the lives of residents. With these and other



People jogging at Jurong Lake Gardens

Photo courtesy of Unsplash

strategies, Singapore's green and blue landscapes are not just backdrops for relaxation and social interaction, but also help to create a more comfortable urban environment by contributing to improved air quality and cooler temperatures.

Cultivating health and wellness in Singapore requires intentional planning of sports and recreational facilities to keep people active. Under the Sports Facilities Master Plan, Sport Singapore continues to develop public sports facilities such as swimming pools and gyms to meet the evolving sporting needs, interests and aspirations of Singapore's population. The aim is to provide Singaporeans with inclusive, accessible and affordable sports facilities within a 10-minute walk from their homes by around 2030.¹²⁶ This is complemented by a variety of sport programmes and other opportunities under ActiveSG, Singapore's national movement for mass participation. To further encourage participation across more community segments, Singaporeans and Permanent Residents received a top-up of S\$100 worth of ActiveSG credits as part of commemorations to mark Singapore's 60th year of independence. This builds on previous credit top-ups in 2014 and 2023.

Places that facilitate fun and play also give residents opportunities to relieve stress. As part of the upcoming Draft Master Plan 2025, the URA engaged Singaporeans on their views and ideas on recreational spaces across the island. Taking into consideration the feedback received, the URA's Recreation Master Plan aims to support a variety of recreational nodes and trails offering differentiated experiences island-wide, integrate more play spaces within neighbourhoods, and involve the community in co-creating recreational spaces.¹²⁷

CONCLUDING POINTS

A high quality of life is not limited to the areas discussed in this chapter but involves a breadth of topics. The interplay of numerous factors makes attaining this outcome a complex undertaking that requires constant communication with the public to gain insight into their hopes and desires for the city.

As with other cities however, it is not feasible for Singapore to address all the wants and needs of its residents—even with the outcome of creating a high quality of life driving its efforts, because it has to reconcile conflicting needs and interests. Over the years, Singapore has seen a trend of NIMBY-ism or the “not in my backyard” syndrome, where people raise objections over certain facilities that will be built near their homes due to reservations that these new developments might impact their quality of life or reduce property values. For instance, in the 2010s, there were uproars when nursing homes and eldercare centres were to be placed within residential neighbourhoods. The situation led to complaints, petitions and extensive dialogue sessions.¹²⁸ Likewise, there were also occurrences of NIMBY-ism for the building of other “less desirable” facilities like funeral parlours, columbariums, and migrant worker dormitories. Residents usually acknowledged that these were essential to have but were unwilling to have them close to where they live.

Hence, the government sometimes needs to make difficult decisions to resolve trade-offs. This is done by carefully balancing the outcomes of quality of life, environmental considerations and economic needs through long-term planning, dynamic urban governance and building collaborative ecosystems throughout society.

SPOTLIGHT

Liveability Outcomes and Their Intersections

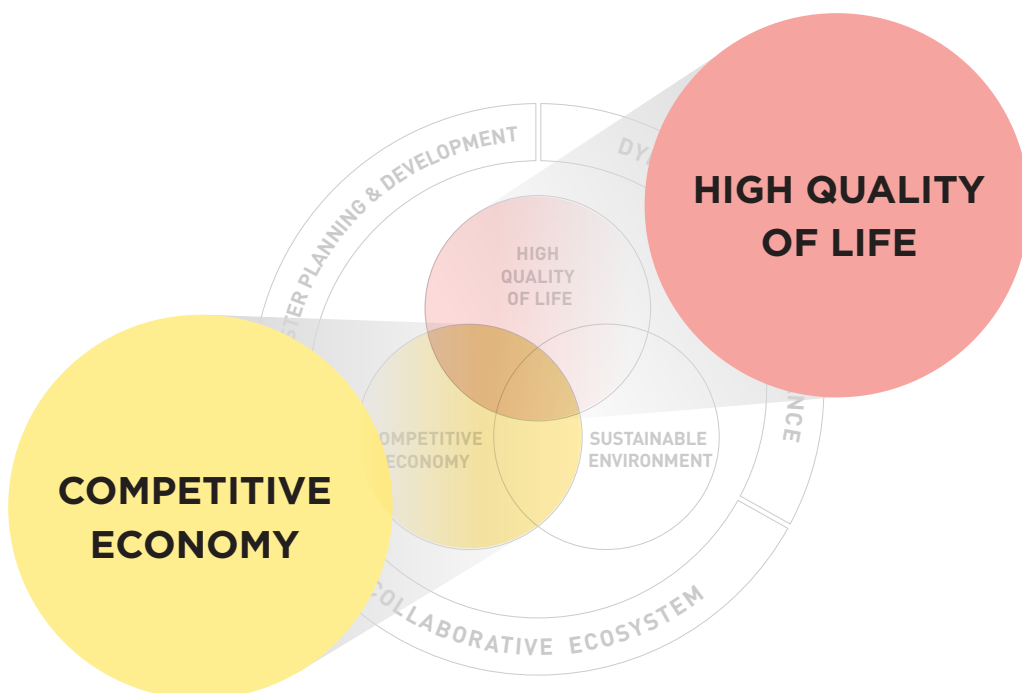
The Liveability Framework emphasises the need to balance between the three outcomes of a competitive economy, sustainable environment and high quality of life for a truly liveable city. This section will offer examples of how Singapore has faced and must be prepared to manage tensions and trade-offs in its development journey. At the same time, overlaps between the outcomes also represent the potential for synergies to be reaped. Planning in Singapore has always been challenging, but as it becomes more built up, urban issues will become more complex. Thus, it will be increasingly important for planning and development to be more intentional, and for policies to adopt a more holistic lens to address emerging cross-domain challenges.



Integrating nature into the built environment, such as at Khoo Teck Puat Hospital, is part of Singapore's vision to become a City in Nature

Photo courtesy of Andrew @ Redbean

COMPETITIVE ECONOMY AND HIGH QUALITY OF LIFE



Singapore's pursuit of economic competitiveness not only creates a foundation for its economy, it allows the city to achieve other liveability goals such as a high quality of life and a sustainable environment. Nevertheless, the city must weigh the immediate benefits of economic progress against its impacts on individual residents and for Singapore as a whole.

MAINTAINING A COMPETITIVE AND HEALTHY WORKFORCE

Fostering a high quality of life by building equitable access to healthcare and ensuring the overall well-being of residents is important in achieving a competitive economy. Especially in Singapore where the economy is highly dependent on its human capital, the health of residents helps to ensure productivity in the workforce. Although its population is ageing, if Singapore can ensure that its aged residents remain healthy and active, they can potentially be a powerful economic force. Having experienced professionals remaining longer in the workforce will be an asset to the economy as they can continue to contribute meaningfully to growth and mentor younger workers.

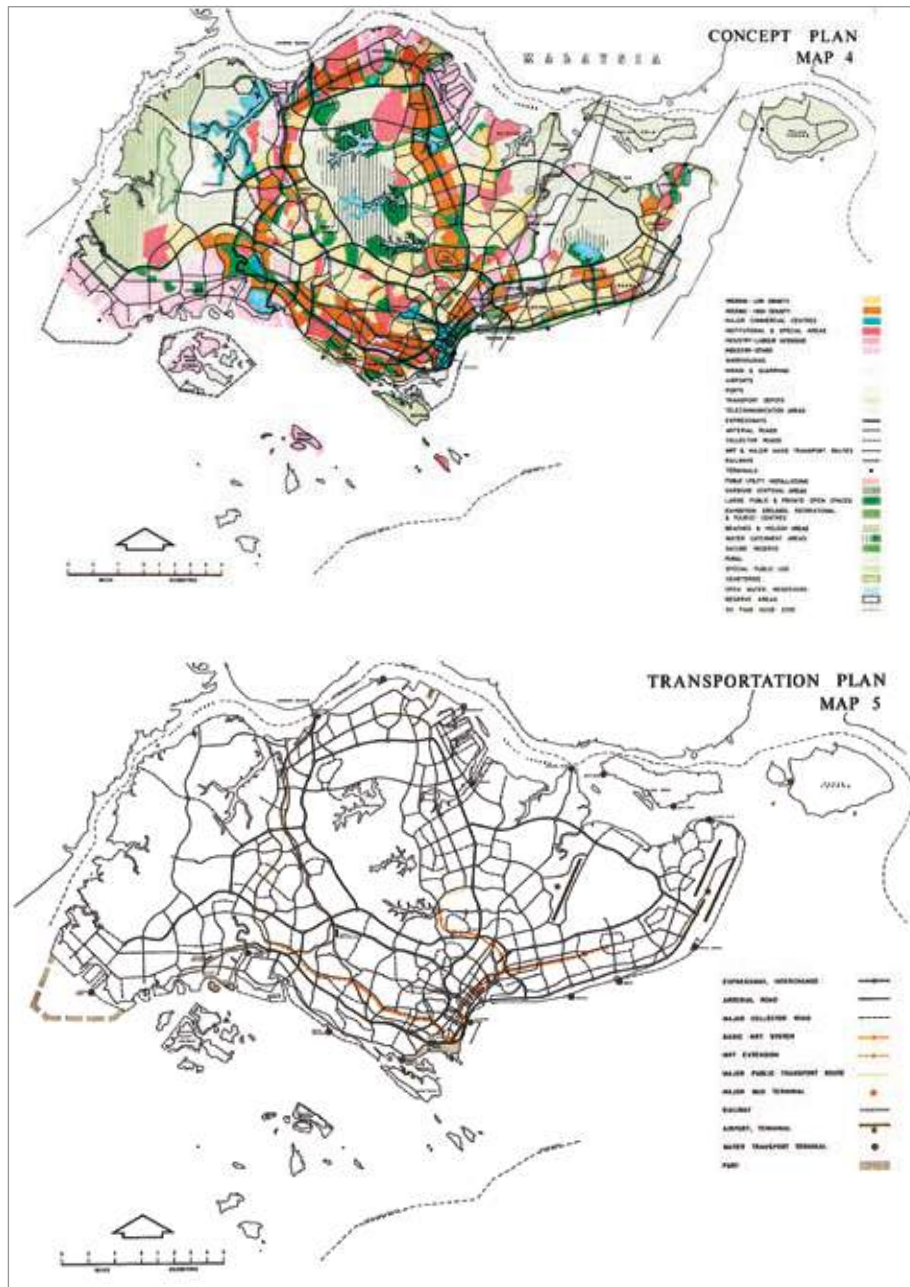
To help its older workers stay relevant in a changing economy, Singapore has to make sure that they are able to receive the relevant education and training needed for upskilling. Singapore has invested heavily in the education sector to build up the capabilities of its people. The implementation of the SkillsFuture Level-Up Programme on 1 May 2024 represents a commitment to provide greater support to mid-career Singaporeans aged 40 and above to upskill and stay relevant amid evolving economic demands.¹²⁹ Continuing Education and Training programmes supported by SSG provide a diverse range of courses across various industries to support adult learning.¹³⁰ Institutes of Higher Learning play a significant role in equipping learners with relevant skills by offering courses and programmes in emerging economic sectors.¹³¹ Industry partners, training providers, government agencies and employers all contribute significantly to supporting quality adult learning, ensuring that Singapore's workforce is equipped to meet the demands of the economy throughout all stages of their careers.

The evolving expectations of workers shines a spotlight on the possibilities of a trade-off between pursuing economic and career growth and having work-life balance to enhance liveability. There may be a need to rethink what employment means—that it may no longer be sufficient to just create good jobs but to also give workers the autonomy and support to rest and recharge when needed.

Furthermore, the heavy reliance on human capital for Singapore's growth places pressure on its workers. The Ipsos World Mental Health Report released in 2023 revealed that 46% of respondents in Singapore identified mental health as the foremost health concern, while 35% ranked stress as the third most pressing health issue.¹³² While employees remain dedicated to achieving their goals in their professional capacity, it may take a toll on family and personal fulfilment. Green and blue spaces, coupled with places for recreational activities, are thus important elements that provide residents with opportunities to unwind and prioritise their well-being.

ENSURING A WELL-CONNECTED CITY AND WORKFORCE

In a city, the ability of residents to move around seamlessly, efficiently and affordably for their daily needs not only contributes to a high quality of life, it is crucial in supporting economic productivity and growth. Hence, Singapore has prioritised the integration of mobility considerations into its planning from the onset. Its first long-term plan—the 1971 Concept Plan—served as a land use and transportation blueprint to guide Singapore's planning over a 40- to 50-year horizon. It delineated how its domestic road and rail systems, as well as transnational hub infrastructure, should be laid out, thereby defining Singapore's overall urban structure. It also proposed a “ring concept” where satellite residential towns were located around the central catchment area.¹³³ Each town would be connected with each other, the city centre and industrial estates at the fringes through a comprehensive Mass Rapid Transit (MRT) system and expressway network.¹³⁴ Many of the plans in the Concept Plan have since been implemented and they define the everyday lived reality of residents today.



The 1971 Concept Plan (top) and Transportation Plan (bottom) served as blueprints for Singapore's early urban development journey

Photo courtesy of Urban Redevelopment Authority

Roads and expressways currently account for about 12% of Singapore's domestic land take and it is not sustainable to grow the city's road space indefinitely.¹³⁵ Therefore, it is important to manage private transport usage and prioritise the provision of public transport. The Land Transport Master Plan (LTMP) 2040, which charts out concrete actions to ensure that Singapore's public transport system remains efficient, convenient and affordable, is a useful roadmap. One of the strategic goals as laid out in the LTMP 2040 is to create a "45-minute city" and "20-minute towns" via Walk, Cycle, Ride modes,¹³⁶ supported by smoother and safer commute experiences. For one, the Land Transport Authority (LTA) will be working to expand Singapore's rail network from 270 km today to about 360 km by the early 2030s, and have 8 in 10 households within a 10-minute walk of a train station.¹³⁷ Moreover, some of the key transit nodes are planned and designed upfront as Integrated Transport Hubs, often comprising integrated transport facilities such as a bus interchange and train station along with adjoining mixed-used developments. Typically supported by a comprehensive network of sheltered walkways and other all-weather active mobility infrastructure, they provide seamless inter-modal transfers for commuters, and serve as an integrated solution to mobility in a highly dense, tropical urban environment.

Despite Singapore's decentralised polycentric structure, its Central Business District will continue to be a mainstay as the largest business and mixed-use hub in the city. Furthermore, it is introducing more housing options within the central area to diversify the overall use profile in and around the city. Therefore, Singapore needs to ensure that residents have good options to conveniently access the downtown area to live, work and play.

In recent years, new MRT stations in the city centre have been added to the network, and more are in the pipeline. This will help to ensure the downtown area is well-connected by a comprehensive public transport network.¹³⁸ First-and-last-mile connectivity is also enhanced through the progressive implementation of dedicated walking and cycling pathways that link housing developments to public transport nodes. In Singapore, planning provisions have been accorded to private sector developers to include bicycle parking spaces as well as end-of-trip facilities like shower rooms within their developments, and this has helped to support an increase in uptake.¹³⁹ By prioritising

connectivity, Singapore's comprehensive public transport network and integrated approach towards mobility planning have helped to empower citizens to not only participate actively in their social and economic spheres, but to do so in a more sustainable manner.

BALANCING CONSERVATION AND REDEVELOPMENT

As its population becomes more diverse, it becomes all the more crucial that Singapore continues to foster and strengthen its national identity. Singapore's identity is shaped by things such as its unique nation-building journey and ability to live harmoniously as a multiracial, multireligious and multicultural society. These elements are not only captured in its shared values and memories, but also in the built heritage that connects residents and engenders a sense of belonging to the city.



Originally with business functions on the ground floor and homes on the upper storeys, many conserved shophouses have undergone adaptive reuse and commonly function as office space, retail shops or food and beverage outlets

Photo courtesy of Unsplash



The Golden Mile Complex was designed in a Brutalist architecture style and completed in 1973
Photo courtesy of Jonathan Lin (CC BY-SA 2.0)

Singapore has made remarkable progress with regard to the conservation of historically significant buildings. Despite having to push the urban redevelopment agenda during post-independence years, planners did not forget about conserving these cultural landmarks. During resettlement and rejuvenation efforts, there was careful consideration to avoid large-scale demolition. Instead, plans for conservation were drawn up and kept for the right time when it would be more financially feasible.¹⁴⁰ Further down the road in the 1980s, the Conservation Master Plan formally recognised the first 10 conservation areas—including Chinatown (Kreta Ayer, Tanjong Pagar, Bukit Pasoh and Telok Ayer), Kampong Gelam, Little India, Boat Quay, Clarke Quay, Cairnhill and Emerald Hill—which led to the conservation of about 3,200 shophouses.¹⁴¹ At present, over 7,200 buildings have been gazetted for conservation.¹⁴²

On the other hand, conservation comes at a price as these sites represent development potential, where taller and more

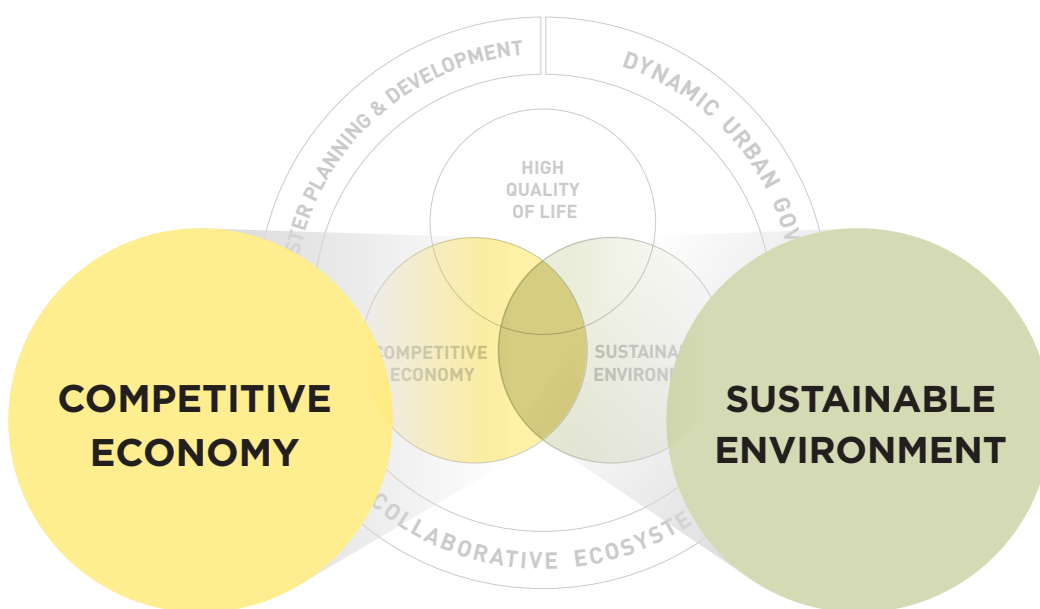
commercially valuable buildings could be erected. In particular, many conserved buildings are found in the core of the city where land typically demands a premium. Restoration and maintenance works can also be more costly due to having to adhere to strict conservation guidelines.

In order to strike a balance between social and economic considerations, the government decided to sell some of the conserved properties to the private sector. The URA took the lead in the refurbishment effort and demonstrated the viability of several projects in the 1970s and 1980s. Various agencies also came in to install infrastructure like electrical substations and service lanes.¹⁴³ While there were concerns and mixed reactions from developers, these preparations proved to be worthwhile as the sale of conserved shophouses was extremely successful.¹⁴⁴ Besides retaining their historic value and adding to the architectural mix of the city, the conserved buildings have high real estate prices and are draws for tourists.

Now the attention has turned towards modernist buildings that were constructed during a later part of Singapore's timeline—developments that embody the innovation and resourcefulness of its urban pioneers in revitalising the city. Singapore is continuing to engage the private sector to harness their capital and expertise in upholding the nation's built heritage, as in the case of the Golden Mile Complex which was gazetted for conservation after thorough engagements with various stakeholders. The URA came up with the approach of providing the developers with additional planning incentives and waivers such that the site can continue to retain its economic viability and business appeal.¹⁴⁵ This approach facilitated an unprecedented collective sale of the large strata-titled conserved building.¹⁴⁶ In August 2024, the developer received approvals to add on 4 storeys of office use to the Golden Mile Complex as well as build a new 45-storey residential tower.¹⁴⁷

Nonetheless, it is impossible to conserve every building, and Singapore will have to remain judicious in selecting what to keep, and finding other innovative ways to celebrate the city's heritage. While redevelopment for some areas is necessary, the importance of heritage and identity markers has grown, and planners have sought to optimise between these desired goals. The example of the Golden Mile Complex demonstrates how Singapore overcame tensions between preserving the character of the city for a high quality of life and managing real estate and land values for a competitive economy.

COMPETITIVE ECONOMY AND SUSTAINABLE ENVIRONMENT



As Singapore navigates the complexities of today, the intertwining of a competitive economy and a sustainable environment has taken on newfound importance. This reflects a collective recognition of the imperative to foster sustainable economic growth while safeguarding nature. The burgeoning realm of the green economy holds promise for growth and progress, yet it also brings with it unforeseen consequences, such as the potential escalation of prices for goods and services. Achieving equilibrium between competitiveness and sustainability requires well-thought-out planning processes, inventive approaches, and unified action from all stakeholders.

SCALING UP THE BENEFITS AND MANAGING THE COSTS OF SINGAPORE'S GREEN TRANSITION

The green economy not only presents growth opportunities for Singapore, but also brings it closer to creating a more sustainable and liveable environment. Investing early in clean energy and infrastructure will reduce Singapore's environmental impact and also allow it to position itself as a leader in green innovation and a hub for green solutions and green services.

Singapore is actively promoting the transformation and decarbonisation of existing sectors through targeted incentives. For instance, the EDB and NEA administer grants to support companies in reducing emissions and adopting energy-efficient technologies. Additionally, the government is facilitating the transition to a low-carbon economy by supporting the development and commercialisation of innovative sustainability solutions through initiatives like the Research, Innovation and Enterprise Plan, and the Enterprise Sustainability Programme.¹⁴⁸ These efforts not only contribute to economic growth by creating opportunities in the green sector, they enhance the nation's competitiveness by demonstrating a proactive approach to environmental sustainability.

Although the green economy creates numerous opportunities, the implementation of sustainable solutions may entail new costs. For example, Singapore introduced the carbon tax in 2019 (under the Carbon Pricing Act 2018) as an economically backed environmental policy to reduce carbon emissions in order to mitigate climate change. This measure compels firms to incorporate climate considerations early into business operations as Singapore moves towards a low carbon economy so that firms are able to better plan for the transition. Failing to do so may leave these organisations with inadequate time to transition in later stages, by which time others would have already integrated low carbon solutions ahead of them.

While the carbon tax is meant to be levied on businesses to reduce their carbon footprint, the rising costs of carbon pricing could be passed on to consumers and individuals such as through increasing utility bills.¹⁴⁹ Striking a balance between the potential increase in cost of living and embracing green solutions is not straightforward. It is essential to find a middle ground that

promotes sustainability without unduly increasing the burden on households. Implementing appropriate regulatory measures, being transparent with the reasons behind cost increases, and providing incentives and subsidies could soften the impacts of the trade-off.



Companies need to find their way to decarbonise, and assess which technologies are relevant to them.

The carbon tax is not simply a tax; it is a lever to change the way companies operate. The government is prepared to help companies in this journey by putting in even more than what we collect in carbon tax revenue in the initial years to enable companies in their decarbonisation efforts.”

Grace Fu

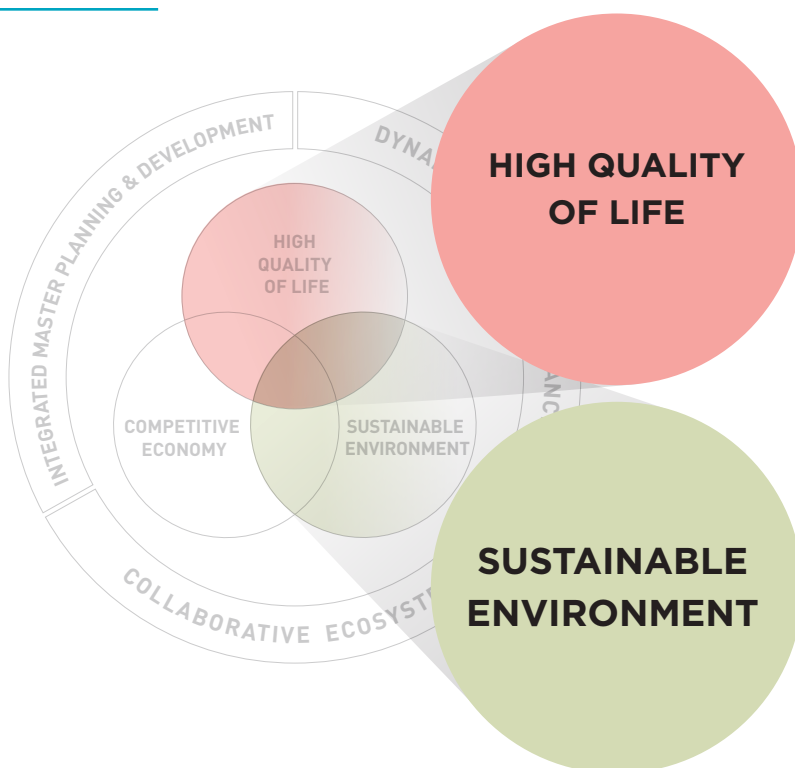
Minister for Sustainability and the Environment (2020–present), and
Minister-in-charge of Trade Relations (2024–present)

For instance, the right pricing of water is necessary to recover the full cost of producing and supplying this resource, finance long-term investments sustainably to meet future water demand, and safeguard water security. In Singapore, the price of water is pegged to the cost of producing and supplying each drop, and is also aimed at encouraging households and industries to conserve water.

Even as Singapore prices its water right to reflect rising cost of production and supply, support is provided to lower- and middle-income households through a utilities rebate to HDB households. For businesses, the Water Efficiency Fund provides grants to businesses looking to explore water conservation projects and water recycling initiatives in their daily operations. Water demand in Singapore is expected to double by 2065. Right pricing and sustainable growth in water demand will help to ensure a sustainable water system and safeguard water security for Singapore.¹⁵⁰

Hence, because the transition to a green economy is essential, Singapore should continue to provide support for individuals and businesses so that they can feasibly adopt practices that are more environmentally friendly.

SUSTAINABLE ENVIRONMENT AND HIGH QUALITY OF LIFE



As cities grapple with climate adaptation and mitigation, it is important to deal with changing cost dynamics and make adjustments to everyday conveniences. Hence, while Singapore recognises the long-term value of protecting the environment, it has to take a nuanced approach to bring people along in this movement. With education and greater coverage of sustainability issues, many residents are also more attuned to environmental conservation which can sometimes spark concerns when new developments take the place of green landscapes. In the planning process, Singapore should therefore consider a wide range of views and forge common understandings. For instance, increasing temperatures are a growing concern which affects all three liveability outcomes, such as the comfort of residents, workforce productivity and energy costs, as well as potential loss of biodiversity. Cities should thus communicate these impacts in holistic and tangible ways to drive stakeholder action.

INTEGRATING GREENERY INTO DEVELOPMENT

To accommodate the ever-changing demands of Singapore's people, it is a fact that more and more land will be required. One way that Singapore's scarcity of space can be overcome is by building for multiple uses. For instance, Singapore has invented creative types of infrastructure that not only serve environmental functions but also increase quality of life by providing areas for leisure.



One of Singapore's strategies to cope with its land constraints is to maximise the use of land, such as at the Marina Barrage which acts as a water source, provides flood control, and offers vibrant spaces for public recreation

Photo courtesy of Andrew @ Redbean

For one, Singapore has a large Park Connector Network (PCN) consisting of shared footpaths and cycling lanes that connect people with nature.¹⁵¹ Some sections of the PCN are made up of small strips of land that have been left idle, such as the areas immediately adjacent to drainage canals which would not be used except for the infrequent servicing of the canals. As of end-2024, the PCN extends to about 391 km and reflects good progress towards achieving Singapore's overall target of 500 km by 2030.¹⁵²

The Marina Barrage is another example where grey infrastructure was conceptualised as green and blue infrastructure. With its iconic green roof overlooking Singapore's urban skyline, Marina Barrage has become a mainstay for residents that are seeking a recreational space to unwind. Spanning the mouth of the Marina Channel, the Marina Barrage has created a freshwater reservoir in the heart of the city centre and also plays a crucial role in flood control around the Marina catchment area. By innovating ways to better optimise its land, Singapore is able to meet the needs of its current residents while preparing for those of future generations.

Nonetheless, there comes a point where Singapore must trigger the option to develop spaces that were safeguarded in the past for future uses, but have been left idle and grown green in the meantime. For instance, in the 2010s it was announced that several plots of land that housed secondary forest habitat would be made available for sale to developers. The news drew backlash from residents due to potential impacts to nature and biodiversity in the area.^{153,154} In such cases, the government engages stakeholders to assure them that the construction will be handled sensitively and with mitigating measures in place, like replacement of greenery and thoughtful urban design.

These reflected growing public interest in environmental protection. These examples alongside others have helped government agencies sharpen their public engagement over time. The URA has implemented measures to proactively identify potential concerns from the bottom up, prior to the launch of land parcels that will be tendered for sale. It also consults Singapore's Members of Parliament on proposed land sale sites and potential concerns from the perspective of the community.¹⁵⁵ For sites that are likely to impact surrounding stakeholders, developers are also

required to distribute flyers to keep the community informed of upcoming plans and provide measures to mitigate the impact of the development on surrounding residents. Communication channels are also provided for the community to provide feedback to the developers.¹⁵⁶ In addition, development projects that are close to sensitive nature areas are subject to greater scrutiny by the regulatory agencies and may be required to undergo detailed environmental studies. The findings from such studies, including any potential impact and adequacy of mitigating measures, are carefully considered before the project is allowed to proceed.

UTILISING NATURE TO IMPROVE WELL-BEING AND STRENGTHEN SOCIAL COHESION

Integration of greenery in residential areas as well as proximity to natural spaces have become increasingly valued in urban environments. These provisions contribute significantly to the social determinants of health in a city, as green spaces offer opportunities for relaxation, recreation and social interaction, thereby enhancing the physical and mental well-being of residents and overall liveability.¹⁵⁷ As part of Singapore's vision to become a City in Nature, the National Parks Board (NParks) has been creating therapeutic gardens in parks across Singapore and aims to have 30 completed by 2030.¹⁵⁸ These gardens are aligned with Singapore's efforts to enhance the social resilience of residents and provide accessible spaces for relaxation and mental rejuvenation.¹⁵⁹ This initiative reflects Singapore's commitment to effectively leverage greenery to promote the health and well-being of the urban population.

Urban green spaces integrate ecology with the social dimension, providing opportunities for individuals from diverse backgrounds to come together, engage with one another and form connections. This in turn cultivates social capital as shared values and trust are built within a community. This not only contributes to individuals' well-being but ultimately fosters long-term social cohesion, which contributes to a high quality of life. For instance, NParks' Community in Bloom programme has created opportunities for community bonding by facilitating interactions across social



HortPark is a one-stop destination that offers information, ideas and inspiration for home and community gardeners

Photo courtesy of JnzI (CC BY 2.0)

groups and fostering community spirit through communal gardening.¹⁶⁰ In addition, these community gardens empower individuals to cultivate their own food for personal consumption and sharing within the community, promoting food resilience. They also enhance habitats through the cultivation of plants that support local biodiversity.¹⁶¹ NParks also introduced the Allotment Gardening Scheme in 2016 to provide additional space for gardening in parklands. Currently, there are over 2,400 allotment garden plots island-wide, and this will be progressively increased.¹⁶²

MANAGING HUMAN-ANIMAL ENCOUNTERS

Singapore's intensive greening efforts, expansion of its nature park network, and enhanced connections of green and blue spaces have facilitated wildlife movement and population increase, including the return of species previously thought to be locally extinct, into Singapore's urban spaces. At the same time, development has inched closer to traditionally green areas, resulting in displacement of animals from their natural habitats. Both of these trends lead to increased human-animal interactions. This has compelled Singapore to consider what a City in Nature means for residents, particularly in terms of human-animal encounters.¹⁶³ Though most interactions are peaceful, there have been incidents of residents being attacked by wildlife such as wild boars, otters and monkeys. Conflict can also manifest in property damage, such as the case of otters entering residential properties with ponds to prey on fish.¹⁶⁴



Otters at Jurong Lake Gardens

Photo courtesy of Tan Jun An (CC BY-SA 4.0) / Wikimedia Commons

Therefore, Singapore needs to consider measures that address complex human-wildlife issues as it continues to weave nature into its urban fabric and the chances of encounters with wildlife—and conflicts—increase. NParks has focused on public education and outreach efforts to encourage coexistence with wildlife. This includes discouraging intentional feeding of animals and irresponsible disposal of food waste.¹⁶⁵ Conservation organisations and nature groups have also started initiatives to educate the public and cultivate favourable human-wildlife encounters.¹⁶⁶

Apart from public education, physical measures have been introduced to discourage human-wildlife interactions. One example is at the Nanyang Technological University campus located next to the forests of the Western Water Catchment area, where monkey-proof bins were installed to discourage these animals from foraging for food.¹⁶⁷ Elsewhere, gaps in gates have been meshed up and specialised barriers have been erected around ponds to keep otters out.

NParks has adopted community- and science-based approaches such as conducting population surveys and research studies aimed at gaining a deeper understanding of wildlife distribution in Singapore. This enables the implementation of appropriate mitigation measures where necessary. For example, GPS collars have been employed to monitor the movements of Long-tailed Macaques in locations such as the Central Catchment Nature Reserve and Bukit Timah Nature Reserve.¹⁶⁸ By adopting a more science-based approach that identifies the benefits of biophilia and greenery to liveability, Singapore has been able to strike a delicate balance between species conservation, adequate management of wildlife populations, and public safety.

CONCLUSION

Based on the Liveability Framework diagram, the ideal “sweet spot” for a city’s liveability lies at the intersection of the three outcomes of competitive economy, sustainable environment and high quality of life. While this is conceptually compelling, it is important to be mindful that practically, there are no global objective thresholds to absolutely assess whether liveability has been met.

Every city needs to figure out its own set of performance indicators, taking into account unique factors such as its developmental stage, geography, access to natural resources, and demographics. It is more important to focus on reconciling the trade-offs and optimising the synergies that arise among outcomes at each phase of development, and bringing stakeholders along on the journey.

Related to the contextual differences across cities (see Chapter 5 for Global Case Studies), the pursuit of liveability outcomes must also consider how these outcomes are always “bounded” by the limitations of the system they are functioning within. In the Liveability Framework diagram, this is represented by the space that contains the outcomes, with boundaries defined by the “ring” of urban systems that signify the limits of the system. In this chapter, for each outcome, contexts were discussed that not only inform their definitions, but also give rise to their constraints and trade-offs. It is precisely because resources like land, labour and energy are not finite that the quest for synergistic intersections of outcomes is increasingly challenging.

However, recognising this is a good first step, given that cities—by virtue of their constitutions as complex systems—have in place the capacity to overcome these resource constraints and enable outcome synergies. For Singapore, it has been drawing upon systems and institutions that it has developed over time—integrated master planning and development, dynamic urban governance and collaborative ecosystems—to effectively address these challenges to benefit the whole of society.

The next chapter will explore how these urban systems have played a pivotal role in shaping the Singapore that is seen today, and how their guiding principles will continue to serve as the foundation for achieving and sustaining liveability outcomes for all in the long run.



Singapore incorporates open spaces into high density urban living to offer places for residents to seek respite

Photo courtesy of Unsplash

[CHAPTER 3] THE SUPPORTING SYSTEMS

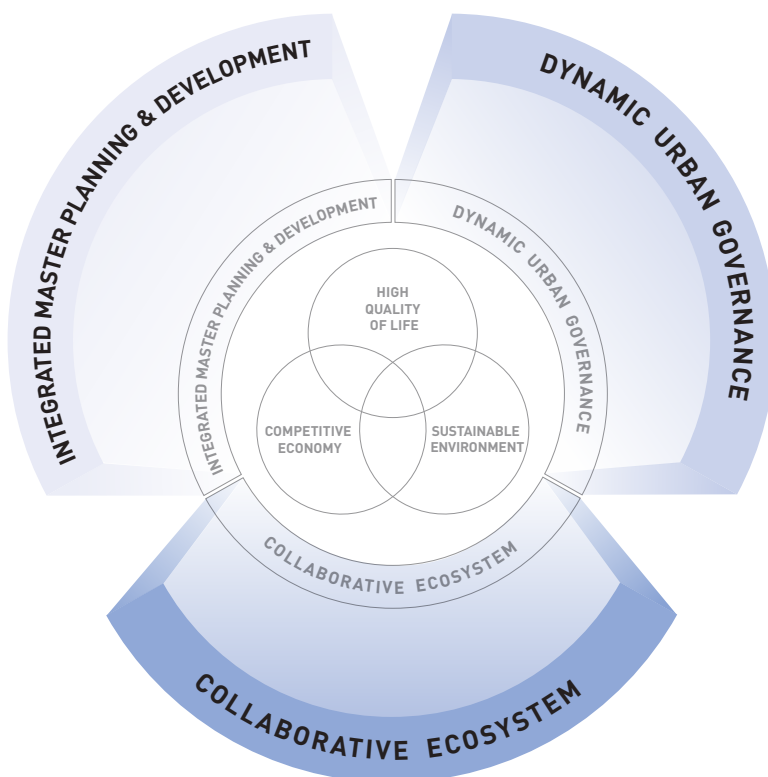




INTRODUCTION

When Singapore gained independence in 1965, the primary focus was to ensure the survival, success and prosperity of this new island nation. At the time, the immediate priority was action rather than reflection, leaving little room for the systematic formulation of governance principles. It was only later, after a proven track record of sustained success, that Singapore sought to document experiences and lessons learnt, and codify the principles guiding its urban development transformation over the years through the Liveability Framework.

During the course of documentation, the investigations revealed several key elements crucial to understanding urbanisation in Singapore. First, a system of integrated planning and development was essential to maintain a focus on creating a liveable city in the long term. Second, subscribing to a dynamic urban governance approach was critical in sustaining necessary conditions for a thriving liveable city. Third, as urban challenges became more complex in the context of increasingly scarce and costly land resources, there was a growing need to harness the collective capacities of the government, private sector, academia and the general community through a collaborative ecosystem that provides the “gel” to enable both planning and governance processes to respond better to complex issues and deliver co-created solutions.



This chapter examines the crucial systems needed to achieve liveable city outcomes. Singapore's success has been underpinned by an integrated master planning and development system, a dynamic urban governance approach, and in more recent years, the development of a collaborative ecosystem. This tripartite approach adopts a view that cities are complex systems, and while the components of these systems are accorded equal importance to each other, stakeholders need to be aware that they interact and thereby shape one another nonlinearly. This augmentative relationship between healthy systems not only equips cities with the conditions and tools to address present challenges, but more importantly, ensures that they can pivot towards more liveable and sustainable futures.

System 1

INTEGRATED MASTER PLANNING AND DEVELOPMENT

INTRODUCTION



Unlike other global cities, Singapore, being a small island city-state, cannot afford to locate important functions away from the city—airports, military training facilities, water treatment and waste management facilities, and ports have to be built within a small space of 730 km², close to housing and commercial facilities. Within this finite space and resource envelope, we have to find a way to meet diverse needs and aspirations—to create a vibrant and competitive global city, and an endearing home for all Singaporeans to live, work and play.”¹⁶⁹

Desmond Lee

Minister for National Development (2020–2025)



Rising population in Singapore
Photo courtesy of joyt / Adobe Stock

Post-independence, Singapore's population was growing faster than expected, and the unemployment rate was high. The task of the government then was to house the population, the majority of whom were living in the city area, while creating employment opportunities. Singapore's planning approach needed to evolve to embrace industrialisation, growth and a good quality of life for the people. To achieve this, the Singapore government consolidated physical planning and implementing agencies under the Ministry of National Development (MND) and formed the State and City Planning (SCP) project. The SCP project, initiated in 1967, involved an international panel of experts and local professionals, and eventually evolved into the 1971 Concept Plan.



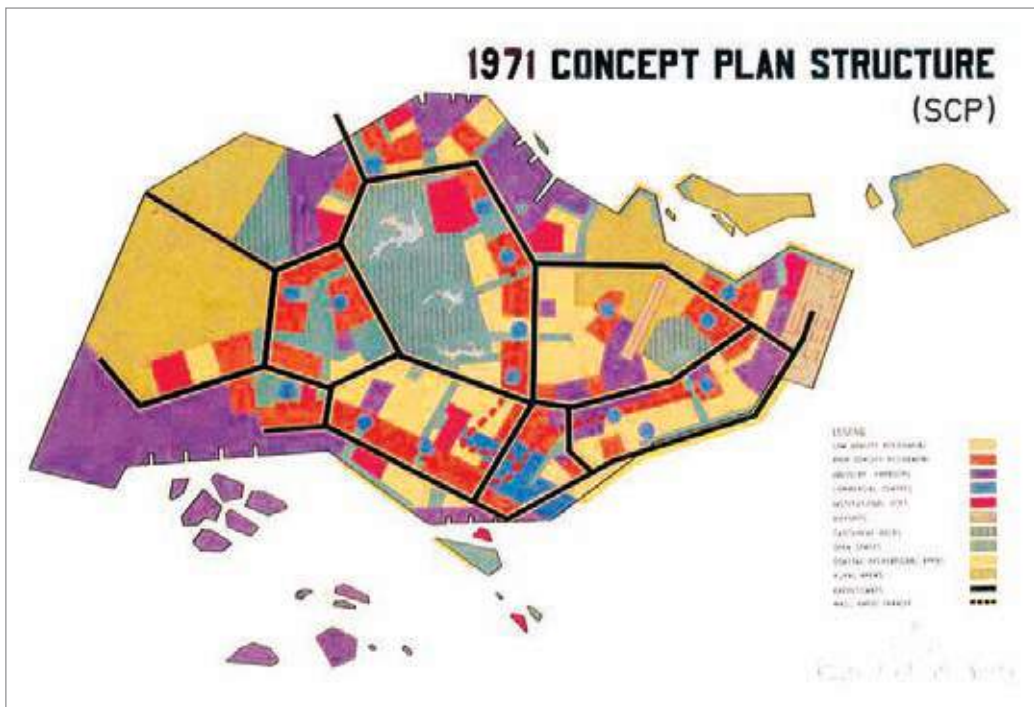
The State and City Planning project looked into fresh areas such as sociology, which we previously had no time for that. In addition, the project also looked at integrating land use and transportation where we studied the impact of how a change in land use would react on the transportation network.”¹⁷⁰

Chua Peng Chye

Singapore’s Chief Planner (1973–1976)

The 1971 Concept Plan was developed with a long-term planning horizon, aiming to address the shortcomings of a “project-by-project” planning approach. It integrated urban planning with social and economic policies, focusing on maintaining political independence, economic viability and national identity. The plan included specific projections for population, workforce, housing, transportation and economic growth. It introduced a Ring Plan for Singapore’s development, emphasising both land use and transport system planning. The plan led to greater coherence in public development, particularly in public housing, industrial estates and roads. The MND Planning Department used the Concept Plan as a guide for subsequent land allocation, with the Master Planning Committee evaluating proposals based on the broad planning strategies of the Concept Plan. The existence of the Master Planning Committee facilitated coordinated development, allowing agencies to safeguard land for their future needs and plan capital-intensive infrastructure projects over the mid-term.

In the mid-1980s, demographic changes, economic shifts and environmental considerations prompted a review of the 1971 Concept Plan. Preparation of the 1991 Concept Plan began in the late 1980s, marking the first time the planning authority in Singapore drafted the Concept Plan independently. The 1991 Concept Plan was a “Year X” plan envisioning the land use structure for a population of 4 million over 40 to 50 years.



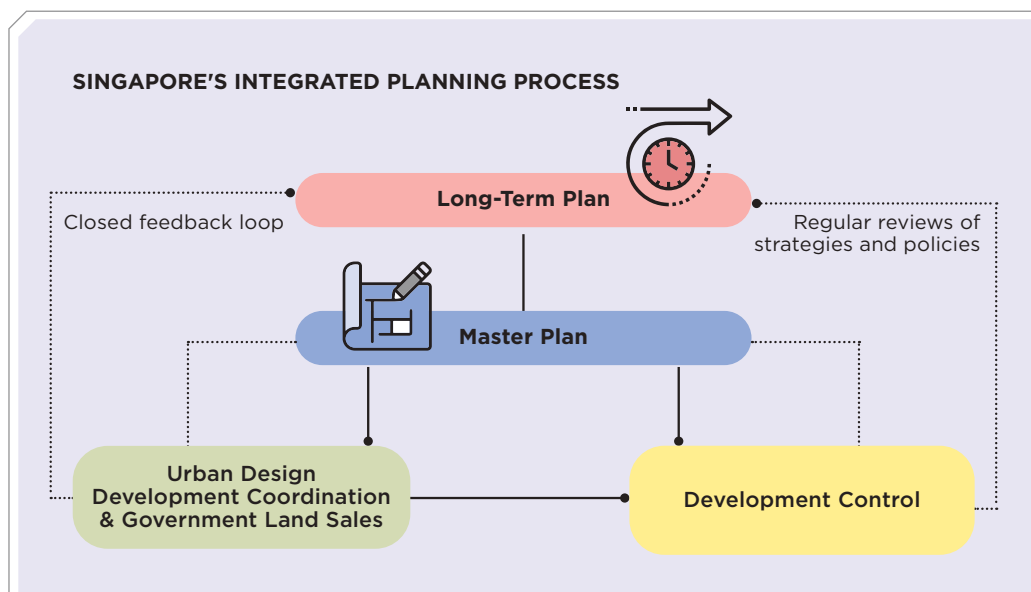
1971 Concept Plan

Image courtesy of Urban Redevelopment Authority

The planning process involved three main phases—a review of land use requirements, formulation of development strategies and policies, and traffic modelling. An Inter-Ministry committee and various sub-committees were formed to address specific areas and make recommendations, which were then discussed holistically. The strategic policy directions were endorsed by a committee comprising all permanent secretaries, and guided critical areas such as industry, commerce, housing, transport, recreation, infrastructure, institution use and the environment.

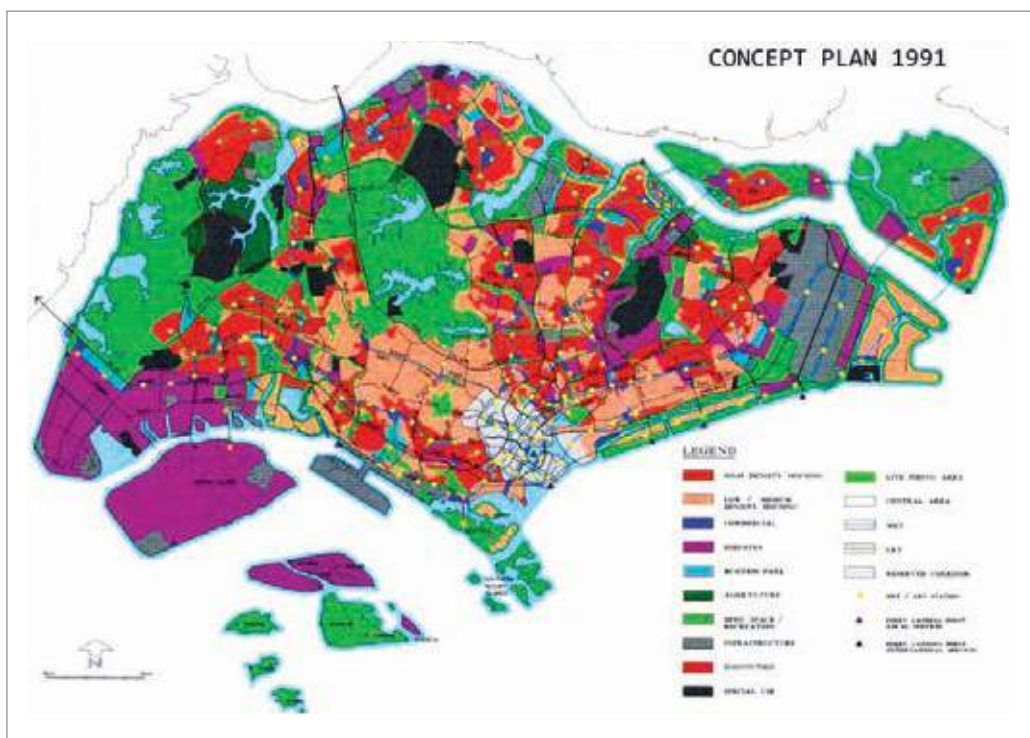
The 1991 Concept Plan introduced bold ideas such as decentralising commercial activities from the city's central area. The plan emphasised public transit as the primary organising principle, leading to the redistribution of commercial activities to locations near Mass Rapid Transit (MRT) interchange stations. It also focused on high-density housing and intensified commercial activities around MRT stations to encourage the use of public transport. Additionally, the plan addressed industry development, housing strategies and recreation policies, aiming to enhance Singapore's post-independence image as a Garden City with well-distributed open spaces and nature conservation areas. The 1991 Concept Plan integrated critical land uses at a national level, aligning with the policy directions and goals of each critical use. The review of the Concept Plan culminated in an exhibition in 1991 to publicise its strategic thrusts and implications for Singapore's urban planning.¹⁷¹

Singapore's planning and development approach has since evolved into its current integrated system of Long-Term Plan and Master Plan, leading to the effective implementation of well-planned infrastructure in Singapore today.



Singapore's integrated planning process

Adapted from original image from Urban Redevelopment Authority



1991 Concept Plan

Image courtesy of Urban Redevelopment Authority

The Long-Term Plan (previously known as the Concept Plan) guides the development of Singapore, mapping out strategic land uses and infrastructure needs over the next 40 to 50 years. The strategies outlined in the Long-Term Plan are translated into a statutory Master Plan which details the development of land and property over the next 10 to 15 years.

Developing these plans involves extensive engagements with a wide spectrum of stakeholders, including the public, community organisations, businesses, industries and government agencies, to deliberate and prioritise the limited land to meet diverse hopes and aspirations for Singapore. With this system in place, Singapore has sought to effectively plan ahead and judiciously manage its limited land resources.

This planning process also provides the framework for Singapore to translate its liveability goals into actionable strategies and positively impact the lives of residents. For example, the Draft Master Plan 2025 translates land use strategies developed under the recently concluded Long-Term Plan Review into detailed near- to mid-term plans that will help to make Singapore a liveable, inclusive and endearing home where generations can fulfil their aspirations.

Specifically, the planning process focuses on the following island-wide themes:

Shaping a happy healthy city with more inclusive homes and support for active lifestyles and ageing-in-place as well as connected and accessible spaces.

Enabling sustainable growth with a vibrant economy that creates opportunities for all.

Strengthening urban resilience by leveraging creative solutions to optimise land and combat climate change.

Stewarding nature and heritage by enhancing Singapore's natural capital and shaping a home that residents cherish.

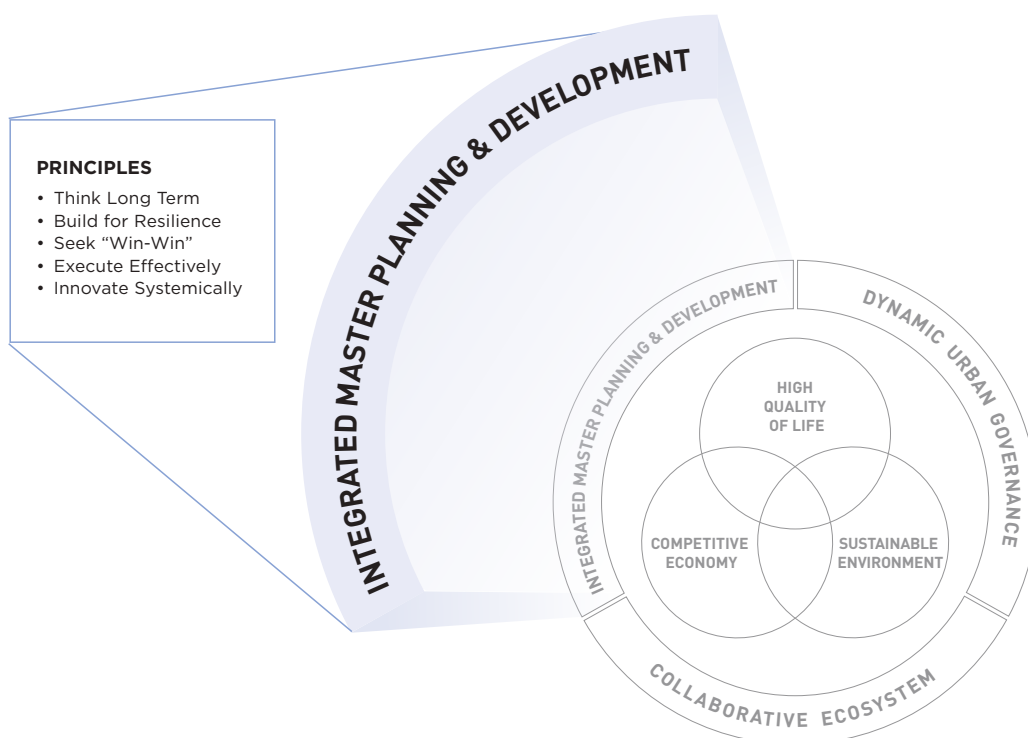
RECENT CHALLENGES TO PLANNING AND DEVELOPMENT IN SINGAPORE

With the accelerated pace of global change and increasing complexity of urban issues, there is greater emphasis on Singapore's resilience in its planning processes, urban development, infrastructure and social fabric. Planning processes need to expand beyond one trajectory for the future, buildings and infrastructure need to be accommodative of adaptive reuse and multiple functions, and the community needs to have more autonomy and ownership in the planning process.

While essential, planning for resilience does come at a premium, in terms of increased cost and time pressure. This places greater demands on planning agencies to ensure positive outcomes. Hence, a high level of foresight is required to anticipate possible needs. It is also the impetus to preserve resources for the future while addressing current issues that may result in tensions and spatial contestations.

For Singapore to be resilient, integrated master planning and development, as a system, needs to be responsive, flexible and adaptive to critical issues. In line with this, integrated master planning and development is now being shifted to focus towards a scenario-based planning approach, rather than projecting just one desired trajectory. Planning for scenario-based futures provides Singapore with optionality and the agility to develop holistic solutions that cater to a diverse range of stakeholders' needs. For this to be effective, there needs to be synergistic collaborations between different stakeholders—where policy differences can be resolved early on and potential trade-offs may be managed collectively, in constructive and innovative ways.

There are five principles by which integrated master planning and development contributes towards liveability outcomes in Singapore—thinking long term, building for resilience, seeking “win-win”, executing effectively and innovating systemically.



PRINCIPLE 1:**Think Long Term**

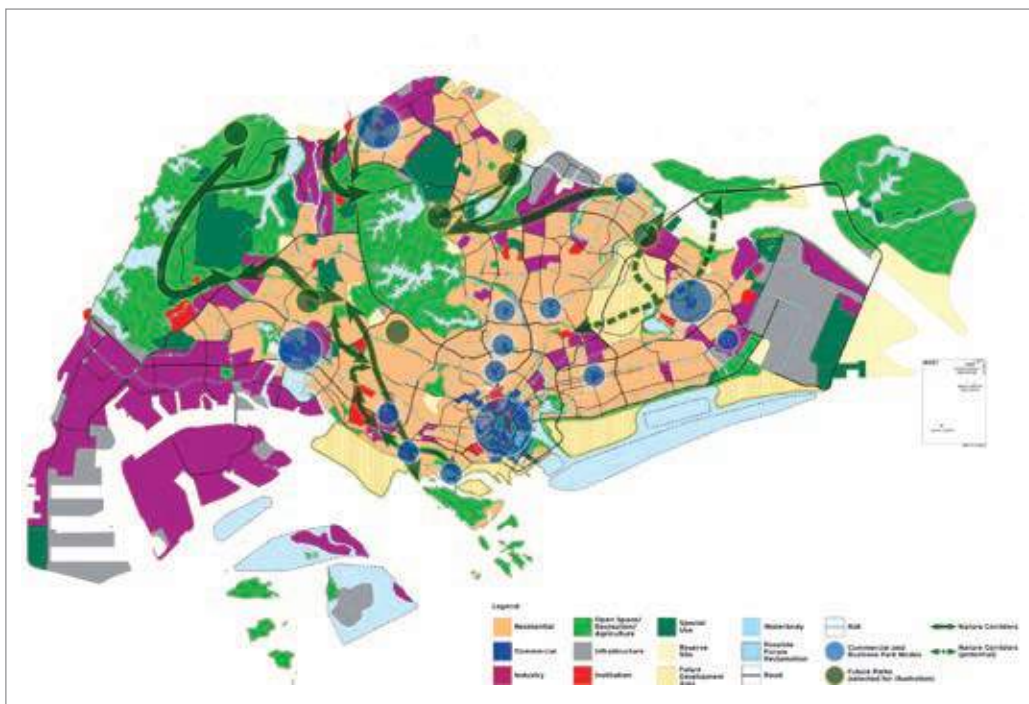
We plan for a 50-year horizon, with civic participation at high conceptual levels, but also at the very practical micro level, on where we live, how we live, work, play, use our green spaces, protect our heritage, prepare for climate change, and so on.”

Desmond Lee

Minister for National Development (2020–2025)

Taking a long-term perspective in land planning has enabled Singapore to prudently manage its limited land resources and ensure sustainable development. For example, it involves safeguarding sufficient land for future population growth and economic activity while meeting current needs.

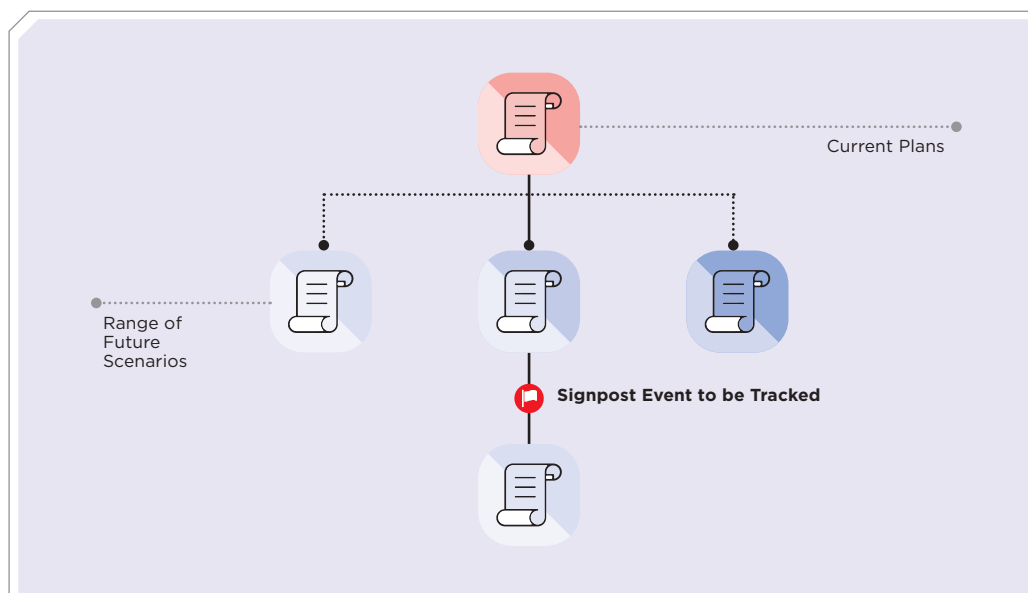
The long-term perspective is explicitly embedded in the latest Long-Term Plan, which encompasses projected land use demands for housing, industry and commerce, recreation and nature areas, transport, utility infrastructure, and defence requirements. This plan undergoes a review every 10 years to facilitate timely land use changes in response to emerging demographic, social, economic and technological trends.



The URA Long-Term Plan (launched in 2022)

Image courtesy of Urban Redevelopment Authority

As the complexity of urban issues and the pace of change have increased, the planning projections of the Long-Term Plan have concomitantly evolved towards a pre-emptive, scenario-based approach. Urban planners in Singapore consider multiple pathways, project a range of possibilities for the future, and identify signposts that would help evaluate and trigger decisions further down the road—the goal of which is to develop plans that are flexible and agile to embrace new opportunities.



Long-Term Plan Review process with scenario-based planning

Adapted from original image from Urban Redevelopment Authority

Being pre-emptive and predictive requires foresight and vision, coupled with pragmatism. It also requires a shared understanding between policymakers and the community, especially when difficult decisions have to be made, with an eye to balance both current and future needs.¹⁷² To ensure that the current population shares a similar commitment to safeguarding limited resources for future generations, policymakers have been investing more effort into engaging members of the public over the longer term, dealing strategically with issues confronting Singapore, and providing opportunities for the community to contribute to problem solving—including asking themselves what they can do now to be part of the solution later. This approach may hopefully serve to inspire the broad populace to step up as stewards of Singapore's future.

BOX STORY

THE LONG ISLAND PROJECT



Resilience is very much ingrained in many of our policies now because countries and cities need to have the ability to adapt old buildings quickly and flexibly, as well as develop extra buildings, spaces and resources.

Resilience sometimes has to be paid for through an ‘insurance premium’. Coastal protection, for example, is a kind of ‘insurance premium’ that we are paying for now.”

Grace Fu

Minister for Sustainability and the Environment (2020–present),
and Minister-in-charge of Trade Relations (2024–present)

BACKGROUND

Climate change is a real and critical threat for Singapore. With around 30% of land located less than 5 m above mean sea level, Singapore is extremely vulnerable to the impact of sea level rise. For instance, there have been instances of flooding within East Coast Park during high tides, even without heavy rain. “Long Island” is one possible strategy to protect homes, businesses, critical infrastructure and public spaces in the area, such as Changi Airport and East Coast Park.¹⁷³



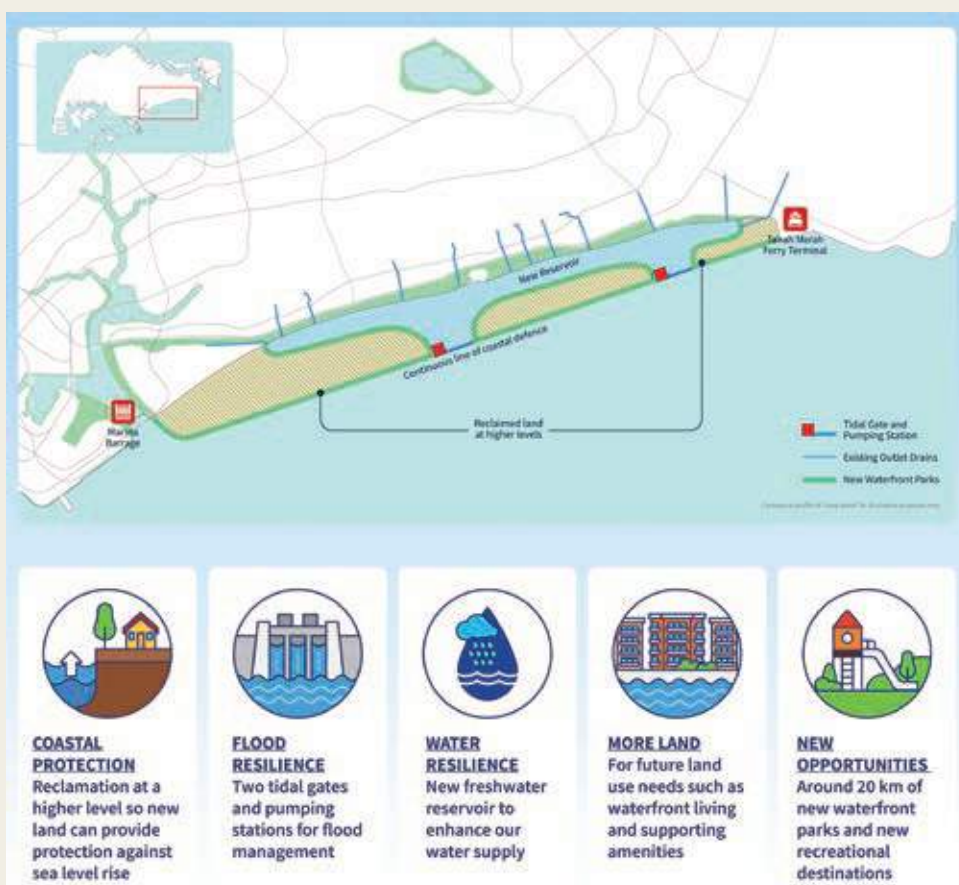
Transient flooding at East Coast Park due to heavy rainfall

Photo courtesy of PUB

PROPOSED SOLUTION

Long Island is being studied as an integrated solution to protect the East Coast from rising sea levels and strengthen flood resilience. This project will involve reclaiming land off the East Coast area to a higher level and forming a continuous line of defence along the coast, protecting the inland areas from rising sea levels.

Existing outlet drainage along the coast will then drain surface runoff into a new reservoir. There will be two centralised tidal gates and pumping stations, similar in concept to the Marina Barrage, which will keep seawater out during high tides and help discharge excess stormwater into the sea during heavy rainfall.



Long Island proposal

Image courtesy of Urban Redevelopment Authority

TAKING A LONG-TERM APPROACH

The idea for the Long Island project was first mooted under the 1991 Concept Plan. Then Prime Minister Lee Hsien Loong (2004–2024) later shared further details on it during his 2019 National Day Rally, and it was subsequently showcased at an exhibition by the Urban Redevelopment Authority (URA) in 2022.

The concept has since evolved into an integrated solution that aims to address multiple national needs—mitigate rising sea levels, strengthen flood resilience, and boost Singapore’s rainwater harvesting capacity, while providing additional land for development. In late 2023, Minister for National Development Desmond Lee (2020–2025) announced that Singapore was commencing public consultation to shape the plans for Long Island, which will be informed by technical studies.

It also entails reclaiming about 800 hectares of land off the East Coast to meet future development needs and includes the creation of a new freshwater reservoir. New green and blue spaces will be



Artist's impression of Long Island

Image courtesy of Urban Redevelopment Authority



Minister for Sustainability and the Environment Grace Fu engaging with participants on coastal protection and flood resilience

Photo courtesy of PUB

integrated with other recreational areas, waterfront living concepts and nature-based solutions to create multi-functional and climate-resilient spaces. For instance, there will be new recreational opportunities by adding around 20 km of new waterfront parks, which will be part of a larger and continuous 120-km-long stretch of accessible waterfront space along Singapore's southern coast.¹⁷⁴

As noted by Minister Grace Fu, the process of developing Long Island will incur huge costs and drastic landscape changes, hence this process has to really be done carefully. For solutions to bear lasting resilience, the process of developing long-term solutions needs to also embrace engagement with the public from the get-go.

Since 2023, the URA and partner agencies have engaged about 3,000 members of the public and stakeholders to understand their aspirations for Long Island and seek their ideas on the preliminary concept for the project. Agencies will continue to engage and study the project extensively to shape a Long Island that reflects collective aspirations and caters to the needs of future generations.

PRINCIPLE 2:**Build for Resilience**

In the past, economy was a lot simpler, industry was a lot simpler. But now, we are squeezed by the necessity, scarcity of land, so we need to think of different ways...”

Gan Kim Yong

Deputy Prime Minister (2024–present), and
Minister for Trade and Industry (2021–present)



Physical and behavioural paradigm shifts must go hand in hand. For a city to be resilient, we need everybody to work together.”¹⁷⁵

Cheong Koon Hean

Chair, Lee Kuan Yew Centre for Innovative Cities,
Chair, Advisory Panel for the Centre for Liveable Cities, and
Professor of Practice, Singapore University of Technology and Design

While having foresight to think long term is important, it is impossible to predict and anticipate trends with absolute certainty. Therefore, urban planners have incorporated a built-in review mechanism into the planning process. The Long-Term Plan is reviewed every 10 years, while the Master Plan is reviewed every 5 years.

As the pace of change has significantly accelerated in recent years, it has become increasingly apparent that the resilience of Singapore’s planning system cannot rely solely on the reviews of the Long-Term Plan and Master Plan. Plans, and the planning process, need to incorporate elements of agility and optionality. This should also be supported by a high degree of flexibility at the systemic level, with government agencies willing and able to continually review existing plans and policies to accommodate emerging responses and solutions.

For instance, flexibility has been woven in by having designated statutory processes that allow for ad hoc alterations to the Master Plan, and waiving certain guidelines when a proposal merits special consideration. This has been essential for the planning and development regime to strike a balance between exercising control and flexibility.

Singapore has sought to achieve planning resilience in four key domains:

Planning process: Singapore has adopted a new and less deterministic approach to evaluate planning strategies and navigate uncertainties in the recent Long-Term Plan Review by using a scenario-based approach (also discussed in Principle 1). Through this, Singapore actively works towards developing planning strategies and policies that can address a range of planning scenarios and set aside areas to provide optionality when land use needs change.

Infrastructure and resources: To optimise Singapore's limited land area and resources, government agencies actively pursue adaptable and flexible designs. Explorations are also underway to determine the viability of underground, air-based urban mobility and floating infrastructure approaches. Where possible, developments are also deployed for multiple uses to meet a variety of needs. A notable example is how unused spaces under rail viaducts, such as those along the Punggol Light Rail Transit, have been activated as parks and recreational spaces for residents to enjoy.

Social fabric: Drawing from Singapore's experience during COVID-19, planning for resilience also includes building and preserving social capital. To achieve this, government agencies need to engage the public in planning processes, with the aim of fostering community ownership of plans.

Flexible mindset: The best-laid plans will not come to fruition if policymakers are not adept at accommodating change. In addition to resilient planning processes, infrastructure and communities, government agencies need to consistently adopt a critical mindset towards existing policies and be prepared for change. One way that the URA introduced this was via the Enterprise District approach, where broad planning parameters for land use and intensity are introduced for the entire area, instead of individual land parcels. The Master Developer for the District has the flexibility to plan and develop the area.

OPINION

SHAPING OUR CITY'S FUTURE— SINGAPORE'S INTEGRATED APPROACH TO PLANNING AND DEVELOPMENT

By Lim Eng Hwee

Chief Executive Officer, Urban Redevelopment Authority

By most measures, Singapore has progressed well as an inclusive, attractive and liveable city that thrives economically, while balancing environmental protection. This can be attributed to our comprehensive and integrated approach in planning and development.

INTEGRATED PLANNING AND DEVELOPMENT

TAKING A LONG-TERM APPROACH FOR SUSTAINABILITY

Like other cities, we must adapt to rapid technological advancements to capture economic opportunities, while also meeting the rising aspirations and evolving needs of our residents. We need to build resilience to shocks and disruptions, such as pandemics, geopolitical tensions and climate change. Our unique challenges as a small city-state with finite land resources require us to take a long-term approach to chart out our vision and strategies for the future, coupled with regular reviews to meet changing needs and trends.

In the latest Long-Term Plan Review (LTPR), the URA developed broad land-use strategies for the next 50 years and beyond, with inputs from the public and other stakeholders. These strategies enable us to judiciously manage our land resources to meet our diverse needs for present and future generations.

In conducting the LTPR, we identified the trends that will affect the way we live, work and play. To respond to the increasingly dynamic and uncertain future, we decided to take an approach that focused on optionality, flexibility and resilience in drawing up the Long-Term Plan, projecting the possible range of land demand in different scenarios. This new approach enabled us to examine the possible futures in a systematic manner and to identify decisions and strategies to respond to different planning outcomes.

To provide more flexibility, one key move was to earmark large tracts of land as Future Development Areas where the specific mix of land uses will be reviewed closer to implementation. For example, Paya Lebar Air Base will be developed as a new community of the future when the current airbase relocates.

Through the review process, we reaffirmed key planning principles relevant to how we plan for Singapore's development. These include providing a good quality living environment that promotes the well-being of residents, creating economic opportunities for all as a well-connected hub, and catering for accessible and inclusive spaces to help build stronger communities.

We also deepen our sense of identity and home through distinctive spaces to cherish, by incorporating climate-resilient infrastructure and systems that support sustainable living, and through stewardship of our natural capital to create a greener environment.

FROM PLANNING TO IMPLEMENTATION

To realise our shared vision for the future, long-term land use strategies are translated into medium-term detailed plans in the Master Plan. The Master Plan provides a clear and transparent guide for development. Approval through the development control process enables the planning intention articulated in the Master Plan to be realised.



Stakeholder and community tours at the LTPR exhibition led by our colleagues and volunteers

Photo courtesy of Urban Redevelopment Authority

In addition to the Housing & Development Board (HDB) and JTC Corporation (JTC) developing our public housing estates and industrial parks, the Government Land Sales programme is another key mechanism to implement the plans on the ground, by releasing land in line with planning strategies and development directions.

We need to ensure that infrastructure and utilities are adequate and provided in tandem to support development. Our urban systems have become increasingly interdependent and complex. Since 2015, URA has been working closely with agencies involved in planning developments, major infrastructure networks and community facilities to jointly review their staging plans annually. This proactive approach ensures agencies' plans remain aligned and facilitates implementation. In addition, it enables the integration and co-location of infrastructure and developments to optimise land use above and below ground.

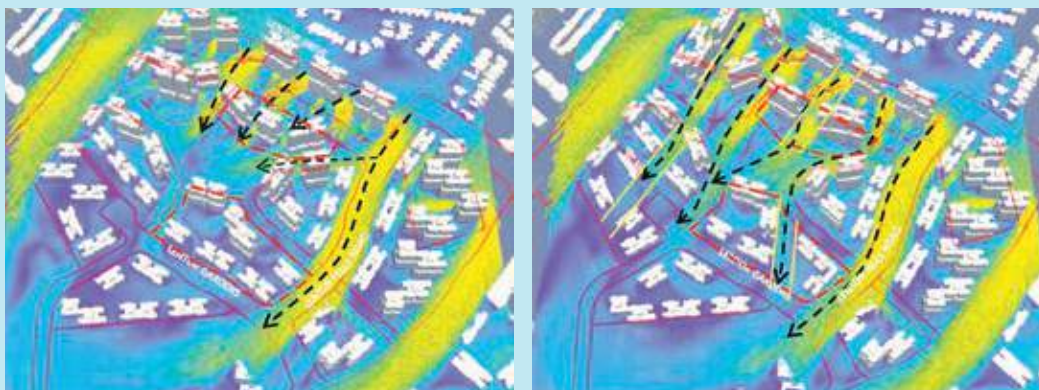
ENGAGING OUR STAKEHOLDERS

We are taking a more inclusive and consultative approach throughout the entire planning and development process. The LTPR was one of our biggest engagements to date, drawing views of over 15,000 people from all walks of life. We are building on this in the public engagement for the Draft Master Plan 2025.

We also gather feedback and insights from the nature and heritage communities, industry professionals, residents and building owners, to map out detailed plans, refine our guidelines and inform near-term land supply strategies.

RESEARCH, DATA-DRIVEN INSIGHTS AND DIGITAL TOOLS

We are adopting a more data-driven approach to provide robust analysis and insights in evaluating planning strategies and options to cater to future needs. Examples include environmental modelling to safeguard wind corridors and accessibility analytics to plan essential services for “10-minute neighbourhoods”.



Wind Analysis Study showing enhancement of wind speeds through Lentor Hills estate before (left) and after (right) the creation of wind corridors

Images courtesy of Urban Redevelopment Authority



i Light Singapore at Marina Bay

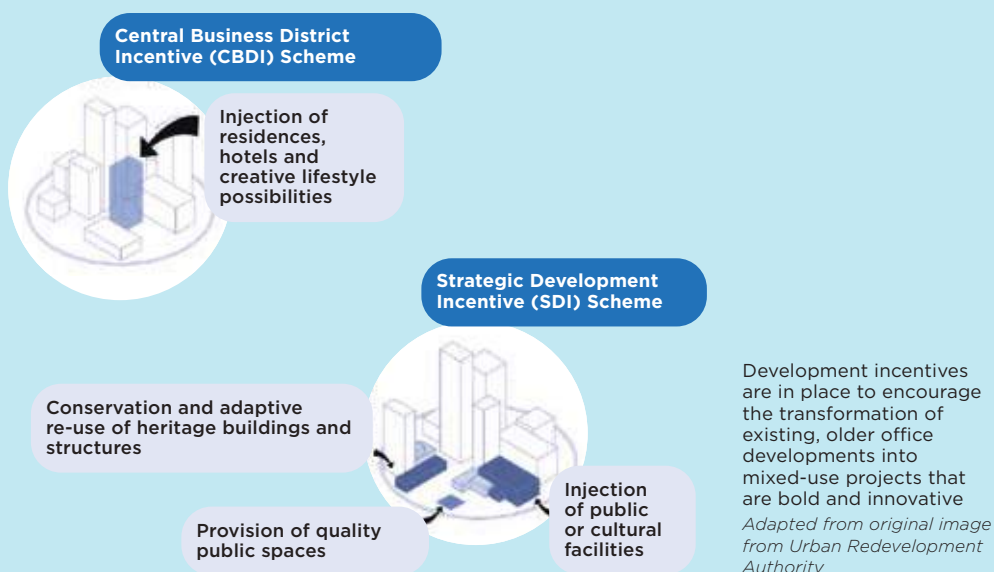
Photo courtesy of Urban Redevelopment Authority and i Light Singapore 2022

To plan and stage new housing and community facilities more responsively, we work with partner agencies to better understand demographic trends, household living arrangements, preferences and patterns of use. This draws on survey findings, census records and other data. One focus area is to provide more age-friendly and inclusive neighbourhoods, for example, through new designs for future nursing homes.

HOW IT ALL COMES TOGETHER

CREATING A VIBRANT CITY WITH ECONOMIC OPPORTUNITIES FOR ALL

To anchor Singapore as an international financial and business hub, Marina Bay is planned as a mixed-use district that is a seamless extension of the existing Central Business District. This distinctive new district has taken shape, with major developments housing key business and financial institutions, as well as cultural and lifestyle attractions. Through placemaking efforts with key stakeholders and partners, Marina Bay has come into its own as a People's Bay—a popular public space and focal point for celebrations and activities, such as the Marina Bay Singapore Countdown held on New Year's Eve and i Light Singapore.





Artist's impression of the future Jurong Lake District, which is envisioned as a model for sustainable development

Image courtesy of Urban Redevelopment Authority

Within the city, we have introduced incentive schemes to support the selective rejuvenation and positive transformation of existing built-up areas. These encourage a wider diversity of uses to support more vibrancy both day and night, for example, through the conversion of older office buildings into mixed-use developments. In that process, we enhance the city by introducing public spaces, retail as well as food and beverage amenities, cultural facilities, pedestrian linkages, etc. The schemes also integrate sustainability and other construction industry transformation outcomes.

DEVELOPING MORE JOB NODES TO SUPPORT BUSINESSES AND THE COMMUNITY

We have planned for growth at new business nodes distributed across the island. These are well-served and integrated with transportation networks. They build on Singapore's polycentric approach to bring workplaces closer to homes. More mixed-use developments in these nodes will provide a wider range of job options and amenities for both workers and residents.

The 410-ha Jurong Lake District (JLD) is the largest of these nodes. Strategically located near key transport nodes, industrial hubs and top educational institutions in the west of Singapore, JLD will support business growth and innovation, with flexible zoning to encourage live-work-play integration. Enhanced connectivity through four MRT lines to the rest of the island, and extensive networks of pedestrian linkages and cycling paths within the district and to surrounding towns, ensure the district remains well-connected and car-lite. Envisioned as a new development model for urban sustainability, district-level urban solutions such as District Cooling and District Pneumatic Waste Conveyance Systems, innovative planning, and more ambitious sustainability targets for all new developments will be implemented to help the district achieve net-zero emissions by around 2045.

Development is also underway at Punggol Digital District. This is the first Enterprise District, where the master developer, JTC, has the flexibility to vary the mix of land uses in each parcel within the overall quantum at the district level, and curate the tenant mix to respond to evolving business needs. JTC will co-locate its business park workspaces with the learning facilities of the Singapore Institute of Technology's new campus, creating opportunities for synergy and collaboration.

MAKING WALKING, CYCLING AND PUBLIC TRANSPORT MORE ATTRACTIVE

To enhance the commuting experience and encourage the shift towards a more sustainable car-lite city, we are working with the Land Transport Authority (LTA) to introduce more Transit Priority Corridors, like the North-South Corridor, and to extend cycling path networks in housing towns and routes to the city. We have planned comprehensive underground and aboveground pedestrian networks with covered walkways and linkways in our housing estates, city centre and key business nodes. At the building level, a Walking and Cycling Plan is required for selected developments to ensure that their design considers safety, convenience, and accessibility for pedestrians and cyclists.



Kampung Admiralty is an integrated development with apartments for the elderly that are co-located with a medical centre, facilities for childcare and eldercare, and green spaces

Photo courtesy of Urban Redevelopment Authority

CREATING A QUALITY LIVING ENVIRONMENT WITH INCLUSIVE AND ACCESSIBLE AMENITIES

With a focus on liveability, Singapore's housing towns are planned to provide a good quality living environment with schools, shops, healthcare, community, sports and recreation facilities, as well as parks conveniently located within each town.

Government agencies have worked closely together to plan and implement new typologies for co-locating multiple community facilities, such as Our Tampines Hub, Heartbeat@Bedok and Kampung Admiralty. These optimise the use of land, increase convenience for residents, and are activated with programming to foster community bonds. We are planning ahead for facilities that can be adapted and converted over time in response to changing demographic profiles and needs of the towns.

STEWARDED OUR NATURAL CAPITAL TO CREATE A GREENER, MORE RESILIENT ENVIRONMENT

Even as we develop our city, we have set aside green spaces in the form of parks, nature reserves, nature parks and other green spaces, and linked these up with a network of park connectors. The Rail Corridor, a former railway line spanning 24 km, has become an extensive and inclusive community space with ecological value.

We are developing a deeper understanding of how to sensitively plan and integrate nature when developing greenfield and brownfield sites. Through the findings of the Ecological Profiling Exercise conducted by the National Parks Board (NParks), we will formulate strategies to support ecological connectivity between key natural habitats and strengthen the resilience of our natural ecosystems.

At the building level, integration of greenery and public space are encouraged through the incentives and requirements under the Landscaping for Urban Spaces and High-Rises programme. This has contributed to increasing verdant landscaping and skyrise greenery in our urban environment.



Guoco Midtown is a mixed-use development integrated with the conserved former Beach Road Police Station

Photo courtesy of GuocoLand

DEEPENING OUR SENSE OF IDENTITY THROUGH DISTINCTIVE SPACES

As Singapore continues to develop and grow, the selective conservation of our built heritage helps retain the distinctive character of our city and provides physical markers of our shared memories. We have integrated conserved buildings with new developments, such as at Guoco Midtown, South Beach and Capitol Singapore. With successful and creative adaptive reuse, they will continue to forge new memories for our next generation.

In view of Singapore's development constraints, we are not able to keep all our old buildings but must calibrate a good balance between conservation and redevelopment. To provide a robust basis for doing so, we carry out detailed studies to identify significant buildings and structures, engage the community and other stakeholders, and consider how to sensitively integrate heritage elements into our city and towns as we develop. Some examples include Farrer Park, where the future housing estate will be integrated with familiar sporting heritage landmarks, and the Golden Mile Complex—one of the most significant modern buildings in Singapore and the first large-scale, strata-titled development to be conserved.

INTEGRATING CLIMATE-READY AND SUSTAINABLE INFRASTRUCTURE AND SYSTEMS

To build resilience to climate change, we will leverage our natural capital by intensifying greenery within our urban environment to reduce stormwater run-off and reduce urban heat island effects. We are studying various options to protect our coastline, including the possibility of integrating coastal protection measures, stormwater management systems, and a reservoir with planned future reclamation at Long Island for housing and other uses in the longer term.

CONCLUDING REFLECTIONS

Planning remains critical for Singapore as we are a small city-state. Despite the many challenges and uncertainties that we face, taking a long-term and integrated approach remains key for Singapore to continue to be a sustainable and liveable city. This ensures that future needs and opportunities are comprehensively and carefully considered, even as we develop and sensitively rejuvenate our city to meet current needs.

We adopt a holistic perspective with tight coordination across the whole of government, from planning through to implementation. We also involve stakeholders in co-creating and realising our plans.

It is vital that we build in flexibility to adapt to changing needs and withstand occasional shocks. This is coupled with continuous innovation to introduce new urban solutions to meet evolving needs and make our city more sustainable.

The ability to sense-make changing needs, draw deeper insights and predict outcomes through data analytics, modelling and simulation are important competencies that will help us better optimise and be more responsive to changes.

These are the critical components in Singapore's planning and development approach that will enable us to optimise the use of our limited resources yet provide an even better living environment that will meet our people's needs going forward.

PRINCIPLE 3:**Seek “Win-Win”**

“ To do planning and development well calls for best practices...you have to have professional inputs, technical inputs, all the various perspectives put in, all your analysis and then you have the process that brings all these considerations into bear, and you need people who have the experience, the competencies, the qualifications and the right capabilities to make decisions.”¹⁷⁶

Lim Hng Kiang

Minister for Trade and Industry (2004–2018)

Each government agency in Singapore possesses a depth of technical expertise and a directive to address specific urban issues. As Singapore becomes more built-up and its building stock and infrastructure begin to age, it is increasingly challenging for agencies to achieve their development or rejuvenation goals individually. Besides having to balance competing priorities within an increasingly limited amount of land, there is also the ongoing struggle to safeguard substantial greenfield sites for future growth.



Our Tampines Hub is one example of an integrated development that incorporated the needs of multiple agencies to deliver good outcomes for residents

Photo courtesy of Centre for Liveable Cities



The effectiveness of integrating land use planning and mobility can be seen in the example of Jurong East

Photo courtesy of Land Transport Authority

To address these challenges, planning solutions need to be more integrative. This implies that government agencies increasingly need to draw upon the expertise of other agencies in order to find systemic solutions. In addition to safeguarding their own domain interests, they now need to identify shared objectives with one another, collaborate, and pool stakeholder networks to identify solutions that can balance between current and future needs.

An example comes from Singapore's transport development journey. Integrated land use planning was essential to maximise the utility and value of spaces surrounding transport nodes.¹⁷⁷ To achieve this, the LTA worked with agencies like the URA, HDB and NParks to align key transport networks with high-density development corridors by synchronising new township developments with transportation infrastructure. The agencies also jointly develop planning and development guidelines for sites surrounding new MRT stations. To ensure that the synergy between land use and transportation infrastructure translates to residents' lived experiences, this approach is also emphasised at the local level through the development of Integrated Transport Hubs where multiple modes of transport come together, for example at Sengkang Town Centre and Jurong East. These nodes are then connected to surrounding developments through sheltered walkways, and in some cases, park connectors which also double up as part of a pedestrian and cycling network. This approach aims to encourage active mobility, by providing seamless transfers between transport nodes and the surrounding facilities, thus covering the "last mile" of one's journey.

Multi-agency collaborations are not straightforward though. For collaborations to be successful, agencies need to be open-minded about seeking expertise across domains and adopting synergistic approaches. This includes developing systemic structures that encourage cooperation.

Competing interests also require different government agencies to iron out their differences, such as by putting in place rigorous processes to discuss and debate policy and planning considerations. The key is not in whether the final decisions are right or wrong; it is in carefully scrutinising all the options available, with a full understanding of the implications of the choices made. This ensures that trade-offs made among the three liveability outcomes are well understood by all parties and appropriately managed.¹⁷⁸

BOX STORY

SEMAKAU LANDFILL PROJECT— THE “GARBAGE OF EDEN”

BACKGROUND

In 1992, Singapore faced a waste management challenge. Existing landfills (for example, at Lim Chu Kang and Lorong Halus) were nearing maximum capacity, while approved sites for future landfill projects had to be re-zoned for other uses. An urgent solution was required to address waste management needs while safeguarding land areas for future development in land-scarce Singapore.¹⁷⁹

The government leveraged Singapore’s expertise in land reclamation and conducted rigorous feasibility studies on the viability of an offshore landfill. This led to the genesis of the Semakau Landfill project—the first man-made offshore landfill in the region, created entirely out of sea-space.

However, members of the public and environmental advocacy groups were not in favour with the idea of an offshore landfill. As the conversion of Semakau Island into a landfill impacted natural space and marine habitats, opponents of the project were concerned that the ecological balance and biodiversity of the area may be disrupted, leading to long-term negative impacts on the surrounding coral reefs, marine life and water quality.

Questions were also raised about Singapore’s ability to comply with stringent international environmental regulations and standards, as well as the long-term sustainability of a landfill on an offshore island.

COLLABORATIVE EFFORTS

A multi-agency approach was undertaken to address various aspects of the project, with each agency taking the lead according to its expertise. The National Environment Agency (NEA) provided regulatory oversight of the project, ensuring that it complied with environmental regulations and standards for waste management systems; the JTC led the development of industrial infrastructure for the facility; and the PUB provided input on the water quality and environmental impact considerations.



Semakau Landfill in 2022

Photo courtesy of National Environment Agency

The agencies jointly conducted environmental impact assessments to evaluate the potential implications of the landfill project, and brainstormed for systemic solutions to minimise the impact of the project on marine ecosystems, water quality and surrounding environments. These assessments led to the eventual solution of developing Semakau Landfill by joining two smaller islands—Pulau Semakau and Pulau Sakeng—with a 7-km perimeter bund, enclosing part of the sea in between. The bund was linked with an impermeable membrane, marine clay and rock layers to keep leachate within the area and the surrounding waters free of pollution.

Apart from the joint planning and development of Semakau Landfill, the NEA and PUB worked together to conduct public engagement and education initiatives to raise awareness about waste management, environmental stewardship, and the role of the landfill in Singapore's overall waste management strategy and sustainability goals. The landfill began operations in April 1999, enabling the last mainland landfill at Lorong Halus to close after it was filled.

ACHIEVING INTEGRATED OUTCOMES THROUGH CLOSE INTER-AGENCY COLLABORATION

The inter-agency approach undertaken to address the concerns at a systemic level led to the eventual development of the Semakau Landfill as an integrated solution in waste management and environmental conservation. Recent monitoring efforts have shown no indication of deterioration in Semakau Island's surrounding seawater quality, and natural ecosystems are reportedly flourishing in the waters. Since 2005, Semakau has been open to the public for recreational activities such as guided

nature walks, sport fishing tours and stargazing. It is also a testbed for new innovations, such as a floating wastewater treatment plant, and in the future, renewable energy solutions such as a micro-grid that integrates multiple energy sources. Dubbed the “Garbage of Eden”, the Semakau Landfill project has evolved beyond being a solution for Singapore’s waste management challenges.¹⁸⁰ It exemplifies the synergistic impact when agencies with different strengths collaborate towards “win-win” outcomes that benefit the greater whole.¹⁸¹



Semakau today offers habitat for biodiversity in its mangrove forests (top images), seagrass meadows (bottom left) and intertidal zone (bottom right)

Photos courtesy of National Environment Agency

PRINCIPLE 4:**Execute Effectively**

We need to be hands-on and get to the ground, rather than only being in ivory towers, planning.”¹⁸²

Chng Kai Fong

Permanent Secretary (Information and Development),
Ministry of Digital Development and Information (2023–present)



A plan is only as good as how well you implement it.”¹⁸³

Mah Bow Tan

Minister for National Development (1999–2011)

Plans on paper are only effective if, and when, they are successfully implemented. With Singapore’s complex urban issues, the process of translating integrated solutions to their outcomes becomes more challenging. Agencies need to manage multiple layers of diverse stakeholder requirements, often involving the resolution of inherent tensions due to divergent interests. While planning becomes more robust through this process, it also often becomes more protracted, and the journey towards implementation grows cumbersome. At the same time, the process needs to be nimble and agile to keep Singapore’s economy competitive globally.

The underlying tension between the need to be robust, yet nimble, can only be addressed through close coordination between agencies to collectively resolve issues. Only then will implementation of plans be effective, and solutions seamless. Each piece of the planning process also needs to be overseen by a government agency with relevant expertise—whether conducting environmental impact assessments prior to the development of greenfield areas, or ensuring adequate buffers are in place between different land uses to safeguard health and safety considerations. Without close coordination and collaboration between agencies, the increasing layers of considerations will inevitably prolong the development process, and hamper implementation.



Singapore's skyline today reflects the effective implementation of urban renewal plans
Photo courtesy of Unsplash

BOX STORY

THE SINGAPORE GREEN PLAN 2030

BACKGROUND

Climate change is a global challenge, and Singapore has been taking a proactive approach towards building a resilient and sustainable future. The Singapore Green Plan 2030 was developed as a whole-of-nation movement that advances Singapore's national agenda on sustainable development. Launched in February 2021, the plan charts ambitious targets, with concrete timelines, on a 10-year road map. The aim is to strengthen Singapore's commitments under the United Nations' 2030 Agenda for Sustainable Development and the Paris Agreement, and to position the city-state to achieve long-term net-zero emissions aspirations by 2050.¹⁸⁴

APPROACH AND KEY PILLARS

Initiatives of the Green Plan are collectively spearheaded by five ministries—the Ministry of Education, MND, Ministry of Sustainability and the Environment (MSE), Ministry of Trade and Industry (MTI), and Ministry of Transport (MOT). Collaboration between the various government agencies contributed to the development of five key pillars and two enablers spanning across all aspects of life.¹⁸⁵

The five key pillars are:

City in Nature: Conserve and extend Singapore's natural capital island-wide, to ensure a green, liveable and sustainable home

Sustainable living: Improve the cleanliness of the environment, as well as conserve resources and energy as a way of life in Singapore

Green economy: Support the green transformation of businesses and industries, harness environmental sustainability as a competitive advantage, and create new green opportunities and jobs

Energy reset: Transit to cleaner energy and increase energy efficiency to lower Singapore's carbon footprint

Resilient future: Adapt and protect Singapore and Singaporeans against the impact of climate change

The two enablers are:

Green government: Promote and enhance environmentally sustainable and climate resilient practices in the public sector

Green citizenry: Support and encourage individuals, households, and community groups to co-create and co-deliver solutions for environmental sustainability and climate resilience

STRATEGIES FOR IMPLEMENTATION

Due to the scale of ambitions in the Green Plan, the government has also put in place certain measures to facilitate this transition:

Cost and education: Implementing sustainable initiatives often requires significant investment and expertise. Hence, funds have been made available for stakeholders through various schemes. For instance, businesses can tap on the Water Efficiency Fund to finance water conservation initiatives as well as the Enterprise Sustainability Programme to build up their sustainability capabilities.¹⁸⁶



Tree planting efforts by Farrer Park Hospital staff

Photo courtesy of Ekyl16 (CC BY-SA 4.0) / Wikimedia Commons

Regulatory and policy frameworks: Developing and implementing effective regulatory and policy frameworks to support sustainable practices and technologies while balancing economic considerations can be complex, and requires careful planning and stakeholder engagement. In 2019, Singapore introduced a carbon tax to put a price on the externality or social cost of carbon. To support emissions-intensive trade-exposed companies that may require more time to make the switch to greener alternatives, a transition framework was also introduced to provide allowances.¹⁸⁷

Data and monitoring: Establishing robust mechanisms for data collection, monitoring and reporting is essential for tracking progress and impact. However, ensuring the availability of accurate and timely data can be a challenge. In 2024, the Gprnt.ai platform was set up to automate and improve the ease of environmental, social and corporate governance reporting for firms.¹⁸⁸

Public awareness and participation: Garnering public buy-in is crucial, but it can be difficult to effect changes in deeply entrenched lifestyle habits. Policies such as the disposable carrier bag charge are in place to nudge consumers towards making more sustainable choices.

As a whole-of-nation movement, the key challenge for effective implementation lies in building consensus and collaboration among diverse stakeholders. For example, the OneMillionTrees movement is one of the major efforts to foster a City in Nature. With an ambitious goal to plant one million trees over a ten-year period, this is a nationwide effort that harnesses the community to not only physically plant trees but also maintain them. Through the programme, members of the public also participate in outreach and education efforts.¹⁸⁹

Existing infrastructure and land areas also need to be developed to meet technical requirements for the implementation of the Green Plan. For instance, while solar power is a promising form of renewable energy for Singapore, it can be intermittent depending on localised weather conditions. To mitigate this, government agencies have collaborated with key players in the private sector to develop and launch an Energy Storage System (ESS). The ESS will help to maintain the power grid's reliability by storing excess energy generated by solar panels during periods of high sunlight and making it available for use in times of low sunlight or high energy demand. The collaboration between public and private sectors helped to accelerate the implementation of this technology. Today, Jurong Island houses the largest ESS in Southeast Asia, which was deployed and commissioned within a record time of six months.¹⁹⁰



SolarLand at Jurong Island utilises vacant land to generate clean energy
Photo courtesy of JTC

BOX STORY

THE MUNICIPAL SERVICES OFFICE



The Municipal Services Office facilitates an integrated approach to town management, routing public feedback on matters ranging from public housing to nature and greenery to the proper agency

Photo courtesy of Unsplash

BACKGROUND

Municipal services in Singapore are delivered by various government agencies and town councils. This sometimes leads to fragmentation and inefficiencies in service delivery. Singaporeans used to have to direct their feedback to the correct agency, and time was often wasted if feedback was sent to the wrong place.¹⁹¹

As Singapore's population grew and the required services increased in complexity, the need for a more coordinated and integrated approach to municipal services became increasingly apparent.

ROLE OF THE MUNICIPAL SERVICES OFFICE

The Municipal Services Office (MSO) was set up on 1 October 2014 to improve the government's overall coordination and delivery of municipal services by various public agencies in Singapore. It was envisioned as a coordinating body, bringing together various stakeholders, including government agencies, town councils, and community partners to work towards common goals and address shared challenges.

The municipal services coordinated by the MSO include maintenance of greenery and local infrastructure (such as roads and footpaths) and upkeeping the cleanliness of public areas. As part of the effort to provide integrative solutions, the MSO also partners with different government agencies to share and monitor complaints on municipal matters, so they can collaborate in resolving cases.¹⁹²

SOLVING LOCAL ISSUES EFFECTIVELY

The MSO has implemented "smart" technologies to facilitate expedited resolution of municipal issues that cut across different agencies' purviews. For instance, through the OneService App for smartphones, residents can snap photos of trouble spots, tag on location information, and send their feedback without the need to know whose responsibility it is. The app will route it to the appropriate agency or town council to resolve the issue and

provide timely responses to the feedback provider. The MSO also worked with the Government Technology Agency (GovTech) to develop and launch the OneService Kaki Chatbot for WhatsApp and Telegram users in 2021, and for Instagram users in 2023, enabling residents to easily report municipal issues through these commonly used social messaging applications.¹⁹³



The OneService Kaki Chatbot and OneService App

Photo courtesy of Municipal Services Office

Because of their convenience, these channels are also helpful in enhancing community engagement. They empower residents to actively participate in the improvement of their living environment and be more involved in the upkeep of public amenities and infrastructure.

As the MSO consolidates all the data and feedback on municipal services and issues, it also provides an opportunity for agencies to make use of the input from residents to inform their decision-making processes. For instance, the MSO helps agencies to identify priority areas for improvement and allocation of resources based on the community's needs. The MSO's common data sharing and monitoring function has also contributed to greater coordination and collaboration between different stakeholders such as government agencies, town councils and community partners. These co-created solutions have been more effective and holistic to address service gaps.^{194,195}

PRINCIPLE 5:**Innovate Systemically**

I think a lot of urban development milestones and policy and what you call breakthroughs...have to do with these very scarce resources.”¹⁹⁶

Mah Bow Tan

Minister for National Development (1999–2011)

Addressing the increasingly complex issues facing cities today often necessitates innovative systemic solutions that require government agencies to expand their scopes of work and objectives. In Singapore’s case, the agility to think outside of the box, coupled with technical expertise, has enabled it to develop sustainable solutions to urban problems and implement effective policies and programmes to make its limited land area liveable for residents.

One example is the optimisation of Singapore’s drainage corridors for multiple uses. Addressing drainage needs while utilising the land for green space, these channels are further activated by the island-wide Park Connector Network which provides recreational opportunities for the public and serves as ecological corridors for flora and fauna. This transforms mere physical infrastructure into a social and green asset. The conversion of a once-concrete channel at Bishan-Ang Mo Kio Park into a naturalised waterway exemplifies this approach, by expanding its function beyond flood control to also offer habitat for biodiversity and green space for public enjoyment.

Systemic innovation is also essential for enhancing Singapore’s global competitiveness. For instance, Singapore’s District Cooling System¹⁹⁷ is an economically and environmentally sensitive solution that has been adopted in other areas in the region, such as

Chongqing, China.¹⁹⁸ Approaches and strategies that have been developed to support Singapore's long-term resilience and self-sufficiency have helped to position the nation as a thought-leader and hub for novel and sustainable solutions to emergent issues.

To deliver innovative systemic solutions, the innovation process must also be systematic. This requires a structured review and evaluation of existing policies and measures in light of demographic and economic shifts, and it must be supported by a culture that encourages progressive innovation towards desired outcomes. This way of working not only encourages the maximisation of scarce resources but also fosters a nurturing environment to experiment, leading to systems that are “safe to fail” rather than “fail-safe”.



Active, Beautiful, and Clean (ABC) Waters Programme at Bishan-Ang Mo Kio Park

Photo courtesy of Unsplash

BOX STORY

KAMPUNG ADMIRALTY— A MODEL FOR INTEGRATION AND CO-LOCATION

BACKGROUND

The development of integrated, co-located HDB models is an example of systemic innovation in action. As Singapore's population ages, ageing-in-place has become broadly perceived to be a viable solution to support older adults' independence, and also mitigates the potential fiscal and healthcare burdens



To support an increasingly ageing population, Singapore needs better integration and co-location of healthcare amenities

Photo courtesy of Green Nudge

typical of ageing populations. To support ageing-in-place, housing environments have to be one-stop localities for older adults. This usually entails integrating supportive amenities for healthcare needs and active ageing. Yet, in Singapore, these functions traditionally occur in silos, with each function corresponding to its designated land use.¹⁹⁹

INNOVATING AND COLLABORATING ON AN “ALL-IN-ONE” HUB SOLUTION

Kampung Admiralty has transpired as an integrated housing model to mitigate the potential burdens of the expected socio-demographic shift.²⁰⁰ The design intent was to create a prototype for a residential neighbourhood that would be sensitive to the needs of older adults. The project includes elder-friendly studio apartments; a medical centre with eldercare facilities, providing residents convenient access to healthcare services; and community amenities that support active ageing, such as a hawker centre, retail shops and a community garden.

As there were no precedents for such a model, government agencies involved in the project had to innovate based on existing norms, and collaborate to resolve policy differences. For instance, the integration of various facilities within a single development led to concerns about the optimal allocation of space, and the potential impact on the overall community environment. The HDB and Ministry of Health (MOH) engaged in extensive coordination to ensure that the various facilities were appropriately designed and seamlessly integrated. The planning agencies also prioritised the inclusion of green spaces as well as barrier-free access points into the development.



Artist's impression showing a cross-section of Kampung Admiralty

Image courtesy of Housing & Development Board

The efforts paid off. Today, the development is a key focal point for community activities and services in the neighbourhood. As Singapore's first integrated public housing model, Kampung Admiralty also represents Singapore's efforts to innovatively address evolving needs in the population. Its success has positioned Singapore as a thought-leader of housing solutions for seniors—the development has received international recognition and prestigious awards, including the World Architecture Festival's Building of the Year award in 2018.



Event at Kampung Admiralty

Photo courtesy of Housing & Development Board



Artist's impression of an age-friendly space at Kampung Admiralty

Image courtesy of Housing & Development Board

BOX STORY

OPEN DIGITAL PLATFORM

BACKGROUND

The Open Digital Platform (ODP) at Punggol Digital District (PDD) is another initiative that exemplifies how Singapore continues to innovate systemically in the digital space. Prior to its implementation, digital services across Singapore were largely fragmented—each agency developed and managed its systems independently. As urban challenges became increasingly complex and solutions required more integrated approaches, it became evident that the existing model for digital service delivery was no longer efficient or sustainable.²⁰¹

There was a growing need for seamless data sharing and system interoperability across agencies. The rising expectations for citizen participation and more responsive public services further reinforced the urgency for government systems to work cohesively. The siloed approach to digital service management was insufficient to meet these evolving demands. A fundamental transformation in how digital services were delivered and operated was required.

To address this, the ODP was launched to provide a suite of shared digital infrastructure and services, including data analytics capabilities. The initiative aimed to close critical gaps in the existing digital ecosystem and streamline the development and delivery of digital services to better meet user needs.

OVERCOMING THE CHALLENGES

As a novel initiative, the implementation of the ODP posed several challenges that required innovative and multi-pronged solutions. These challenges were addressed through a combination of technical expertise, robust governance frameworks, change management strategies, and a strong commitment to collaboration and user-centric design. Close coordination among government agencies, industry partners, and stakeholders was essential to delivering a cohesive and effective digital platform for public service.²⁰² The challenges were:

Interoperability: The ODP had to accommodate legacy systems and a diverse technological landscape across the public sector while enabling smooth data sharing and connectivity. To address this, standardised data exchange protocols, Application Programming Interfaces and integration frameworks were developed. Clear governance and technical standards were also established to ensure compatibility and interoperability across agencies.

Change management within agencies: Transitioning from agency-specific digital systems to a shared, cross-sector platform required significant shifts in organisational culture and processes. Agencies had to overcome resistance to change, upskill staff, and adopt more collaborative approaches to digital service delivery. Hence, comprehensive training programmes and stakeholder engagement strategies were put in place to support the transition and emphasise the long-term benefits of the ODP.

User-centric design: Ensuring that the ODP's digital services were user-friendly and citizen-centric was a complex task, given Singapore's diverse population. Human-centred design principles guided the development process, supported by rigorous user research and usability testing to evaluate and improve the platform's effectiveness and accessibility.

IMPLEMENTING THE ODP AT PUNGGOL DIGITAL DISTRICT

Today, the delivery of digital services for citizens has been successfully integrated through the ODP. The next stage is for the ODP to be developed as a technological backbone for future developments in PDD. Once fully implemented, the ODP will support the development of smart initiatives that enhance residents' quality of life—enabling seamless connectivity, real-time data sharing, advanced analytics, and the development and testing of innovative urban solutions.

In essence, the ODP forms a foundational platform for digital transformation within PDD. It empowers the district to harness the full potential of technology and data to create a smart, sustainable, and connected living environment.²⁰³



The Open Digital Platform is an award-winning smart city operating system that integrates real-time data from various building and district management operations onto a single platform. It will serve as the digital backbone for Punggol Digital District, Singapore's first smart and sustainable district

Image courtesy of Government Technology Agency

CONCLUDING POINTS

Singapore's urban development journey is a testament to the significance of the key principles of integrated master planning and development discussed in this chapter. As Singapore faces significantly more physical constraints compared to many other cities, these principles have been critical in guiding sustainable development given the scarcity of land. For instance, having the discipline to consider long-term implications for current development trends has helped it identify future areas of concern, allowing government agencies to implement measures that address these concerns well ahead of time. By aiming to build for resilience, planners pre-emptively prepare for unpredictability, and this mindset of readiness has served Singapore well in adapting to emergent trends because plans and the planning process can pivot in a timely manner.

The government's emphasis on seeking "win-win" solutions and implementing plans effectively have also influenced Singapore's agencies to be collaborative, action-oriented and willing to develop the technical competencies required for their domain expertise. With these mindsets in place, the agencies are better equipped to address the complex urban issues facing Singapore today.

From Singapore's experience, translation of plans and vision into reality takes more than a blueprint; it requires a degree of political will, stable governance and a community invested in the cause. While integrated master planning and development is crucial, it also needs to be complemented with good urban governance and a collaborative ecosystem.

System 2

DYNAMIC URBAN GOVERNANCE

INTRODUCTION

In the early years following its independence in 1965, Singapore grappled with formidable socio-economic challenges, including high unemployment and a burgeoning population living in substandard conditions.²⁰⁴ The landscape was marked by badly degenerated slums in the city centre, poor public hygiene and a growing informal economy that strained the city's infrastructure. The government, taking the reins amid these crises, inherited not only a struggling economy but also a civil service in need of reform and internal political tensions that threatened the nation's stability.

Despite these problems, Singapore would, over the next four decades, become one of the world's most competitive economies.²⁰⁵ Its per capita gross domestic product (GDP) ranks among the top 10 in the world.²⁰⁶ Unemployment rates are low, the home ownership rate is high,²⁰⁷ and the 77% of residents who live in multi-ethnic public housing estates are well served by transport links and amenities such as schools, sports complexes and shopping malls.²⁰⁸ Singapore is considered one of the least corrupt countries, with Transparency International ranking it 3rd out of 180 countries and territories.²⁰⁹ At the same time, Singapore was ranked as the most liveable city in Asia, and tied for 30th place as the most liveable city in the world, on Mercer's Quality of Living City Ranking 2024.²¹⁰



Boon Tat Street in the 1960s

Photo courtesy of Urban Redevelopment Authority



Singapore's transformation was the result of decades of long-term planning, bold policies, and a determination to provide a liveable city with a sustainable environment for residents

Photo courtesy of SeanPavonePhoto / Adobe Stock

Singapore's dramatic transformation from developing nation to liveable city-state has much to do with the role of urban governance—particularly in managing the intricate balance between economic growth and social equity, institutional integrity, and public welfare.

In recent years, Singapore has continued to refine its urban governance approach by balancing pragmatism with visionary planning, especially in recognition that it needs to adapt to evolving complexities such as climate change, demographic shifts and technological advancements. Some of the paradigm shifts in the past decade include:

A more adaptive approach: Singapore's governance has evolved into an adaptive one that emphasises the continuous refinement of policies through learning from outcomes. This approach, characterised by a dynamic response to uncertainty, ensures that governance mechanisms are not only resilient but also capable of evolving in tandem with emerging urban challenges. This strategic shift facilitates the creation of innovative, forward-looking policies that are tailored to deal with the wicked problems of an ever-changing urban environment.

A focus on building resilience and effective crisis management: The importance of resilience in urban governance, particularly in the face of crises, is a focal point for Singapore. By implementing governance structures and policies to effectively respond to and recover from shocks and stresses, Singapore aims to build a more resilient and adaptable urban environment that can withstand and recover from various challenges.

A greater emphasis on collaborative governance: With the understanding that community resilience is built through participatory processes, increasing community participation and inclusiveness in shaping the urban environment has become a key strategy for Singapore. High-touch engagement approaches not only build social capital but also help to foster a shared sense of ownership in problem-solving among the community. In doing so, Singapore aims to enhance policy innovation and responsiveness, which ensures sustainable urban development that resonates with the needs and aspirations of its population.

Singapore's experience underscores the need for continuous learning, innovation and collaboration among all sectors of society to achieve a sustainable, resilient and inclusive urban future. Through this lens, Singapore's ongoing transformation may provide invaluable insights and principles of governance for other global cities pursuing sustainability and liveability in an era of unprecedented challenges.

PRINCIPLES OF DYNAMIC URBAN GOVERNANCE

At the core of Singapore's urban governance is the prioritisation of long-term, sustainable outcomes over short-term gains. This foundational principle, crucial since independence, continues to guide current governance, despite the evolving political landscape and challenges to maintaining a focus on long-term goals.



I think long-term thinking is still important. There may be certain policies or plans that we make which may not show results in the short term but will likely show results in the long term. For example, greenery is something that we've always done, taken a long-term view [of]. People ask for the value of having parks and trees. You can only have that, you can only realise the value of these things many, many years down the road.

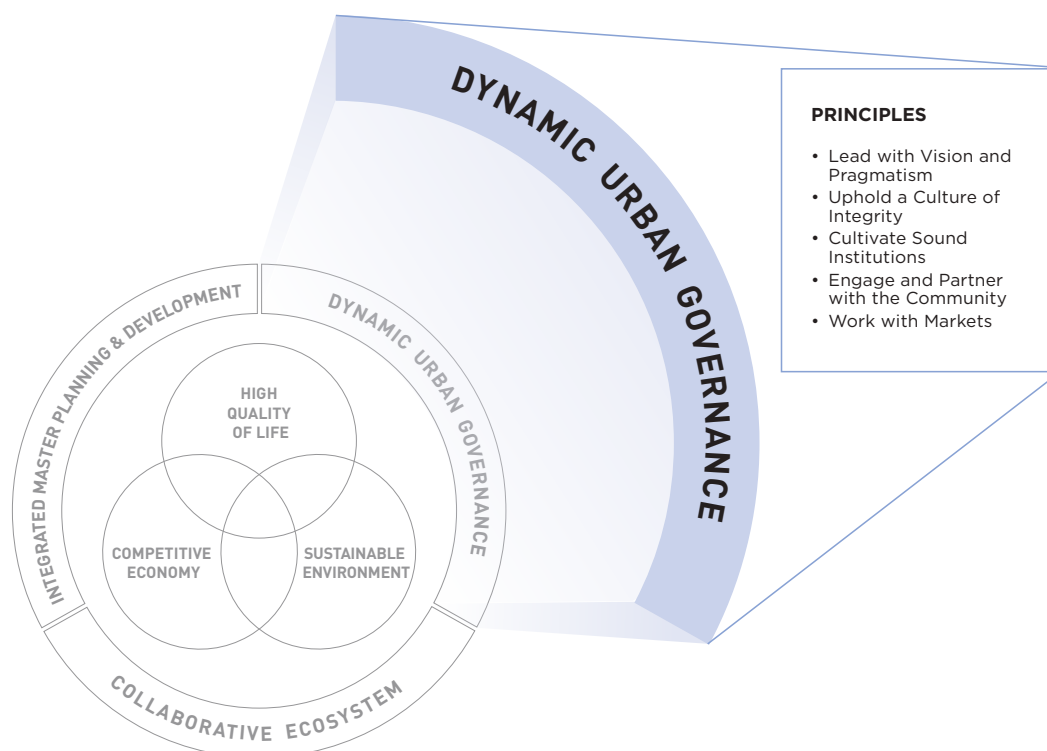
How [is] Singapore...so different? Why is it we are different? We are different because of what we did 20 years ago.”²¹¹

Mah Bow Tan

Minister for National Development (1999–2011)

From the outset, Singapore acknowledged the need for a skilled, technocratic and capable public service. Public servants are tasked with laying out various policy options, highlighting all considerations for decision-making and providing recommendations. However, the ultimate responsibility to select and implement policies rests with the politicians who are tasked with making informed decisions, balancing complex trade-offs and ensuring accountability to the public's needs and desires.

Of the many elements that have had an impact on Singapore's governance approach, five may be seen as operating principles of sound and dynamic urban governances—leading with vision and pragmatism, upholding a culture of integrity, cultivating sound institutions, engaging and partnering with the community, and working with markets.



PRINCIPLE 1:**Lead with Vision and Pragmatism**

Singapore's urban governance model is significantly shaped by the challenges of being a resource-limited and economically vulnerable island city-state. This is reflected in Lee Kuan Yew's candid assessment of Singapore's prospects in 1965:



[A]n island city-state in Southeast Asia could not be ordinary if it was to survive. We had to make extraordinary efforts to become a tightly knit, rugged and adaptable people who could do things better and cheaper than our neighbours, because they wanted to bypass us and render obsolete our role as the entrepôt and middleman for the trade of the region. We had to be different.”²¹²

Lee Kuan Yew

Prime Minister of Singapore (1959–1990)

Lee Kuan Yew's emphasis on the importance of becoming a highly efficient, adaptable and economically competitive nation became a guiding principle for governing Singapore. This ethos led to a governance style that was characterised by pragmatism, focused on economic development and socio-political stability as key to the nation's progress, and translated into rapid economic growth and the development of a sustainable and liveable city over generations.

Since 1959, the government has adopted a long-term, future-oriented perspective in policymaking, which is considered a strength of Singapore's governance. However, this model has faced criticism, particularly concerning housing and transport policies in response to the influx of immigrants and foreign workers since 2005. The government's ability to address voters' concerns while upholding core principles, along with policies that helped to improve the lives of citizens throughout the course of Singapore's development, laid the key foundations for effective urban governance.

Lee Kuan Yew's approach to governance which focused on learning, adaptation and passing knowledge on to future generations, along with the deep, strategic thinking of pioneer leaders like Goh Keng Swee, underpinned Singapore's success. This period of its development was marked by a pragmatic and experimental approach to policymaking, with a focus on learning by doing, and driven by the need to respond swiftly to changing circumstances and seize opportunities for progress. This approach was instrumental in shaping public policy during Singapore's early days and has been central to its transformation into a highly developed urban state. Political scientist and diplomat Chan Heng Chee characterises this period of policymaking as one of "experimentation with reactive institution-building designed to shore up support rather than as a period in which there was an effort systematically to implement a clear vision of a political or an administrative system."²¹³ There was little time to draft master plans and follow through with dogmatism.



It would be a mistake to say it was all planned. What is key about Singapore is that we plan a little but when the environment changes, we react very fast to seize the opportunities and then we fly."²¹⁴

S. Dhanabalan

Minister for National Development (1987-1992)

This flexible and visionary, yet pragmatic, approach to governance is further made possible today with data-driven methods and tools such as foresight and scenario planning to effect change where needed and build upon existing strengths. This anticipatory governance approach emphasises evidence-based decision-making and a clear strategic vision, fostering resilience and adaptability in a complex and interconnected environment.

BOX STORY

PORT AND THE CITY— BALANCING GROWTH AND LIVEABILITY

Long before its colonial history, Singapore was already known as a thriving trading post at the crossroads of ancient maritime routes. As early as the 3rd century, Chinese records identified Singapore—then known as Temasek—as a strategic hub for regional trade. Merchants from across Asia sailed here to exchange prized goods such as porcelain, spices and textiles.

This rich history as a meeting point for global commerce laid the foundation for Singapore’s modern maritime success, enabling it to become the world’s busiest transshipment hub and a premier international maritime centre today. The maritime industry currently contributes about 6% of Singapore’s GDP.

Singapore’s geographical position at the intersection of key trade routes has certainly been beneficial, but its status as a leading global hub port has not been accidental. Strategic foresight and leadership, along with the willingness to make courageous decisions, have been essential for Singapore to remain future-ready, be a pacesetter, reap first-mover advantages, and thrive in a dynamic global industry.

FORESIGHT AND BOLD ACTION

Singapore’s decision to build a container terminal in 1969 reflected foresight, and was a forward-looking response to the potential of containerisation in global shipping.²¹⁵ At the time, demand along the Europe–Far East route was still uncertain, but the risks of not adapting were clear.

The establishment of Singapore's first container terminal at Tanjong Pagar in 1972 enabled Singapore to capitalise on the trend of containerisation ahead of its widespread adoption, and helped Singapore secure a valuable first-mover advantage in the region. Singapore overtook Rotterdam in 1982 as the world's busiest port and remains among the top 10 ports today.²¹⁶

DEVELOPMENT OF TUAS PORT

In 2012, Lui Tuck Yew, Minister of Transport (2011–2015), announced plans for a port at Tuas, which would consolidate existing container terminals into one location. This move aims to streamline transshipment operations, reducing turnaround time and business costs by eliminating the need to transfer containers between terminals. When completed in the 2040s, Tuas Port, spanning about 13.37 km², will be able to accommodate the largest container ships and handle up to 65 million twenty-foot equivalent units (TEUs) annually.²¹⁷ Together with Singapore's International Maritime Centre, Tuas Port will ensure Singapore remains trusted by the maritime industry, as well as resilient and ready for the future.



Because we had planned ahead, our port was able to handle extra volumes during the pandemic, while ports in other countries experienced closures, severe congestion and long delays. But PSA [and] our port remained open 24/7 throughout. This reinforced Singapore's position as the 'catch-up port' where vessels made up time for delays elsewhere."²¹⁸

Lee Hsien Loong

Prime Minister of Singapore (2004–2024)

Singapore's port strategy revolves around 3 Cs—Connectivity, Capacity and Competitiveness.²¹⁹ The port is connected to over 600 ports worldwide, reinforcing its role as a critical node in global trade. Long-term planning ensures Singapore's port capacity keeps pace with shipping demand—an essential factor in maintaining strong network connectivity. Competitiveness is driven by consistent value creation and efficient service delivery, helping shipping lines reduce transit times and costs.²²⁰ This strategic approach has firmly established Singapore as the world's leading transshipment hub.

As with the Pasir Panjang Terminal, the development of Tuas Port will take place over several phases:

- Reclamation of Phase 1 of the development commenced in 2015 and was completed in 2021.
- Phase 2's reclamation works commenced in March 2018.
- Phase 3's planning is currently in progress, and Phase 4 will follow.



Artist's impression of Tuas Port
Image courtesy of Maritime and Port Authority of Singapore

The container terminal operator, PSA, intends to relocate its operations at Keppel and Brani terminals to Tuas Port by 2027, and its operations at the Pasir Panjang Terminal to Tuas Port by 2040. All container port operations will be consolidated at Tuas Port when it is completed in the 2040s.

BUILDING A SMART AND SUSTAINABLE PORT

As a greenfield site, Tuas offers a blank slate to test and deploy innovative technologies such as automated container port systems, optimisation techniques and technologies, and green port technologies. Automation is key to ensure that operations can be handled safely and efficiently. One such example is the deployment of versatile and manoeuvrable Automated Guided Vehicles (AGVs) to automate container transport operations and move containers efficiently and securely in Tuas Port. Other new innovations and applications, such as maritime surveillance drones and remotely piloted and autonomous vessels, are being trialled and implemented to improve productivity and the safety of maritime workers.

Sustainability is another consideration in the construction of Tuas Port. For example, electrified port equipment such as quay cranes, yard cranes, and AGVs have been implemented. AGVs can reduce carbon emissions compared to diesel prime movers. The PSA will further reduce energy consumption at Tuas Port through smart grid solutions, battery energy storage systems and optimisation of container handling processes. In addition, Tuas Port's Maintenance Base building was constructed with intelligent energy management strategies and solar photovoltaic panels to harvest energy, making it one of Singapore's first Super Low Energy Buildings, using 58% less energy compared to other similar sized buildings. The PSA aims to achieve net zero emissions by 2050.

To future-proof Tuas Port against climate risks, it will be built at least 5 m above mean sea level in anticipation of rising sea levels. Further adaption measures are being studied to ensure Tuas Port remains climate resilient.

As port operations gradually shift from the city ports to Tuas, vessel traffic is expected to increase in density and complexity. The Maritime and Port Authority of Singapore (MPA) is developing an artificial intelligence-enabled Next Generation Vessel Traffic Management System to replace the existing Vessel Traffic Information System to strengthen vessel navigational safety and efficiency in Singapore's waters.

INVOLVING THE MARITIME COMMUNITY

In addition to investing in technology and innovation, the Singapore government has actively sought input from the maritime community to enhance port efficiency and strengthen Singapore's competitive position. For example, the solutions provided by mVizn, a deep-learning machine vision technology provider, have been instrumental in alleviating port congestion at the PSA's Tuas Port and City Terminals, ensuring operational safety and bolstering supply chain resilience.

Marine technology startups such as mVizn are nurtured by the MPA's Port Innovation and Ecosystem Reimagined at Block 71 (PIER71™) programme, which serves as an incubator and accelerator to curate innovative proposals under four key focus areas: Maritime Green Technologies, Next Generation Ports, Smart Shipping and Digitalisation. Since its inception in 2018, PIER71™ has nurtured over 150 marine technology startups, which have raised over S\$100 million in investments from venture capitalists, and are supported by a growing network of over 60 corporate partners.

EXEMPLIFYING THINKING AHEAD

The decision to consolidate Singapore's container port operations at Tuas reflects a long-term strategic vision. Tuas Port enhances Singapore's competitiveness and resilience in an era of shifting trade patterns and growing complexities in maritime logistics.

This move also aligns with broader urban planning efforts. Port expansion over the decades has had a profound impact on Singapore's urban development. Looking to the future, by relocating port operations away from the city centre, Singapore frees up valuable land along the southern waterfront, paving the way for new residential, commercial and recreational developments under the Greater Southern Waterfront project.

Singapore's transformation into a global hub port in just six decades is not simply due to geography. Its success stems from deliberate investments in scale, connectivity and operational excellence that offer strong value to shipping lines. Strategic foresight and the willingness to make bold decisions have been key. These qualities remain essential as Singapore positions itself to stay ahead in an increasingly competitive global transshipment landscape.

PRINCIPLE 2:**Uphold a Culture of Integrity**

In the governance landscape of Singapore, building and upholding a culture of integrity has been crucial for maintaining public trust and ensuring the efficacy of public institutions. It involves several key components that have been integral to Singapore's development into a liveable and sustainable city. This commitment to integrity is underpinned by the principle of meritocracy, which ensures that opportunities and advancements within the public service are based on merit, thereby fostering fairness and equality. This is reflected in the 2024 Transparency International Corruption Perceptions Index which ranked Singapore as the 3rd least corrupt country in the world out of 180 countries, and the only Asian country ranked in the top 10.²²¹

Singapore's reputation for being incorruptible has been established through two primary approaches:

An unwavering intolerance towards corruption, exemplified by the resolute commitment of the Corrupt Practices Investigation Bureau (CPIB) to pursue all instances of corruption, regardless of the sums involved or the prominence of the individuals implicated. Singapore's zero-tolerance stance on corruption is further underscored by the stringent penalties associated with bribery—offenders may face imprisonment and/or fines equivalent to the bribe amount. Additionally, the prosecution of corruption is facilitated by streamlined procedures that facilitate the acquisition of evidence.

A framework of rules and processes that has been implemented to minimise opportunities for corruption. Public officers receive competitive remuneration to mitigate the allure of bribery and are held to exacting standards of integrity.²²² They are required to avoid conflicts of interest between their official roles and personal interests, decline gifts related to their work or declare and relinquish such gifts, or compensate their value. Furthermore, they are mandated to annually declare their lack of indebtedness to prevent the accumulation of compromising obligations, and disclose their personal and familial assets to ensure transparency regarding properties or investments acquired beyond their means. These measures also curtail the capacity of officers to exhibit favouritism.²²³



Maintaining the integrity of our system is a multi-pronged and continuous effort.

At the individual level, we must have the right ethos and values, understand both the spirit and letter of the rules, and uphold them. At the team or organisation level, we must look out for one another to minimise the chances of us being compromised, subverted, or succumbing to human frailties. At the system level, we must have regular internal audits, external audits, and have institutions like AGO and CPIB to respond to issues not picked up by other layers of checks.”²²⁴

Chan Chun Sing

Minister for Education (2021–2025)

Ongoing education and training for public servants reinforce ethical decision-making and the importance of adhering to legal and moral standards. Additionally, transparency and openness are pivotal, with the government actively promoting public consultation and access to information, thereby enhancing accountability and citizen engagement. Furthermore, whistleblower protection policies play a critical role in encouraging the reporting of unethical behaviour without fear of reprisal, ensuring the effectiveness and robustness of accountability mechanisms.

This commitment to integrity is also evident in the establishment of government-linked corporations (GLCs) in Singapore. Unlike those of many other developing countries, Singapore’s GLCs, established in the 1960s and 1970s, operated according to commercial principles and competed for government tenders on an open and transparent basis.

Notably, these companies remained relatively corruption-free, a testament to the prevailing culture of integrity within the public service. Public officers seconded to GLCs from statutory boards carried out their duties with care, reflecting the values of hard work and honesty that were pervasive among the majority of public servants. This commitment to integrity has played a crucial role in maintaining ethical standards, fostering transparency, and upholding accountability across public institutions and commercial entities—positioning Singapore as a global exemplar of integrity in governance and business practices.

Over the years, Singapore has also implemented other approaches to maintain transparency and accountability, aiming to build trust and legitimacy among citizens:

Open Data Platforms: Singapore has launched open data platforms that provide public access to a wide range of government data, promoting transparency and enabling citizens to access and analyse information on various aspects of urban governance, public services and city development.²²⁵

Public Consultation and Engagement: The government regularly engages in public consultation and seeks feedback from citizens on policy decisions, urban development plans and public service delivery, fostering transparency in decision-making processes and ensuring that citizen voices are heard and considered.²²⁶

Independent Oversight Bodies: Singapore has established independent oversight bodies, such as the Auditor-General's Office (AGO) and the Public Service Division, to monitor and evaluate government operations, financial management and service delivery, thereby enhancing accountability and oversight in governance.

Collectively, these strategies and practices underscore Singapore's commitment to nurturing and sustaining a culture of integrity within its governance framework, which is essential for the continued trust and confidence of its citizens as well as the international community.

PRINCIPLE 3:**Cultivate Sound Institutions**

In the pursuit of success, whether at the national or organisational level, the significance of good leadership cannot be overstated. However, it is essential to acknowledge that leaders, like all individuals, are susceptible to various biases. Therefore, the establishment of robust institutions and processes is crucial to safeguard against the interests of a few leaders at the helm. These robust structures are vital in ensuring the full utilisation of available resources and expertise within a country or organisation.

Lim Hng Kiang, Minister for National Development (1994–1999), emphasised the government's stance on the importance of institutional structure, highlighting the need for minimised dependence on individual judgement and the maximisation of skills and competencies through structured processes:



I think basically you want as much structure and process as possible, so that you're less dependent on individual judgement. As an administrator, my inclination was to try and put as much structure and process in place as possible so that all the skills and competencies are brought to bear. If everything depends on just the judgement of the individual, then I think you're very subject to the idiosyncrasies of that person."²²⁷

From the beginning, the Singapore government understood the pivotal role of the public service in achieving its objectives. The transformation of the bureaucracy from a colonial administration to a public service for national development necessitated the nurturing of both human capital and institutions. The development of efficient and resilient institutions, resulting in a capable technocracy, has been central to Singapore's rapid development.

Recognising the need for talented individuals within the Public Service, the Singapore government initiated aggressive talent recruitment, development and retention policies. Meritocracy guides the recruitment and promotion of public servants at all levels, with the Public Service Commission and other public agencies awarding scholarships for tertiary education to academically able students.²²⁸ The salaries of senior public servants are benchmarked to those in the private sector,²²⁹ and emphasis is placed on fostering morale, promoting staff well-being and encouraging continuous learning.

The expertise and integrity of the Public Service are further leveraged in effective and efficient institutional settings. The Cabinet, led by the Prime Minister, sets general strategic policy directions, and careful deliberations on policy proposals are conducted to ensure optimal outcomes.

The government has also ensured that “productive fights” arising from policy debates result in consensus based on pragmatism, as seen in the decision-making process regarding the construction of the Bukit Timah Expressway (BKE).²³⁰ The decision to proceed with the construction of the BKE involved a discussion within the Cabinet, where the MND proposed measures to minimise the environmental impact. While concerns raised by the Ministry of the Environment (now known as the Ministry of Sustainability and the Environment) were duly noted, the Cabinet collectively decided to take the risk of building the BKE to improve overall transport connectivity.

Subsequently, the government implemented a proposal to build an ecological corridor to mitigate the environmental impact of the new expressway, following consultations with various stakeholders and studies of overseas examples. Works on the Eco-Link@BKE corridor commenced in July 2011 and were completed in 2013.²³¹ As of 2021, around 100 species of fauna have been recorded on the Eco-Link@BKE in total, reflecting the success of the corridor in facilitating wildlife movement between the Bukit Timah and Central Catchment Nature Reserves.



Eco-link@BKE

Photo courtesy of National Parks Board

The “virtuous” institutions of the Public Service are expected to innovate and bring about institutional change through a continuous cycle. While the limits of resources, whether natural, physical or financial, place bounds on urban development, innovation can mitigate these limits and, in some cases, remove them in the long term. It was this audacity that led Singapore to court investment from multinational corporations in the 1960s and introduce innovative policies, such as the world’s first road usage pricing system in 1975.

These robust institutions and processes have been pivotal in Singapore’s governance and development journey and have not only facilitated effective policy implementation and resource utilisation but also fostered a culture of innovation and bold decision-making, positioning Singapore as a global example of effective governance and sustainable development.

BOX STORY

BUILDING RESILIENCE— A WHOLE-OF-GOVERNMENT APPROACH TO CRISIS RESPONSE

Singapore's crisis management capability has evolved through learning from past crises. The Homefront Crisis Executive Group (HCEG) was established in 2004, following the reorganisation of the earlier Executive Group after the SARS outbreak in 2003.²³² Chaired by the Permanent Secretary of the Ministry of Home Affairs, the HCEG comprises senior representatives from all ministries and oversees Crisis Management Groups for various incidents.



A COVID-19 Vaccination Centre in Singapore in 2022
Image courtesy of ZKang123 (CC BY-SA 4.0) / Wikimedia Commons

The whole-of-government mindset among public officers serves as the “software” of cross-agency crisis management, fostering coordination and initiative. The Singapore government developed the Disease Outbreak Response System Condition (DORSCON) framework after the SARS and H1N1 crises; when elevated to Yellow, DORSCON activates the Crisis Management Group for Health to lead the whole-of-government management of disease outbreaks such as COVID-19.²³³

PROTECTING THE COMMUNITY AT LARGE

The coordinated crisis management capabilities of the Public Service enabled the government to implement comprehensive measures to protect Singapore from the COVID-19 pandemic. The Multi-Ministry Taskforce (MTF), co-chaired by Minister Gan Kim Yong, Minister Lawrence Wong and Minister Ong Ye Kung, established multiple lines of defence to mitigate the risk of imported cases and local transmissions.²³⁴ This approach, grounded in evidence and expertise, aimed to sustainably control and slow down the virus over an extended period. Immediate actions, such as temperature screening at border checkpoints and travel restrictions, were implemented by agencies like the Immigration and Checkpoints Authority (ICA) and MPA to manage the outbreak’s global impact.²³⁵

The MTF prioritised minimising COVID-19 cases through thorough contact tracing and quarantine measures involving the MOH, MND, Singapore Police Force and Singapore Armed Forces. It maintained transparency by hosting daily media briefings and providing honest reporting of COVID-19 cases, fostering trust with citizens, which is crucial for effective crisis management. The Ministry of Digital Development and Information (MDDI) employed different platforms to engage specific audiences, including tailored crisis response information for senior citizens through television programmes and online content.²³⁶

Important messages were conveyed to reassure migrant workers through the friendsofmw.sg online portal. With the assistance of GovTech, residents were also provided with timely, concise information through messaging platforms like WhatsApp and Telegram, as well as a dedicated Info Bot summarising COVID-19 information on government websites. The MDDI utilised social media platforms such as Facebook, Instagram, Twitter and TikTok, along with Digital Display Panels in HDB lifts and lift lobbies. The Protection from Online Falsehoods and Manipulation Act served as the legal framework to combat fake news, establishing the government's credibility as a trusted source of information during the crisis.²³⁷



Safe distancing markers in MRTs during the early days of the pandemic

Photo courtesy of zhenkang (CC BY-SA 4.0) / Wikimedia Commons

RESPONDING WITH HEART

Despite the risks of imported cases, the MTF prioritised the safe return of residents stranded overseas, coordinating with the Ministry of Foreign Affairs (MFA) to facilitate their repatriation and subsequent quarantine. As local transmissions increased, the MTF ensured the provision of reusable masks to all residents following the World Health Organization's advice. Early in the outbreak, when local transmissions had reached 54 and total cases 1,000, a "circuit breaker" was announced to tighten containment measures. Public Service officers acted as "ambassadors", promoting social responsibility, with SG Clean and Safe Distancing Ambassadors educating the public on personal hygiene and safe distancing. Additionally, Enterprise Singapore and the Singapore Tourism Board provided employment to 500 displaced residents to assist with safe distancing efforts. These collective efforts aimed to protect residents and curb the spread of COVID-19.²³⁸

INCLUDING THE WHOLE OF SOCIETY IN CRISIS RESPONSE

During the crisis, ordinary residents, businesses and non-governmental organisations (NGOs) initiated ground-up efforts to aid those in need. They donated and delivered food and essentials to affected families, and sent well-wishes and small gifts to frontline healthcare workers. Recognising the community's response, the Ministry of Culture, Community and Youth developed the SG United portal to rally residents and link volunteers with useful resources, fostering a whole-of-nation approach.²³⁹

When clusters of infection emerged in foreign worker dormitories, the MTF engaged various stakeholders to enhance care for the workers. The dormitories, ill-suited for a pandemic, were gazetted as isolation areas, and the workers were quarantined. The government assured the workers of continued



Safe Distancing Ambassadors in Singapore ensuring compliance with COVID-19 safety measures

Photo courtesy of Unsplash

salary payments and acknowledged the need for improved dormitory standards. A Joint Task Force set up by the Ministry of Manpower and SAF, along with NGOs and citizen volunteers, addressed the well-being of workers by improving their living conditions while overcoming logistical challenges.²⁴⁰

The primary focus of this response was the establishment of an institutional coordinating structure, which, coupled with a whole-of-government approach among public officers, has equipped Singapore with robust crisis management capabilities. This preparedness has enabled the government to implement comprehensive measures aimed at safeguarding Singapore, with a careful and prioritised delivery of these measures to address the needs of those most affected by this unprecedented crisis.

BOX STORY

INSTITUTIONALISING EFFORTS TO RESPOND TO CLIMATE CHANGE

The Inter-Ministerial Committee on Climate Change (IMCCC) was established in 2007 to take a whole-of-government approach on climate action.²⁴¹ Initially chaired by Deputy Prime Minister S. Jayakumar (2004–2009), the IMCCC brought together ministers from key ministries including the MFA, MND, MTI, Ministry of the Environment and Water Resources, Ministry of Finance and MOT. To support its work, an Executive Committee and various Working Groups were established, comprising senior management from relevant ministries and statutory boards.



Environmental issues frequently involve externalities. The consequences of the emission are not necessarily borne by the emitter. If you pollute a waterway, you will not be affected by it, but someone downstream will be affected by it. If you tell the person he must do more to mitigate the impact of his actions, he doesn't feel the benefits. So, what does the IMCCC do? It tries to make these trade-offs and consequences visible. We must understand how these affect us as a whole and reconcile all the costs. We do what makes sense on a national level, rather than looking at things only at a sectoral level.”²⁴²

Teo Chee Hean

Senior Minister (2019–2025),
Coordinating Minister for National Security (2011–2025),
and Chair of the Inter-Ministerial Committee on Climate Change
(2011–2025)



Committees and working groups addressing Singapore's climate change-related issues
Adapted from original image from National Climate Change Secretariat

The IMCCC demonstrates the nation's strategic approach to combating climate change through robust institutional frameworks. By centralising coordination, integrating climate considerations into diverse policy areas, and fostering a collaborative approach, the IMCCC has spearheaded initiatives like the Singapore Green Plan 2030, carbon tax implementation, energy efficiency promotion, enhanced public transport, and green building standards.

To further enhance coordination, the National Climate Change Secretariat (NCCS) was established under the Prime Minister's Office (PMO) in 2010. NCCS supports the implementation of Singapore's domestic and international policies and strategies to tackle climate change, while its placement within PMO's Strategy Group strengthens planning on cross-ministry issues.

Together, the IMCCC and NCCS have advanced climate resilience, supported research and innovation, raised public awareness on climate change and positioned Singapore as a leader in urban sustainability and international climate efforts.

PRINCIPLE 4:**Engage and Partner with the Community**

Creating a liveable city is a huge and complex undertaking, and city planners need the support of the city's inhabitants for projects and policies to succeed and be sustainable. No government has all the answers or inexhaustible resources. When the community has a stake in the city, there are more opportunities for the public and private sectors to work together with the people for the long-term good of the city.

The Singapore government has involved the community in protecting the country's shared resources, as these contribute to each resident's interest. In this way, working with the government to care for water resources and greenery would come naturally to the city's residents. The government has also engaged the community by creating avenues for participation in policy formation. Even though policy and planning decisions are fundamentally undertaken by the government, it has increasingly engaged the public to bolster the legitimacy of decision-making and improve policy outcomes.



[W]e organised our own brand of public participation, quite managed, but nonetheless, it was an opening of the planning system for more consultation. So, we have planners prepare the plan and then release it publicly, organise the dialogue for that draft plan with the public. Of course, we invited people to come at that time. I think people were not as vocal as today and [we] had to get them to participate. But nonetheless, it was a good start.”²⁴³

John Keung

Chief Executive Officer, Building and Construction Authority (2006–2017)

Since the 1980s, Singapore's urban planning process has included public consultation through the development of Long-Term Plans and Master Plans.²⁴⁴ These plans are shared with the public and professionals via various channels, allowing for objections and other feedback. Over time, the approach has evolved from mere consultation to actively canvassing public ideas, as demonstrated by the preservation of Chek Jawa Wetlands due to public intervention.

Parallel to this, various environmental campaigns from the 1960s onwards, such as the Garden City and Keep Singapore Clean campaigns, aimed to foster a sense of environmental ownership among citizens. Initiatives like the nationwide Community in Bloom gardening programme and Adopt-a-Park further encouraged public involvement in environmental conservation.



A group of residents working on a community garden as part of the Community in Bloom initiative

Photo courtesy of National Parks Board

By the late 2000s, the shift from consultation to engagement became a key aspect of Singapore's urban governance, with senior officials emphasising the importance of public engagement and co-creation in policymaking. This transition towards a collaborative model signifies a move from a government-centric approach to one that values citizen participation and shared responsibility in shaping public policy, and in this case, environmental stewardship.

Community engagement is an important theme in urban governance, and increasingly commonplace in the contemporary planning processes of many cities. It can take many forms—informing, consulting, involving, collaborating, co-creating and empowering—with each moving up the scale of participation from weak to strong. In its weaker forms, engagement can be regarded as political propaganda, seen as mere tokenism and a tool towards securing acquiescence. In its stronger forms, community engagement can be a key ingredient of social capital, elevating the people's ownership of a decision and their participation in its implementation.



Poster for an environmental campaign in 1988

Image courtesy of National Archives of Singapore

BOX STORY

PARTNERING WITH THE COMMUNITY TO RE-IMAGINE THE RAIL CORRIDOR

The Rail Corridor is a former railway line that stretches 24 km from north to south across Singapore. It was used for commuting and transporting goods between Singapore and the rest of the Malay Peninsula at the beginning of the 20th century. The return of the railway land to Singapore in 2011 sparked great public interest in its usage, with many people fearing the loss of the land to development.



The 24-km stretch of the Rail Corridor
Image courtesy of Urban Redevelopment Authority

While the train was operational, the railway acted as a barrier, dividing and isolating communities across the island. Threading through a diverse range of landscapes, including residential, commercial, industrial and recreational areas, the freed-up railway land held great potential in connecting communities.

PROVIDING IMPETUS FOR ENGAGEMENT

The announcement of the railway's closure created significant public interest. The Nature Society of Singapore submitted a proposal to conserve the railway line as an uninterrupted green corridor, which received widespread support on social media.

Acknowledging this, the MND and URA initiated an extensive community engagement exercise to involve as many segments of the population as possible before formulating plans. The approach aimed to establish a shared vision and set of planning and design objectives to steer the future development of the Rail Corridor.²⁴⁵

WORKING WITH THE PUBLIC TOWARDS A SHARED VISION OF THE CORRIDOR

In terms of outreach, scale and approach, the Rail Corridor project is one of the MND's and URA's most extensive public engagement exercises to date. To create a shared vision for the Rail Corridor, the URA sought ideas from diverse segments of society, including interest groups, nature and heritage enthusiasts, sports associations and event organisers, as well as a wide spectrum of local residents, including the elderly, families and the physically challenged.

The engagement effort spanned five years, ranging from a national overview of how residents envisioned the Rail Corridor to detailed consultations with local communities living nearby as to how they could develop a sense of ownership and



Organised site visit to the Rail Corridor

Photo courtesy of Urban Redevelopment Authority

actively contribute to future activities along the Corridor. Breaking new ground, the URA engaged the public at a very early stage, so that they could truly co-create plans for the Corridor in close partnership with the community. The URA set three key objectives for the Rail Corridor's public engagement process:

Foster a shared vision and ownership of the project through active community involvement and public participation in the planning process.

Raise public awareness and get community buy-in for fresh, bold ideas to optimise land use while transforming the Rail Corridor into an inclusive community space, with greenery and heritage as hallmarks of its unique identity.

Strengthen community bonding through meaningful participation in a project of significance to all residents.

BUILDING CAPACITY FOR MORE EFFECTIVE COMMUNITY ENGAGEMENT AND PARTICIPATION

The Rail Corridor project saw the URA engaging the public early in the planning process and ensuring that the engagement reached as many people as possible. The process reflected a desire to involve the community to co-create proposals from a clean slate, rather than merely engaging them to obtain buy-in for a preconceived plan. This signalled a change in the way government officials viewed lay knowledge—they recognised that people know their neighbourhoods best and it is crucial to invoke their ideas and passion to achieve more equitable planning outcomes.

The extensive engagement process brought on board not just professional bodies and advocacy groups, but also students, seniors and residents living in the vicinity of the Rail Corridor. This was a learning experience for advocacy groups as well, as it enabled them to work closely with the community to address their concerns in a holistic manner. Thus, trust and rapport were established more broadly, not just between advocacy groups and state agencies. The engagement drove changes based on public feedback, such as the improvement of safety and connectivity of two steel truss bridges near the conserved Bukit Timah Railway Station and the Rail Mall.

As part of the Draft Master Plan 2019 review, the URA conducted engagement efforts early to provide planners with sufficient time to fine-tune their plans and policies and manage ground expectations. For example, a series of public exhibitions were held between 2017 and 2018 to solicit views from the general public on the development of new growth areas and housing

precincts, as well as ideas for the rejuvenation of mature areas. The feedback received was useful for the review of the plans for these areas. The Draft Master Plan was then exhibited from March to June 2019. Social media efforts before and after the launch helped to spread key messages and sustain public interest, while guided tours organised for key stakeholders including grassroots leaders, agency partners, developers and residents extended outreach efforts to the local community.

In 2017, when NParks took over the management of the Rail Corridor, the partnership that had formed among the stakeholders became known as the Friends of the Rail Corridor; it aimed to cultivate community stewardship towards the shared space, and spearhead ground-up initiatives and community-organised activities to activate spaces along the corridor.²⁴⁶ Where the railway line had once physically divided communities, the Rail Corridor now helps to connect neighbourhoods and link communities to a vibrant community space.

In recent years, Singapore's engagement approach to planning has also broadened to involve building a more participatory local planning culture and cultivating a stronger sense of community ownership. The focus of public engagement for the Rail Corridor was co-creation—beyond its physical form as a linear green space, the Rail Corridor plays a unique role as a piece of social infrastructure with the potential to bring people together. It socialises the community by creating a common space for people to develop shared experiences and memories, and form relationships with one another.

BOX STORY

SUCCESSFUL AGEING— PROGRESSIVE GOVERNANCE AND COLLABORATIVE COMMUNITIES

Singapore has adopted a comprehensive, whole-of-nation approach to tackle the challenges associated with an ageing society, and to ensure that its citizens age successfully and gracefully. The government established the Ministerial Committee on Ageing to spearhead this initiative, coordinating policies and programmes across various sectors. In 2015, this committee launched the Action Plan for Successful Ageing, which serves as a national blueprint aimed at enhancing the quality of life for seniors.²⁴⁷

Central to Singapore's strategy of being a senior-friendly city is the concept of "purposeful longevity", a new narrative that challenges the traditional view of ageing as a decline and promotes an idea where seniors can continue to learn, grow and contribute to society throughout their lives. This requires rethinking and restructuring social systems, workplaces and urban environments to better accommodate the evolving needs of an ageing population.



Ageing actively in the community
Photo courtesy of Green Nudge

CO-CREATING SOLUTIONS WITH THE COMMUNITY



Singapore is encouraging seniors to continue to lead active lifestyles

Photo courtesy of Unsplash

The Ministerial Committee on Ageing sought to co-create the refreshed Action Plan for Successful Ageing with the community, recognising ageing as a collective journey.²⁴⁸ Extensive engagements with over 5,000 diverse stakeholders contributed to shaping the guiding principles of the plan to serve the needs of seniors. Notably, the Citizens' Panel on Contribution explored innovative ways for

seniors to contribute at work and in the community. Their two-month effort involved first-hand insights from seniors and stakeholders and led to the development of creative solutions. This inclusive approach reflects the commitment to address the worries and aspirations of residents towards successful ageing.

Complementing the Action Plan are the Silver Generation Ambassadors, who play a crucial role in outreach efforts by educating other seniors about government schemes and services that can aid them. The Silver Generation Office is the outreach arm of the Agency for Integrated Care. These ambassadors, who are in fact resident volunteers, are also trained to identify and address emerging health and social issues among seniors, ensuring early intervention and encouraging participation in community-based health initiatives.

Efforts have been further augmented with the newly introduced Silver Guardian programme, launched in April 2024.²⁴⁹ The Silver Guardian volunteers will assist in executing activities at Active Ageing Centres, including befriending seniors and organising and leading activities. Partnerships with grassroots organisations, senior activity centres and schools have also been pivotal in extending community health services to seniors. As a result of these collaborations, existing community spaces are turned into vibrant hubs for senior health care, including eye and dental services.

The benefits of active community engagement are multiple—it yields significant results when executed properly under both favourable and challenging conditions. Even if it sometimes makes the decision-making process somewhat cumbersome and delays the execution of plans, the collective effort is worthwhile as it promotes a sense of shared responsibility in developing the community and society.

However, community engagement should not replace the essential roles of leadership and governance. In many cities, the engagement process can become bogged down in disputes, leading to deadlock and indecision when confronting tough choices. Additionally, such participation might result in unfair outcomes if community interests are narrow-minded and dominated by a “not-in-my-backyard” (NIMBY) attitude.

It is the government’s responsibility to protect national interests and consider the needs of diverse community sectors. Effective engagement requires all involved parties to genuinely consider various viewpoints and the knowledge, beliefs, aspirations and values brought forth by different stakeholders.

Conflict is a natural element of engagement scenarios, where the planner’s role as a proficient facilitator, empathetic listener and adept negotiator becomes vital. With a foundation of trust and sincere commitment to collaborative dialogue, conflicts can serve as a constructive force, shaping a more socially resilient society.²⁵⁰

PRINCIPLE 5:

Work with Markets

Singapore’s approach to urban governance is characterised by an emphasis on enhancing public service efficiency by utilising market mechanisms while avoiding market failures. This involves a delicate balance between the varied needs of a diverse stakeholder community. The government maintains a pro-business stance,

fostering an entrepreneurial environment conducive to profit generation, yet it also imposes regulations on businesses to ensure that the broader society does not unfairly bear the cost of externalities. Regulations also aim to maintain market competition for consumer protection and allow government intervention in cases of market failure.

Public housing in Singapore exemplifies the application of market principles to public service delivery. Subsidies ensure affordability and promote homeownership, which in turn enhances citizens' sense of national belonging. Pricing of public housing flats is varied based on factors like location and design, making the subsidy system more equitable.

Singapore's environmental policies also leverage market principles for decision-making, pricing, introducing competition and addressing market failures. While essential services like sewerage are not fully cost-recovered to serve public health interests, other services like waste treatment apply cost recovery to prevent overconsumption and ensure sustainability. This nuanced application of market principles ensures the efficient delivery of public services and the safeguarding of public interest.

Singapore's partnerships with private players in the water industry have helped to spur innovations that diversify and advance its water resource systems, grow the water sector and contribute to GDP growth. Substantial state research and development funding for environmental and water technologies has boosted innovation and capability development, while collaborating with private players in the course of Singapore's first NEWater public-private partnership (PPP) project yielded the first major water recycling plant in the world.

By harnessing the innovative capacity of private companies, PPPs have led to innovations in technical design and operations, such as energy efficiency at the Ulu Pandan NEWater plant. PPPs themselves represent a systemic innovation, as they are a different and novel way for the government to work with private firms to improve outcomes over the longer term.

BOX STORY

RETHINKING WATER SUSTAINABILITY WITH PUBLIC-PRIVATE PARTNERSHIPS

To effectively secure Singapore's water supply, the National Water Agency, PUB, has adapted its procurement strategies over time, reflecting changes in the business environment and industry capabilities. Initially, the PUB outsourced only infrastructure construction, keeping design and supervisory work in-house. However, it now also outsources design and construction to the private sector, while still operating its own plants. The PUB has also employed PPPs for some plants, where private entities are responsible for the design, construction, operation and maintenance of water plants, facilitating the development of a robust and diverse water sector.



Aerial shot of Marina East Desalination Plant
Photo courtesy of Keppel Infrastructure

The PUB pioneered the PPP model in Singapore, starting with a seawater desalination plant in Tuas in 2005. The PPP approach offers value by ensuring cost-effective operations, promoting technological innovation and contributing to the growth of Singapore's private water industry. The PUB has since launched six more PPP projects (three desalination plants and three NEWater factories) following the inaugural project in 2005. A close working relationship between the PUB and private partners in the water sector helps to drive innovation, facilitating the process of setting broad technical specifications for projects to encourage creativity, while maintaining performance standards for the produced water.

The PPP model also expands business opportunities for private sector firms, allowing them to develop expertise and a track record in comprehensive project delivery, which is beneficial for future domestic and international projects.

To ensure the success and reliability of PPP projects, the PUB maintains in-house expertise to assess and monitor the performance of concession companies, ensuring they meet contractual obligations and performance standards. Safeguards are in place within PPP contracts, allowing the PUB to intervene if necessary to ensure continuous plant operation.

Overall, PPP initiatives have enabled the PUB to leverage on the technical expertise from the private sector. The PUB has successfully established mutually beneficial long-term partnerships with its partners, and will continue to work closely with them to support water supply management in Singapore.

CONCLUDING POINTS

Singapore's urban governance has undergone significant changes over the years, adapting to rapidly changing urban dynamics and emerging challenges through adaptive policy frameworks, policy experimentation, adaptive management and iterative learning. The government's philosophy, as summarised by Lee Kuan Yew, emphasises clear signals, consistency, respect, benefits and striving for success, reflecting the importance of political will and tough-mindedness. Prime Minister Lee Hsien Loong (2004–2024) identified clear direction, inter-agency cooperation, and the disciplined and industrious population as key factors behind Singapore's transformation, leading to consistent delivery on promises and a reputation for integrity.

However, Singapore faces challenges in reconciling its global ambitions with the interests and needs of its citizens, particularly in addressing income inequality and managing the influx of expatriate and migrant labour. These pivotal challenges will test the robustness of Singapore's urban governance and present unique hurdles as well as opportunities for innovation and policy adaptation.

“These changes are not exhaustive. We also have to guard against the unknowns and black swan scenarios. In the context of urban planning, we will need to set aside space buffers, be agile and flexible, and be ready to mobilise both government and community resources, just as we did during the COVID-19 pandemic.”²⁵¹

Desmond Lee

Minister for National Development (2020–2025)

Despite these challenges, Singapore's dynamic governance approach, the government's ability to adapt and learn from past mistakes, and the growing presence of a collaborative ecosystem that helps to nurture stewardship of its limited resources have provided strong foundations for its onward developmental journey. The ongoing evolution of urban governance in Singapore reflects a strong commitment to addressing complex urban challenges and ensuring the city's continued vitality and stability.



Coastal areas can be vulnerable to rising sea levels

Image courtesy of cattan2011 (CC BY 2.0) / Wikimedia Commons

System 3

COLLABORATIVE ECOSYSTEM

INTRODUCTION



The key is really to impress upon all Singaporeans that we have to be stewards. Stewardship means you have limited resources, you consume what you need, you improve the situation for yourselves, but with a view to leaving behind for the next generation more than what you have today. That's how a city remains sustainable and liveable.”

Desmond Lee

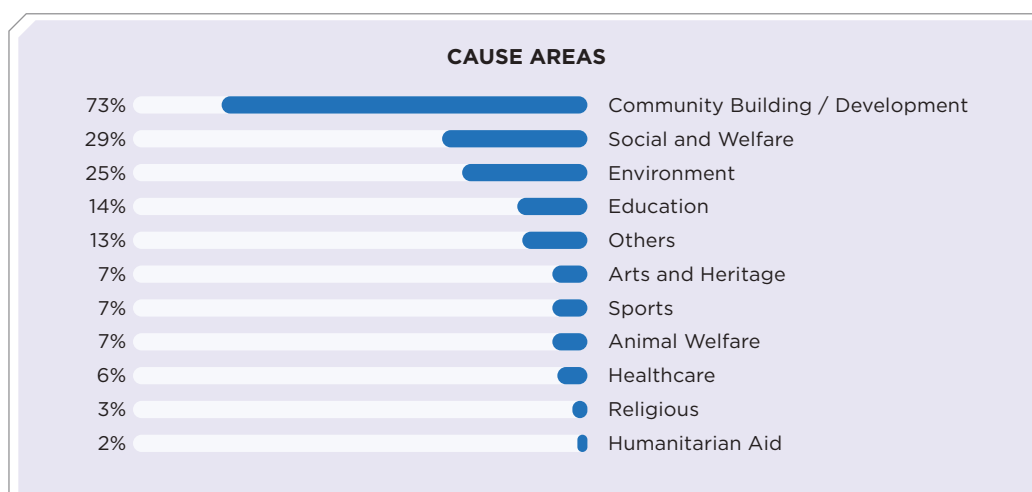
Minister for National Development (2020–2025)

Singapore as a city and nation has evolved over the decades. New generations are succeeding previous ones, and as the city changes, so have the ways in which the government engages the residents of Singapore.

Over the last decade, as social media and new sources of information have proliferated, there has been a shift in how residents view the world and form their opinions. Just as there has been escalating social and political division around the world, Singapore too has been affected by increasing levels of social media-driven polarisation.^{252,253}

Nevertheless, there is also the more positive belief among residents that social media empowers them to become stewards of natural and other resources by providing them with platforms to hold people in power accountable for their actions.²⁵⁴ As the broad concept of stewardship continues to take root, more residents are inspired to contribute to the greater good of society. This includes wanting to become more involved in shaping policies and the broad directional paths that Singapore should be taking.

The first ever Ground-up Initiative Study,²⁵⁵ which was sponsored by Singapore's Tote Board and undertaken by the National Volunteer and Philanthropy Centre in 2022, estimated that Singapore has about 450 active ground-up groups, many of which emerged during the height of the COVID-19 pandemic. Defined in the report as "individuals who voluntarily come together to carry out a self-organised project or initiative to benefit the community", the groups revolved around community building and development (73%), social and welfare causes (29%), the environment (25%) and education (14%).



Causes supported by ground-up groups

Adapted from original image from National Volunteer and Philanthropy Centre

The report also found that the majority of those who started the groups were individuals aged 35 or below, indicating that younger residents are driving their formation.

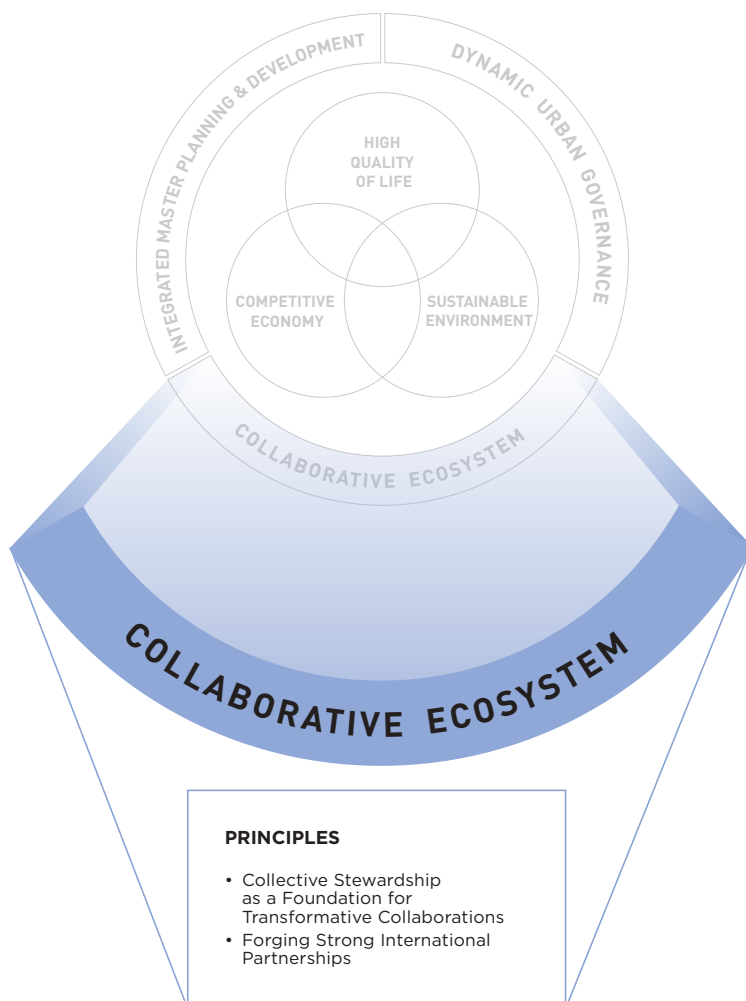
“ When people come together to do something good for the community, it is not just the local impact that we make, but the longer-term, sustainable and ripple effect that can be felt. This is why although many groundups might be small, just starting out, and informal in nature, I believe they can still create a tremendous outsize impact.”²⁵⁶

Edwin Tong

Minister for Culture, Community and Youth (2020–2025)

The government has embraced residents’ increasing desire to be involved in policymaking and shaping the way Singapore develops, moving away from top-down approaches towards a more consultative and collaborative ecosystem of urban governance. During the Building Our Future Singapore Together Dialogue in 2019, Deputy Prime Minister Heng Swee Keat (2019–2025) articulated this shift, speaking directly to residents when he said that “the government will partner Singaporeans in new ways, to design and implement policies together”, and that “beyond partnering you in specific areas, we will work with you to create a shared future, one where every Singaporean will have a part to play”.²⁵⁷

Guiding Singapore's approach towards collaborative governance are two principles—collective stewardship as a foundation for transformative collaborations, and forging strong international partnerships.



PRINCIPLE 1:**Collective Stewardship
as a Foundation for
Transformative Collaborations**

A key plank in the evolution of Singapore's new collaborative ecosystem is the ideal of having residents and the government work together as stewards of the nation's shared future. Minister Desmond Lee has emphasised that the government has "no monopoly on knowledge", and that residents can achieve superior outcomes through partnership with one another. Stewardship goes beyond just balancing the diverse interests of current Singapore residents to also include the needs of residents not yet born. "As they cannot be in the room to speak about their needs... the government has the responsibility to help speak up for their interests." Ultimately, as a small city-state, Singapore has to always balance the needs of both the present and future generations.

The fruits of Singapore's evolving collaborative ecosystem have been varied and have manifested in different ways. For example, in 2019, the Centre for Liveable Cities (CLC) embarked on a multi-stakeholder effort to address the issue of climate change with residents of the Cambridge Road neighbourhood. With approximately 6,800 people living in this low-lying neighbourhood which has historically been prone to flooding, the exercise allowed the residents to collaboratively develop and implement interventions together with grassroots organisations, government agencies and technical experts.



The community is increasingly involved in steering sustainability in Singapore

Photo courtesy of Unsplash

BOX STORY

THE CAMBRIDGE COMMUNITY



Site plan of the Cambridge Road neighbourhood
Image from Centre for Liveable Cities

The Community Resilience by Design @ Cambridge Road project saw a close collaboration between local community groups and various government agencies. The CLC conducted surveys, held focus group discussions and organised several workshops to build confidence among the stakeholders. These engagement sessions enabled local residents and other stakeholders to have a better understanding of the existing conditions in the neighbourhood, and the insights gained would come to guide the approach for the project.

The CLC's engagement with the community spanned various modes including pop-up booths. These sessions offered information on climate change and showcased ongoing government efforts to mitigate and address its potential impacts. Through these interactions, the residents were able to learn more about the issue, appreciate the variety of ways in which they could participate in addressing it, and provide feedback on possible interventions that could be introduced into their neighbourhood.



Information panels displayed at the pop-up booths highlighted ongoing community efforts, and aimed to inspire residents to contribute their ideas on how to address climate challenges in their neighbourhood

Image from Centre for Liveable Cities

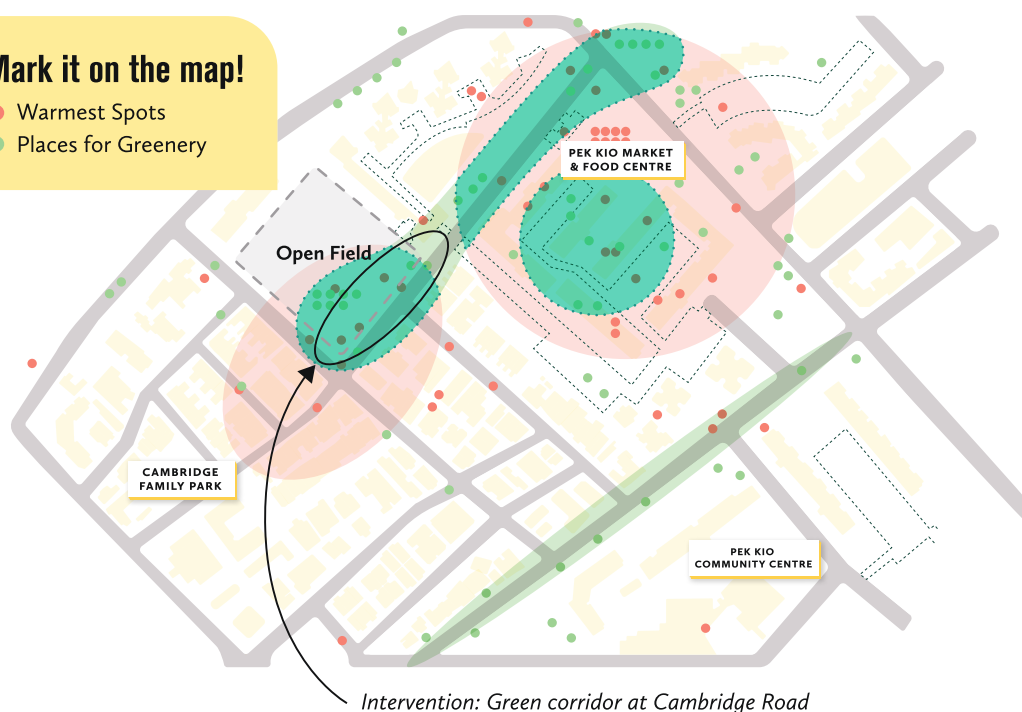
To ensure that the proposed interventions were led by the community, the CLC worked closely with the residents and volunteers throughout the course of the project. Thirty residents from the public and private housing estates in the Cambridge Road neighbourhood and the wider Moulmein-Cairnhill constituency formed a volunteer-based group called Our Green MoCa. The group represents the larger community, works to raise awareness about climate change and aims to inspire action among their neighbours. The collaborative process showed the residents that their views mattered, and this in turn strengthened their sense of ownership of their neighbourhood. The process was its own reward, as it led the residents to become stewards of how their neighbourhood would eventually evolve.

While a pilot site had been identified for a green corridor that would help cool the neighbourhood and alleviate flooding, the volunteers were doubtful that they had the technical skills to design and implement the project. To address this, the CLC reached out to experts like NParks and CLC Visiting Fellow and landscape architect, Herbert Dreiseitl, to share their knowledge with the volunteers. To build their skills and confidence, the experts held workshops on greenery, equipped them with a design toolkit, and conducted an online train-the-trainers masterclass on community engagement and design thinking.

As a result of this multi-stakeholder initiative, the Cambridge Road community conceptualised and brought to reality an 80 m-long green corridor that now connects the neighbourhood's housing estates. With support from NParks and the People's Association, the community co-designed and planted the corridor, and will continue to maintain it. The corridor was designed with a multi-tiered structure to mimic a natural forest, which will attract biodiversity while at the same time improve thermal comfort and promote walkability for pedestrians.²⁵⁸

Mark it on the map!

- Warmest Spots
- Places for Greenery



The community rallied to identify possible areas in their neighbourhood for climate-response interventions, such as a green corridor

Image from Centre for Liveable Cities

The volunteers and other stakeholders also worked to activate underused social spaces. For instance, they partnered with a local art gallery and students to design community murals that incorporated residents' artwork and views on environmental consciousness, sustainability and local heritage.

The continuous community engagement and participation helped to cultivate a greater sense of ownership and resilience among the residents, empowering them to take collective action to improve their neighbourhood, and realise that their ground-up efforts contributed to national efforts on climate action.



Planting the green corridor was a community affair that provided opportunities for community bonding
Image from Centre for Liveable Cities



The Ubin Way code of conduct

Image courtesy of National Parks Board

Another notable example of residents partnering with the government on conserving nature and Singapore's green heritage is the Friends of the Parks initiative. To date there are 14 communities within the initiative, including the Friends of Ubin Network.²⁵⁹ The network consists of residents, youths, educators, researchers, volunteers and members of nature and heritage groups, among others, who come together to develop new initiatives for the rustic offshore island of Pulau Ubin. One of their initiatives was developing, with government encouragement, a code of conduct for environmentally and socially responsible behaviour on Pulau Ubin known as the "Ubin Way".²⁶⁰

Residents are also collaborating with the government to preserve and shape the development of key activity nodes. Instead of looking to the government solely for leadership, community and business groups are partnering with the URA to set up pilot Business Improvement Districts (BIDs)²⁶¹ that will enhance the visitor experience in areas like Raffles Place, Marina Central and Tanjong Pagar. Under the initiative, the stakeholders develop detailed business plans to transform their precincts and the surrounding public spaces through pilot BIDs. Provided they have at least 51% support from stakeholders within the defined boundary of their respective precinct, the government matches dollar-for-dollar the membership fees collected by each pilot BID, up to a cap of S\$500,000 per year, for the first four years of the pilot programme.²⁶²



Public activities at Guoco Tower in Tanjong Pagar
Photo courtesy of GuocoLand

BOX STORY

PLACE PLAN FOR KAMPONG GELAM HISTORIC AREA

Kampong Gelam is a historic district with ties to Singapore's Malay, Muslim, Arab, and other communities. It was gazetted as a conservation area in 1989. The district is anchored by iconic buildings such as the Sultan Mosque, and the Malay Heritage Centre, which are both national monuments. With food, retail and textile businesses operating in over 600 shophouses and representing traditional trades as well as home-grown brands, Kampong Gelam has in recent decades evolved into a well-loved leisure and heritage destination popular with both residents and tourists.

Place management efforts started in 2011 with Saeid Labbafi, a permanent resident of Singapore, whose family owned many carpet shops along Arab Street and had been operating in the historic precinct for close to 20 years. Seeing an opportunity to enhance the neighbourhood he loved, Saeid felt that more could be done if everyone banded together. In 2014, he founded One Kampong Gelam (OKG), an association dedicated to placemaking activities in the area. The group grew to have about 70 members by June 2021.²⁶³



The Sultan Mosque in Kampong Gelam
Photo courtesy of Urban Redevelopment Authority

To expand on the OKG's efforts, an informal partnership known as the Kampong Gelam Alliance (KGA) was set up in 2018. Made up of a more diverse group of stakeholders, including property owners, businesses, institutions, residents and hotels in the neighbourhood, the KGA complemented the OKG's efforts to deepen place management efforts for the area.²⁶⁴

The URA facilitated a discussion among KGA members as well as Kampong Gelam's larger community in end-2020 on how to harness the area's heritage to serve residents better.

The discussions bore fruit in November 2022, when the KGA unveiled an initiative to guide and sustain the growth of Kampong Gelam over five years, as the area's stakeholders strived to make the precinct more relevant to residents of all ages.²⁶⁵

The Kampong Gelam Historic Area 2023–2028 Place Plan²⁶⁶ is a strategic roadmap that aims to enhance Kampong Gelam's heritage, offerings and experiences for stakeholders and visitors alike. It is based on a collective vision for the precinct shaped by feedback and ideas from over 1,600 Kampong Gelam stakeholders and members of the public.

The KGA collaborated with the URA to identify five focus areas to underpin the Place Plan—Identity, Economy, Placemaking, Connectivity and Activation—and a corresponding range of projects that could be introduced progressively over the five-year period. The hope is that these projects will transform and enrich Kampong Gelam into an even more attractive, inclusive and resilient historic area while also preserving its “soul”.^{267,268}

Even as the Place Plan was being conceived collaboratively between the KGA and URA, Singapore's National Heritage Board (NHB) concurrently worked with the URA and Kampong Gelam's stakeholders on the Kampong Gelam Citizen Engagement Project.²⁶⁹ The project mapped over 40 heritage businesses in Kampong Gelam and involved 47 volunteers in helping to document the unique stories behind these businesses and how they had contributed to the precinct's unique cultural identity.²⁷⁰ The volunteers' efforts culminated in a digital map made available on the NHB's resource portal [Roots.gov.sg](https://roots.gov.sg),²⁷¹ where visitors can find out more about these businesses that help to make Kampong Gelam such a rich centre of cultural heritage.



A mural at Kampong Glam completed as part of the five-year plan

Photo courtesy of Pexels

“Kampong Gelam is a unique precinct steeped in heritage, culture, and multi-generational legacies. The findings from the citizen engagement project will be useful for NHB, URA, other agencies and local stakeholders to better understand the situation on the ground and support efforts to raise awareness of the precinct, and its unique cultural identity. The project demonstrates the collective efforts by private stakeholders, public agencies, and the people to enrich a beloved community precinct. We hope that more Singaporeans will be inspired by the stories that are documented and have a newfound appreciation of the heritage businesses in Kampong Gelam.”²⁷²

Muhammad Faishal Ibrahim

Minister of State for National Development (2020–2025)

The growth of citizen-led initiatives such as those to guide the development of Kampong Gelam illustrates a maturing of resident society as it moves away from public perceptions that the “government knows best” and that it must always take the lead in planning and development. This shift towards a more collaborative ecosystem bodes well for Singapore’s future as it grapples with increasingly complex challenges.

Even as the government has increasingly adopted a more collaborative approach with residents, Singapore's evolving social mores and the expectation of citizens to be consulted and more engaged on public policies have pushed the government even further to adopt a less top-down approach in its interactions with residents. In the past, there was the tendency to use top-down mechanisms to effect behaviour through tools such as economic instruments (price mechanisms, incentives and taxes) and legislation. However, unless such policy measures impose high costs or yield large benefits, they have been found to have a limited impact on changing behaviour. Moreover, there are limits to the punitive measures that can be meted out for offences such as littering. Instead, education and engagement programmes have become more important tools, and in the last decade, the government's approach has shifted towards even more engagement and a policy of swaying public sentiment through "nudging".²⁷³ According to behavioural science interventions, nudging can encourage people to be more civic-conscious without the need for expensive programmes or compulsion. At the same time, this form of persuasion assumes a measure of collaboration and willing cooperation from residents.

Within the environmental context, nudges offer an effective yet affordable and less intrusive way of getting people to adopt environmentally friendly behaviours. This is critical considering many of these behaviours are within the private sphere of people's lives, where excessive interference from the government is not desirable. Moreover, besides the more strategic challenge of resource security, resource utilisation—which is linked to consumption behaviour—is a critical component that will determine how successful Singapore will be in achieving its green transition and net-zero goals.

Nudges directly address social, cognitive and physical barriers—usually unaccounted for by traditional policy tools—that hinder environmentally friendly choices from being made in the first place. In this regard, nudges help persuade people towards more desirable behaviours by making the practical benefits of environmentally friendly options more salient, by leveraging social norms, and by making changes to the physical environment to reduce barriers.

THE FORWARD SINGAPORE EXERCISE

Singapore's shift towards a more collaborative ecosystem of governance continued with the Forward Singapore (SG) Exercise. Launched in June 2022, the exercise engaged residents from all walks of life to work with the government to refresh the national social compact for the road ahead.²⁷⁴

Led by then Deputy Prime Minister Lawrence Wong (2022–2024), who represents the next echelon of national leaders (known broadly as the 4G leadership), the Forward SG Exercise was an extensive exercise by the government to work together with residents to come to a broad consensus on what a new social compact and the key directional thrusts for how Singapore should look like. Integral to the exercise was the idea that while society thrives on a diversity of views, and in fact, that there can be disagreement on peripheral issues, it is critical for all of Singapore to come together on the broad strokes and the kind of future the nation should be heading towards.

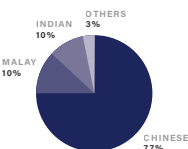
Over 200,000 Singaporeans contributed to the Forward SG Exercise

>35,000
participated in 275 partnerships and engagement sessions

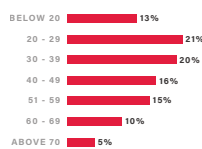
>165,000
contributed through surveys, roadshows and other digital platforms

OUR PARTICIPANTS

54% MALE **46% FEMALE**



Note: Demographics of participants from 102 engagement sessions, where data was collected



The Forward SG exercise builds on the ideas gathered and partnerships developed across various engagements in recent years, including:

- ▶ The Singapore Together Emerging Stronger Conversations
- ▶ The Long-Term Plan Review
- ▶ The Conversations on Singapore Women's Development
- ▶ Over 35 Alliances for Action on economic, social and sustainability issues

Citizens and stakeholders from the private and people sector also led initiatives in support of Forward SG.

- ▶ The NTUC #EveryWorkerMatters Conversations engaged 42,000 employers and workers to refresh the Labour Movement's compact with workers.
- ▶ Some groups submitted policy proposals to the Forward SG Workgroup; others organised Forward SG engagements for their communities.
- ▶ Many kickstarted ground-up initiatives in their neighbourhoods, schools and workplaces to tackle issues related to our social compact.

Many of these initiatives will continue beyond the exercise.

We thank everyone who has contributed, and will continue to grow this spirit of partnership and co-creation.

Engagements were held...

- In different languages
- In every neighbourhood
- At timings suited for overseas Singaporeans
- Both in-person and online
- With the support of more than 560 volunteer facilitators

Engagements adopted a wide variety of formats and methods to cater to different interests and profiles:

- Open Space Technology enabled participants to choose and lead conversations on topics they most wanted to discuss.
- Focus group discussions explored a specific issue e.g. housing, for groups most affected by the issue.
- Role-playing enabled participants to stand in the shoes of a demographic profile different from their own and understand it better.
- Intergenerational conversations brought together people from different ages to build mutual understanding across generations.
- Marketplace for action/partnership enabled people to learn about and sign up for community initiatives in their neighbourhood.

Forward SG Exercise facts and figures
Image courtesy of Forward Singapore

The collaborative nature of the Forward SG Exercise was made explicit by then Deputy Prime Minister Lawrence Wong from the start, when he pledged the following:

“Forward Singapore will be a major undertaking of the 4G team. It is an exercise that we are both excited and honoured to lead. You have my word that we are sincere and committed to listening to and partnering with Singaporeans. We will build on the momentum we have gained and apply the lessons we have learnt over the years.

We will engage in good faith; consider all ideas; and work alongside Singaporeans to achieve our shared aspirations...

Today, I seek your full support and participation. I am counting on all of you—as unionists, as business leaders, but most importantly as fellow Singaporeans to offer your ideas and energies, to shape our vision so they reflect the aspirations and concerns of all Singaporeans and to work hand in hand with the government to turn our common vision into reality.”²⁷⁵

The Forward SG Exercise was conducted for a period of 16 months and elicited inputs from more than 200,000 residents who contributed their ideas through 275 partnerships and engagement sessions, as well as via surveys, roadshows and digital platforms. It culminated in the publication of the Forward SG report on 27 October 2023, which articulates how the government will work with residents to refresh the national social compact for Singapore’s path ahead.²⁷⁶

As a blueprint for the future, the Forward SG report builds on the ideas gathered and partnerships developed across various government engagements with residents in recent years, including the Singapore Together Emerging Stronger Conversations, the Conversations on Singapore Women's Development, and the Long-Term Plan Review, among others.²⁷⁷ Alongside the publication of the report, new avenues for residents to collaborate with the government have been set up, such as the Singapore Government Partnerships Office which offers a dedicated online platform for residents to propose ground-up partnerships with the government.²⁷⁸

Just as Singapore's political leadership enters a period of transition, the culmination of the Forward SG report reflects Singapore's evolution into a more committed consultative relationship between the government and citizenry today. It is an investment in joint stewardship of a shared destiny that bodes well for the continued development of an even more collaborative ecosystem of governance in the future.

Through integrated master planning and development, dynamic urban governance, and a collaborative ecosystem that is premised on a shared belief in stewardship of resources for current and future generations, the process of decision-making in Singapore has generally taken a broad "middle-out" turn. This combines both top-down and bottom-up approaches towards governance while reinforcing the capacities of the intermediate or "middle" level. While there is no single definitive consensus, the middle-out approach is generally described as a hybrid strategy that aims to magnify the strengths of both centralised and decentralised methods while mitigating their weaknesses.

At the same time, Minister Grace Fu, in speaking about the future of environmental sustainability in Singapore, described decision-making and the nature of engagement and collaboration “as sort of on a spectrum”. For example, on more strategic issues, such as determining Singapore’s energy mix and resource security, decision-making would likely be more centralised as the government takes in different information and weighs the various options in consideration of longer-term national priorities and interests. On resource utilisation or consumption-related issues, such as the transition towards clean energy and fuels or everyday water use, she felt there was greater scope to involve the public and private sector stakeholders in finding solutions and to take on greater ownership of the issue.



No one has a monopoly on ideas and the public service may not always have the answer, or be the answer. We are constantly on the lookout for opportunities to crowdsource, consult and co-create—both within the service and with Singaporeans—as we shape our future together.”²⁷⁹

Peter Ong

Head of the Civil Service (2010–2017)

PRINCIPLE 2:**Forging Strong Partnerships
Beyond a City's Boundaries**

Cities are at a crossroads today with multiple pathways ahead. With more complex choices to be made, we must be able to build transformative partnerships that can mobilise resources, facilitate knowledge sharing and secure longer-term commitment to action.”²⁸⁰

Hugh Lim

Executive Director, Centre for Liveable Cities (2020–present)

Even as Singapore’s domestic governance has moved towards ever greater collaboration between the government, business and labour sectors, and individual residents, there is also the recognition that as cities grow, it makes sense to establish strong partnerships and collaborate beyond their boundaries, including with other countries and regions as well as in multilateral settings like the United Nations. For cities in larger countries, this would also mean regional planning and collaborating with adjoining areas, such as how the Regional Plan Association in the United States works towards urban planning and development not just in New York, where it is based, but also with the adjacent states of Connecticut and New Jersey.²⁸¹

In a similar way, Singapore continues to work with its neighbouring regions, countries and cities under a broad “prosper thy neighbour” policy. One clear example of cross-border collaboration is the relationship between Singapore and the southern Malaysian metropolis of Johor Bahru in Johor state, which is separated from Singapore only by the narrow Straits of Johor. Ongoing cooperation between the two cities was most recently manifested in Singapore’s signing with Malaysia of a Memorandum of Understanding (MOU) on a new Johor–Singapore Special

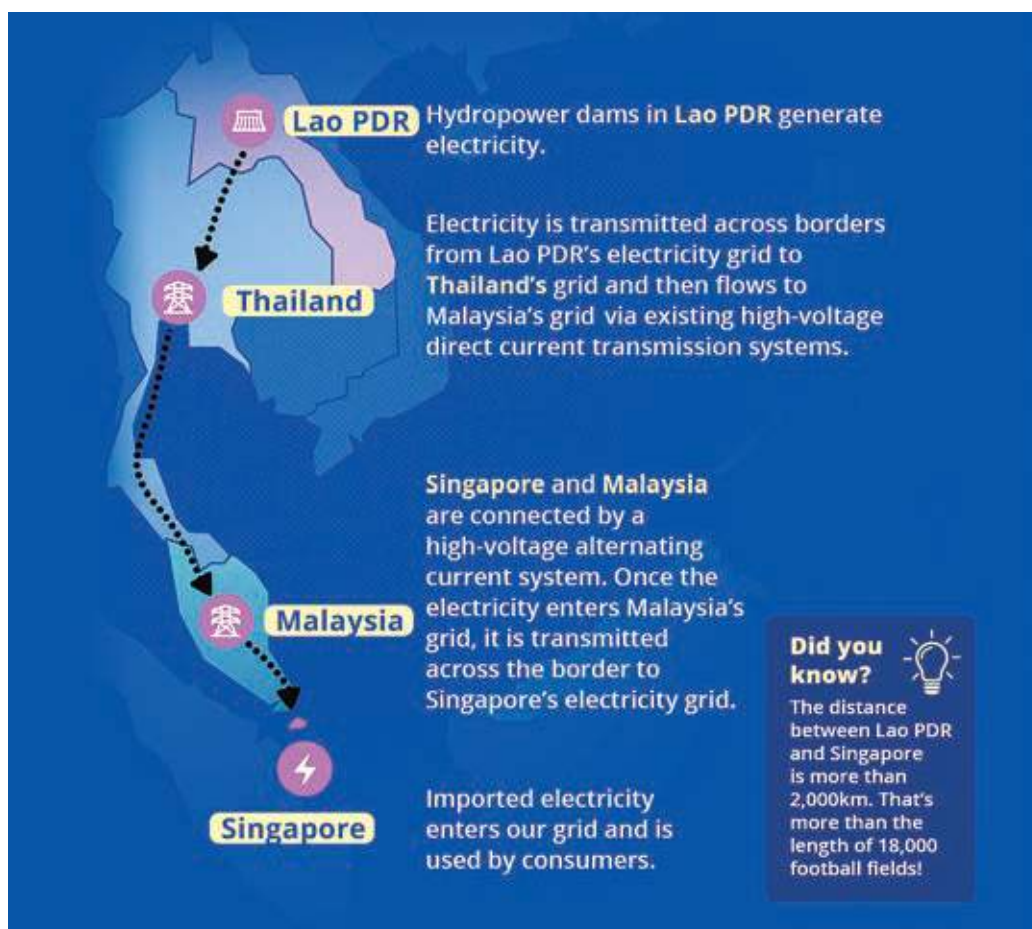
Economic Zone (SEZ) in January 2024. Under the MOU, both sides committed to work towards boosting the cross-border flow of goods and people and developing a framework that will lead to a full-fledged agreement on the zone. Singapore and Malaysia are also exploring other initiatives leading up to the SEZ, including a passport-free clearance system on both sides of the border.²⁸²

Singapore also continues to forge strong international partnerships with countries further afield, such as new collaborations under the United States–Singapore Partnership for Growth and Innovation, which advances cooperation between the two countries under four pillars that address issues of the day: a digital economy and smart cities, energy and environmental technologies, advanced manufacturing and supply chain resilience, and healthcare. In each of these areas, the United States and Singapore are identifying ways to collaborate on common technical standards and build more trustworthy and interoperable systems.²⁸³



United States–Singapore Partnership for Growth and Innovation Roundtable officials from the Ministry of Trade and Industry, and then Commerce Secretary Gina Raimondo, November 2021

Photo courtesy of Ministry of Trade and Industry



Infographic on the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project

Image courtesy of Energy Market Authority

Alongside traditional diplomacy, Singapore collaborates extensively within international partnerships around climate change challenges, which pose a direct threat not only to the urban liveability and integrity of Singapore's built environment due to potential sea level rise, but also through exacerbated urban heat island effects from increased global warming.

Singapore has forged partnerships with its close regional neighbours to collaborate on low-carbon solutions. The Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) is a pathfinder project aimed at enhancing regional power connectivity

and energy security in Southeast Asia. The project involves the utilisation of existing cross-border transmission infrastructure to facilitate the export of hydropower from Lao PDR to Singapore through Thailand and Malaysia. This project marks the first multilateral power trade in the ASEAN region involving four countries.

Singapore's aim is to import up to 4 gigawatts of low-carbon electricity from beyond its shores by 2035, which is expected to make up around 30% of Singapore's projected supply by then.

In the area of carbon capture, Singapore signed a letter of intent with Indonesia for cross-border collaboration on the capture and storage of carbon dioxide (CCS) in February 2024. Working with Indonesia will allow Singapore, with its goal of net-zero emissions by 2050, to explore CCS and low-carbon technological pathways such as hydrogen as part of a suite of mitigation measures. For Indonesia, the agreement bolsters its ambitions to become a regional hub for carbon dioxide storage in the region, given that it has over 400 gigatonnes of storage capacity in the form of depleted oil and gas reservoirs and saline aquifers.^{284,285}

Beyond partnering with other countries to help Singapore achieve net-zero emissions by 2050, Singapore's universities and agencies are collaborating with multinational corporations. For example, in a joint effort by the Nanyang Technological University, the Agency for Science, Technology and Research (A*STAR), and ExxonMobil, a S\$60 million lab was launched on 26 April 2024 to drive research and development in low-carbon technologies by studying solutions such as carbon capture and hydrogen production.²⁸⁶

Singapore also collaborates internationally on Smart Cities issues of the day, including knowledge sharing and collaboration with countries undergoing their own digital government transformations. While some partners are going through a similar learning curve and share similar experiences with Singapore, others are interested in learning from Singapore as an ongoing case study.

The Digital Government Exchange (DGX) is a key platform in Singapore's international engagement efforts, bringing together global public sector leaders to discuss pressing topics around digital government services and to share best practices. DGX is an annual gathering of government chief information officers and



Annual Digital Government Exchange, Singapore
Photo from Singapore Government Developer Portal

public sector leaders from smart cities across the globe, including Australia, China, Denmark, Estonia, Finland, Germany, Israel, Japan, the Netherlands, New Zealand, Sweden, the United Kingdom and the United States of America.

Organised by GovTech, with support from the MDDI since 2016, the DGX is a unique international platform that has fostered a community of like-minded leaders who engage in information exchange, sharing of experiences and mutual learning while exploring future collaboration opportunities. Representatives from multilateral institutions such as the United Nations, the World Bank and the World Economic Forum also participate in these discussions.²⁸⁷ The platform also features technical Working Groups (WGs) in which countries and cities deep-dive into specific subject matters pertinent to governments' drive for digitalisation. Designed with the intent of providing an open conversation yearly, the DGX WGs bring together international experts in their respective fields to conduct in-depth analysis.²⁸⁸

As part of its commitment to international cooperation and knowledge sharing in the areas of urban and nature sustainability, Singapore's NParks worked with the Secretariat of the Convention on Biological Diversity, as well as the Global Partnership on Local and Subnational Action for Biodiversity, to jointly update the Singapore Index on Cities' Biodiversity (SI), also known as the City Biodiversity Index, in 2021.^{289, 290}

The SI is a self-assessment tool for cities to evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines. Covering a broad range of indicators such as biodiversity management and ecosystem services, cities that have applied the SI have found the framework useful in building their capabilities in biodiversity conservation.²⁹¹ According to NParks, since its inception, the SI has been adopted by 39 city governments worldwide.



Greenery, green spaces and natural habitats continue to be the foundations of Singapore's biodiversity

Photo courtesy of National Parks Board

BOX STORY

COLLABORATION ON A HISTORIC MULTINATIONAL AGREEMENT TO PROTECT MARINE BIODIVERSITY

Singapore's collaboration on international partnerships does not just involve the pursuit of cooperative bilateral agreements with other countries or between resident agencies and their counterparts. One of the key planks of Singapore's collaborative approach to international partnerships is its consistent commitment to multilateralism, which has become even more crucial in helping Singapore and its partners meet the urgent challenges of reducing carbon emissions, deal with the negative impacts of climate change, as well as preserve natural environments that are threatened worldwide.

Significant examples of this collaborative approach to multilateral partnerships are given not just through the work of Singapore's agencies but from that of notable resident individuals like Rena Lee, Singapore's Ambassador for Oceans and Law of the Sea Issues (2018–2023). As the president of negotiations at the Intergovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ), Ambassador Lee oversaw talks among more than 190 countries leading to the historic United Nations High Seas Treaty on 4 March 2023.^{292,293}



The BBNJ Agreement will help to preserve the world's marine biodiversity

Photo courtesy of Unsplash

The BBNJ Agreement is the culmination of discussions that began in 2004 under the auspices of the United Nations to enhance the international legal regime concerning the conservation and sustainable use of biological diversity in the oceans beyond the exclusive economic zones and continental shelves of states. Despite being extremely biodiverse, only 1% of the high seas is currently regulated. The BBNJ Agreement is therefore a major step forward in contributing to the governance of the global commons.



I think we must first recognise that while consensus is never easy or guaranteed, it is always worthwhile to work towards achieving consensus.

The draft agreement is not perfect but it is a solid foundation that gives us the tools we need to address the urgent threats that are facing our oceans, in order to achieve our objective of conservation and sustainable use of BBNJ for current and future generations...

The successful and consensus outcome is also testament to Singapore's position as a trusted interlocutor and bridge-builder in the international community, as well as our leadership role in developing the international law of the sea."²⁹⁴

Rena Lee

Singapore's Ambassador for Oceans and Law of the Sea issues, and Special Envoy of the Minister for Foreign Affairs (2018–2023)

Singapore had presided over negotiations of the Agreement since September 2018, and Rena Lee's work to shepherd the negotiations towards agreement was widely lauded, with British newspaper *The Guardian* noting that she "received cheers and a standing ovation from delegates in the room who had not left the conference hall for two days and worked through the night in order to get the deal done."²⁹⁵ Her work and Singapore's commitment to multilateral partnerships were also commended as "a victory for multilateralism" by the United Nations Secretary-General Antonio Guterres, who saluted Ambassador Lee for her leadership and dedication.²⁹⁶

Ambassador Lee's role in representing Singapore's commitment to multilateral and international partnerships won her recognition as one of *Time* magazine's List of the World's 100 Most Influential

People, where it was noted that “with calm dignity, determination, and grace, Lee successfully led deliberations to legally protect biodiversity within the blue heart of the planet, the cornerstone of earth’s life-support system”, and that “we all should applaud her heroic moves, breaking decades of deadlock over governance of human actions that impact not just the future of tunas, sharks, squids, and whales, but that of all of life on earth—humans included.”^{297,298,299}

Ambassador Lee’s achievements not only show that it is possible for a small state like Singapore to shape international discourse on critical issues and be an influential and strategic partner on the global stage, it exemplifies how individual residents can make a difference in addressing important global challenges.



Agreements like the BBNJ will help the coexistence of humans and marine life

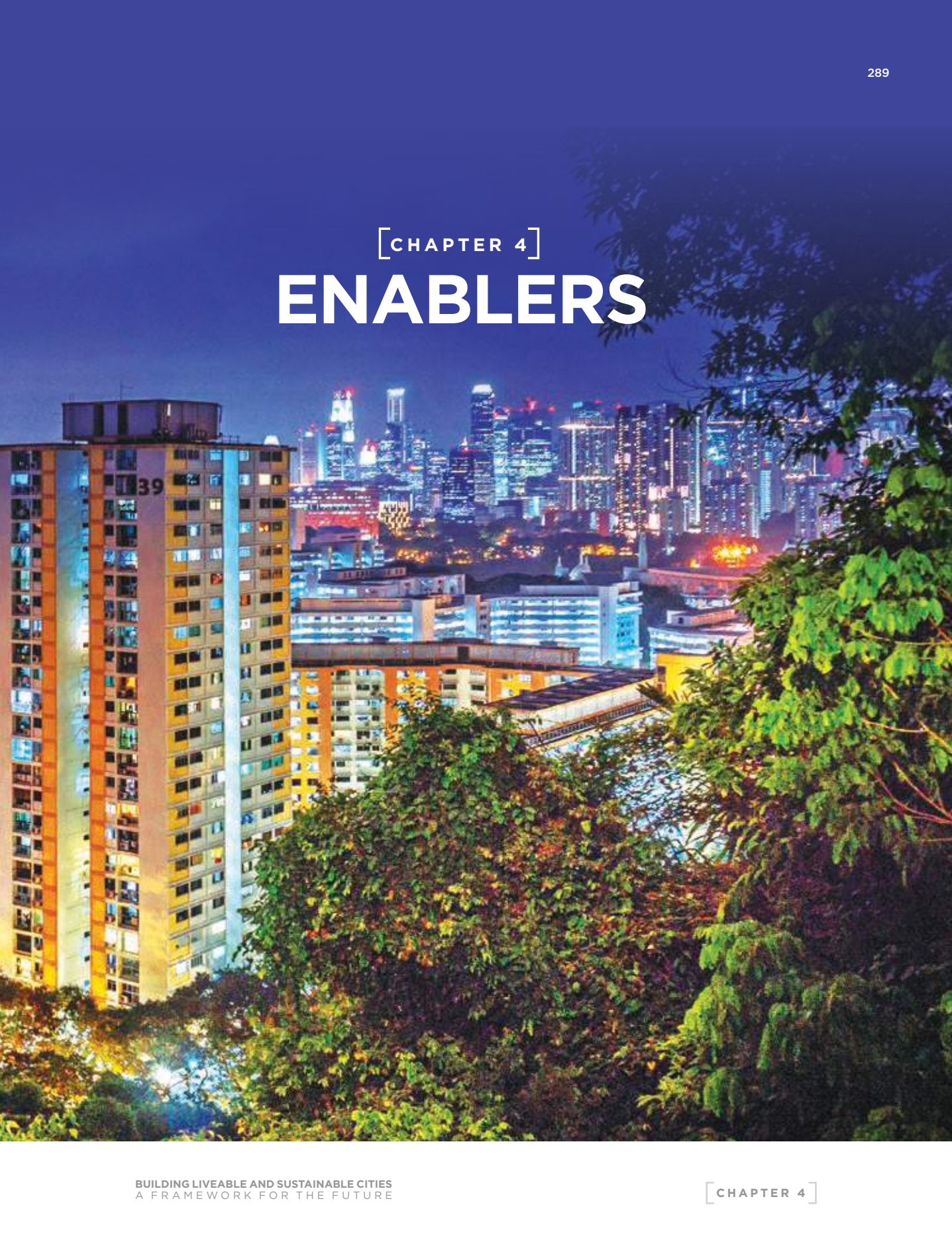
Photo courtesy of Unsplash

CONCLUDING POINTS

Singapore's journey from a fledgling nation grappling with severe urban challenges to becoming a globally recognised liveable city has been underpinned by strong governance, strategic planning and extensive collaboration. As the city-state continues to evolve amid complex global challenges like climate change, technological advancements and shifting demographic landscapes, its continued reliance on robust urban systems not only enhances its own liveability and sustainability but also serves as a model for cities worldwide striving for similar transformations.

Alongside the evolution of urban systems will be the need to seek out, take advantage of and adopt new enablers that can help move cities to the next bound of urban liveability. In that regard, cities including Singapore will need to continually implement new evidence-based approaches to augment planning, governance and partnership processes that will help in dealing with increasingly complex urban challenges in the future. The next chapter on Enablers will discuss this in greater detail.



A nighttime photograph of a city skyline. In the foreground on the left, a tall, multi-story apartment building with a grid-like facade of windows is illuminated. The number '39' is visible on its side. To the right, a dense, dark green forest partially obscures the view. In the background, a vibrant city skyline with numerous skyscrapers and lights is visible under a dark blue night sky.

[CHAPTER 4] ENABLERS

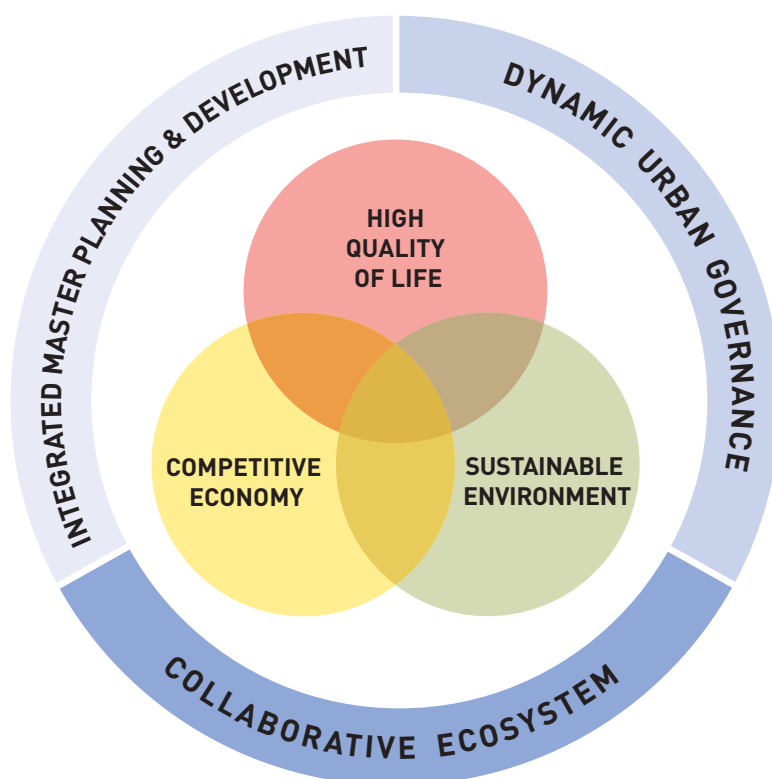
INTRODUCTION

As cities evolve and grow, achieving and sustaining high levels of liveability necessitate a deep understanding of complex urban dynamics. Cities are intrinsically interconnected and comprise multi-level and complex systems that interact and influence each other at multiple scales. This means that a city is not driven by individual actions alone but by the interactions of different urban systems and residents over time. The Science of Cities represents a dynamic and interdisciplinary approach that delves into this complexity, aiming to unravel the underlying principles governing cities' functions and their impact on the



Complex urban environments are composed of interconnected systems,
forming a network of complex systems

Image courtesy of tungnguyen0905 / Pixabay



The Liveability Framework
Image from Centre for Liveable Cities

quality of life experienced by its inhabitants. With the emergence of tools such as agent-based modelling and big data, urban planners and policymakers have begun to view the city through new lenses.

The Science of Cities perspective allows for new, scientifically supported insights that can inform decision-making and provide evidence-based solutions for shaping liveable and sustainable cities. In this way, Science of Cities methods and approaches can be thought of as “enablers” that operate within the “interstitial” space depicted in the Liveability Framework diagram above, thereby helping to augment the effectiveness of systems in delivering liveability outcomes.

Within the Singapore context, urban planning and governance are becoming more complex, especially in the face of a rapidly ageing society, evolving work arrangements and preferences, competing demand for limited green spaces, and climate change. The cumulative impacts of such changes on overall liveability can be difficult to foresee and assess. While not a panacea for all urban issues, new science-based tools and methods have started to contribute fresh and practical insights that examine how different agents in the system are affected by external challenges, how they interact with one another, and in turn, how they influence the system's behaviour and overall liveability outcomes. When applied to urban planning and governance, these approaches can enable a better understanding of cities as complex systems. They can also better equip cities to adopt new trends and possibilities, navigate changes with greater confidence, and strike a more informed balance in managing trade-offs.

This chapter explores the application of Science of Cities approaches in four key areas. First, it delves into how such approaches can inform long-term planning and decision-making processes. Second, it looks at how cities can leverage the integration of digital tools and robotics in the built environment to bring about more efficient governance and management of urban systems. Third, it looks at harnessing social, behavioural and citizen sciences to engage the wider community and inform the design of more effective policies and interventions that promote liveability and well-being of residents. Finally, it also briefly discusses how urban practices can be translated to measurable improvements in liveability, and how some of the innovations are being explored to quantify outcomes more holistically. Through case studies and examples from Singapore and cities around the world, this chapter examines how urban scientific knowledge and approaches are fast becoming allies in the pursuit of liveability and sustainability.

USE OF STRATEGIC FORESIGHT AND PLANNING TO NAVIGATE LIVEABILITY SCENARIOS

Due to the complex interactions that occur within a city, “we only know what is going to happen when it happens. This is the property of emergence, which characterises complex systems”.³⁰⁰ Leveraging foresight techniques, big data and modelling tools to inform long-term planning can help city planners pre-empt possible futures and address associated urban challenges through a more evidence-based lens.

Strategic foresight involves a methodical approach in leveraging future-oriented concepts to better plan for potential opportunities and obstacles, and to enhance a city’s readiness for systemic change.³⁰¹ Foresight employs various techniques, including horizon scanning, trend evaluation and scenario planning to



Investing in foresight capabilities enables cities to anticipate potential challenges and plan their responses more effectively

Photo courtesy of Unsplash

uncover valuable insights about the future. These insights can be used to improve policy formulation and decision-making processes while increasing optionality, by informing policymakers of the moves they can consider taking now to cater for different possible futures.³⁰²

The use of strategic foresight in policymaking is not new to Singapore. Starting as early as the 1980s, the Ministry of Defence (MINDEF) used scenario planning to better prepare for its acquisition cycles.³⁰³ In 1995, scenario planning functions from MINDEF were moved to the Scenario Planning Office—later renamed the Strategic Planning Office—established under the Prime Minister’s Office.³⁰⁴ Scenario planning research, typically involving in-depth interviews from senior public service leaders and experts outside the public service, has been a useful tool for long-term planning as it serves to challenge prevailing assumptions and mental models.³⁰⁵ It also establishes a common ground among government leaders, which can aid in policymaking processes to better address future urban challenges and opportunities.³⁰⁶ The Centre for Strategic Futures, founded in 2009, oversees whole-of-government strategic planning and prioritisation, and also helped to build strategic foresight capabilities within the public sector.³⁰⁷ Harnessing the power of strategic foresight allows Singapore to continue identifying risks and opportunities so that it can remain responsive to a fast-changing environment.

Recent global challenges, such as the COVID-19 pandemic and the climate crisis, have further underscored the need for cities to be adaptable in their land use and infrastructure development strategies. In a densely populated city-state like Singapore, the practice of developing long-term and master plans that are reviewed every 10 and 5 years, respectively, shows the city’s forward-looking approach and commitment towards long-term planning. Technological advancements also enable policymakers to adopt plans that are more dynamic and agile. The Long-Term Plan Review (LTPR) in 2022 exemplifies this approach. For example, as part of the LTPR, the National Parks Board (NParks) embarked on an island-wide Ecological Profiling Exercise to adopt a data-driven science-based approach to inform planners on where to prioritise and safeguard green spaces and corridors for biodiversity, ahead of actual development.

BOX STORY

NPARKS' ECOLOGICAL PROFILING EXERCISE—EMPLOYING A SCIENCE-BASED APPROACH IN STEWARDING SINGAPORE'S NATURAL CAPITAL

Over the decades, Singapore has safeguarded and enhanced its natural capital even as the city has undergone rapid development. Approximately 78 km² of green spaces have been set aside, including four gazetted nature reserves, 4.5 km² of nature parks and nature areas, and more than 391 km of park connectors. These green spaces provide habitats for biodiversity and opportunities for public recreation. In 2020, the Ministry of National Development (MND) announced that NParks would work with the community to transform Singapore into a City in Nature, with the objective of ensuring that residents continue to enjoy high-quality green spaces in the face of continued urbanisation and climate change. City in Nature is one of the five pillars under the Singapore Green Plan 2030, and includes a new planning and development paradigm that will conserve and extend Singapore's natural capital island-wide. The emergence and improvement of new technologies present opportunities for biodiversity research and management in Singapore's urban context.



There is value in the science that we pursue...it can yield a lot of very important results that can have wide-ranging implications on the way we plan our city and on the way we undertake conservation planning. We want to do planning, not fire-fighting. And you can't do conservation planning unless you know the science and unless you start to pursue the advancement in modelling tools.”³⁰⁸

Kenneth Er

Chief Executive Officer, National Parks Board (2014–2023)

In 2021, as part of Singapore's LTPR, NParks embarked on an island-wide Ecological Profiling Exercise (EPE), developing an agent-based spatial model to better understand dispersal patterns and a least-resistance pathway model to predict wildlife movement.³⁰⁹ The EPE sought to develop a more comprehensive picture of Singapore's island-wide terrestrial ecosystem, and understand the role of specific sites in providing refuge and ecological connectivity for native biodiversity. By carrying out the study in tandem with the LTPR, the aim was to better guide upstream planning as Singapore seeks to realise its City in Nature vision, where natural assets are safeguarded and sensitively integrated into the urban landscape in its land use plans.

The terrestrial EPE was carried out through the following steps, in consultation with a 14-member scientific Advisory Panel which comprised academics and expert members from the nature community.



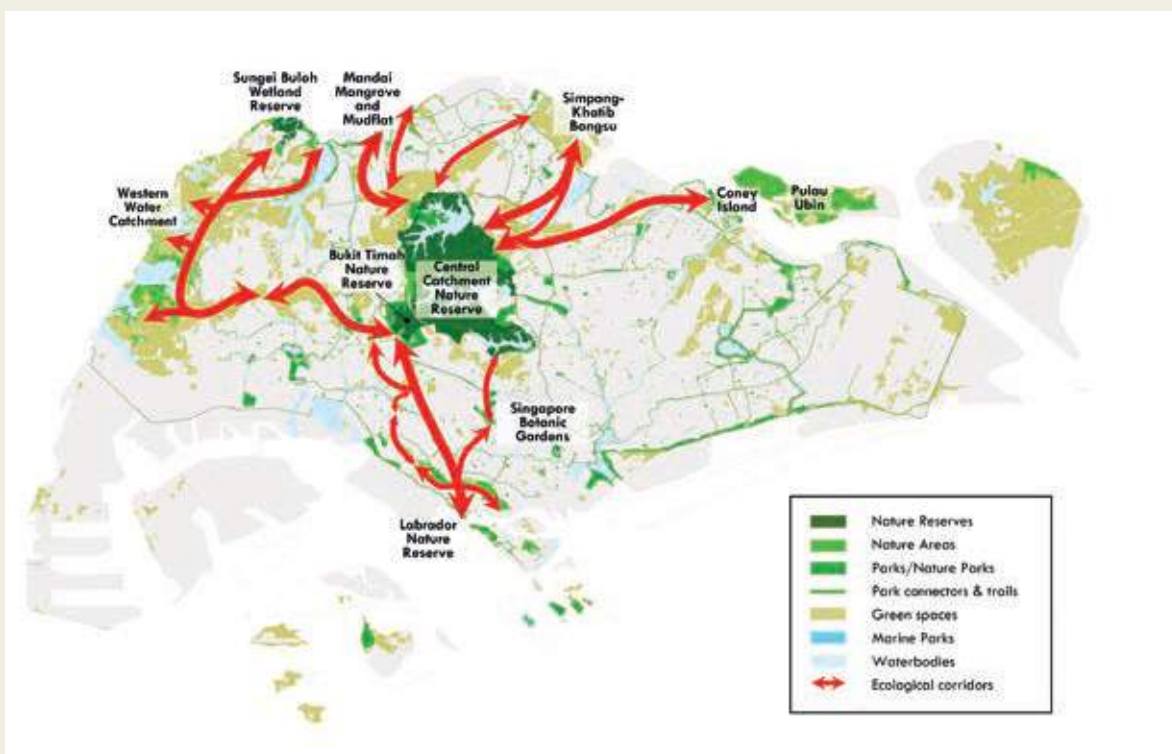
NParks' least-resistance pathway model for terrestrial habitats identifies surface structures between core habitats and assigns a numerical value to each structure, with a lower value being more conducive for animal movement; a pathway of least resistance is then plotted out by selecting a route comprising pixels of lowest values

Image courtesy of National Parks Board

Step 1: Identification of core (source) habitat—building upon existing scientific data and research models, source habitats were identified based on habitat quality such as native species richness, ecological maturity, and rarity of species and habitat.

Step 2: Mapping of buffer (complementary) habitat—in order to ensure that core biodiversity areas would be buffered from edge effects as well as the impacts of abutting developments, complementary habitats were mapped out based on their proximity to core habitats.

Step 3: Identification of ecological corridors—an ecological profiling tool was developed using a least-resistance pathway model that projects the movement of six targeted fauna species. The result is a projection of the connectivity routes that wildlife is likely to take to move between core habitats.



LTPR map showing island-wide ecological connections as identified through NParks' EPE

Image courtesy of National Parks Board

USING SCIENCE TO ESTABLISH NATURE CORRIDORS

Through the EPE, NParks identified four new ecological corridors around the northern, northwestern and northeastern parts of Singapore. With the identification of new ecological corridors under the LTPR, the intention is to ensure that key biodiversity areas, as well as ecological connectivity, continue to be maintained when development is needed at existing green spaces within the corridors.

Khatib Nature Corridor is one example that was established after considering the ecological profile of the area. This new corridor allows ecological connectivity to be maintained and enhanced between the Central Catchment Nature Reserve and the Khatib Bongsu Nature Park. It comprises a series of green spaces that will serve as “stepping-stone habitats” and double up as recreational spaces for residents, thereby enhancing the overall quality of the living environment.

CONCLUSION

In the face of continued urbanisation and climate change, Singapore must find innovative ways to meet diverse land-use needs while ensuring the city remains liveable. The EPE is a continuous iterative process that supports NParks’ overarching research efforts to develop holistic and science-based strategies that inform upstream planning to achieve the City in Nature vision—where greenery and nature are harmoniously woven into the built environment to support biodiversity conservation, and so that residents can enjoy the benefits of a healthy and biodiverse urban ecosystem.

Over the years, planning agencies in Singapore have been leveraging data analytics and geospatial technologies such as ePlanner to assemble, visualise, analyse and overlay multiple data sets. This supports planning analysis and enables deeper understanding of urban issues to make informed decisions in planning for land use, amenities and infrastructure. For instance, public transport data, including crowd levels, have proven to be useful in forecasting peak travel periods and determining strategies to address congestion issues—such as incentivising off-peak travel or enhancing Singapore’s transport infrastructure.³¹⁰

New Science of Cities methodologies, such as the use of digital twins and other simulation and modelling tools, have also been adopted to better anticipate challenges and simulate possible outcomes so that planners can sharpen planning and design interventions for a liveable and sustainable city. Climate change is an example of a predetermined global challenge that cities will need to combat moving forward. On this front, agencies in Singapore have been adopting smart planning tools such as the Integrated Environmental Modeller to optimise thermal comfort through planning and design, for example by harnessing existing wind corridors to create a more comfortable living environment. The Cooling Singapore project is another example of the use of innovative modelling tools in planning to provide thermal comfort for residents, in this case by combatting the urban heat island (UHI) effect.



Generating various development options with procedural modelling and multi-objective optimisation to address urban heat impacts, developed in collaboration between the URA and SUTD Adaptive Design Lab

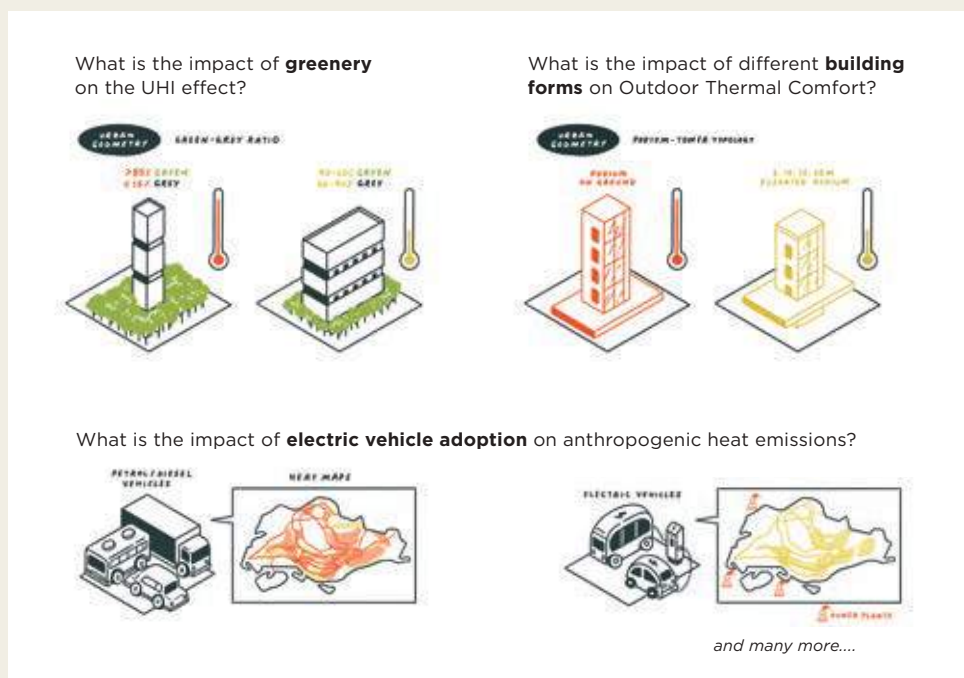
Image courtesy of Cooling Singapore 2.0 project by the Singapore ETH Centre

BOX STORY

COOLING SINGAPORE

With global temperatures on the rise due to climate change, Singapore is confronting an increasingly formidable challenge. As a highly dense, tropical city-state, rising temperatures and urban heat can undermine thermal comfort and health, impacting overall liveability for the city's residents. The Cooling Singapore project was launched in 2017 in response to the gravity of the situation.³¹¹ Supported by the National Research Foundation (NRF) under the Prime Minister's Office, this multi-disciplinary project drew upon the collaborative efforts of researchers from institutions including the Singapore-ETH Centre, Singapore-MIT (Massachusetts Institute of Technology) Alliance for Research and Technology, TUMCREATE (Technical University of Munich), Singapore Management University, National University of Singapore, and the Cambridge Centre for Advanced Research and Education in Singapore.³¹²

Among the innovative solutions devised was the Digital Urban Climate Twin (DUCT), specifically crafted to address the complexities of understanding the causes of urban heat in Singapore. The project aims to utilise DUCT to evaluate scenarios for future climate analysis, which will help in putting together urban design guidelines and informing strategies to tackle future impacts of climate change.



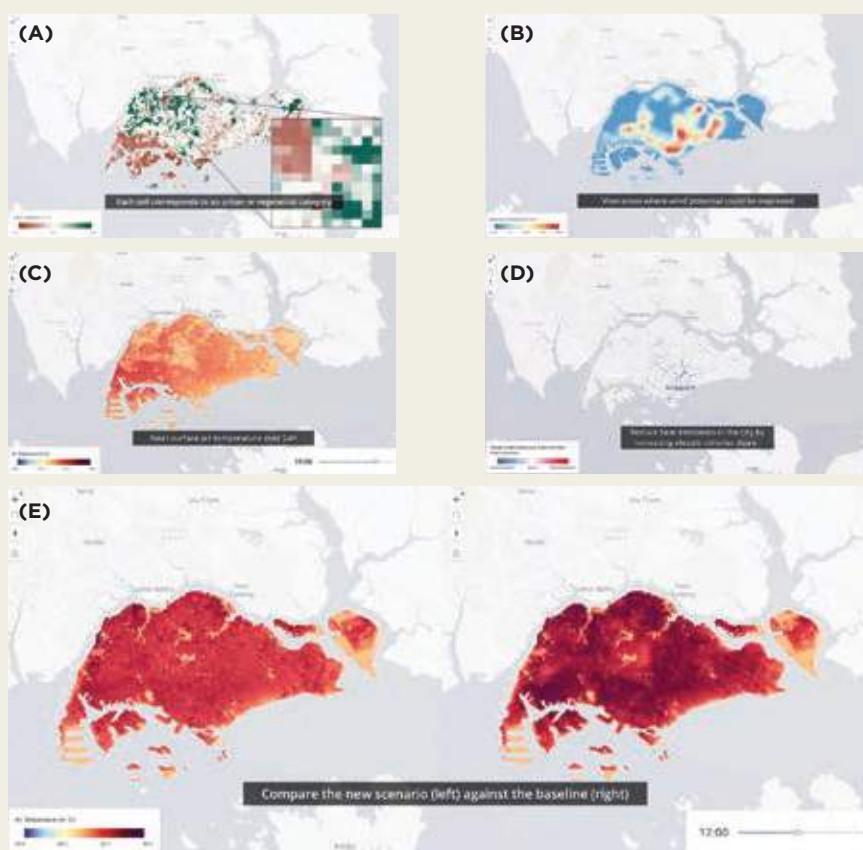
Scenarios that can be simulated using DUCT to assess impacts of various heat management strategies

Image courtesy of Cooling Singapore 2.0 project by the Singapore ETH Centre

ASSESSING THE URBAN HEAT ISLAND EFFECT AND OUTDOOR THERMAL COMFORT

To construct DUCT, the project team focused on identifying suitable metrics and tools for assessing the UHI effect and outdoor thermal comfort (OTC).³¹³ They then compiled an extensive catalogue of potential heat mitigation measures and pinpointed key knowledge and technology gaps to guide future research and development endeavours.³¹⁴ Subsequently, the researchers evaluated the efficacy of various cooling strategies and devised a decision support system to assess the OTC associated with different

approaches.³¹⁵ Additionally, a set of climate-responsive urban design guidelines was formulated, tailored to Singapore's unique context.³¹⁶ Throughout the investigation, the researchers observed a pronounced UHI effect, resulting in temperature differentials reaching up to 7°C across Singapore.³¹⁷ The projections indicate that a warming planet could further elevate temperatures by 1.4–4.6°C by the year 2100.³¹⁸



DUCT simulations showing the impacts of (A) integrating vegetation, (B) improving wind potential, (C) mitigating heat waves and (D) reducing heat emissions by increasing electric vehicle sharing to create (E) an overall comparison of all cooling measures

Images courtesy of Cooling Singapore 2.0 project by the Singapore ETH Centre

CONSTRUCTING THE DIGITAL URBAN CLIMATE TWIN

The development of the DUCT system for Singapore necessitated the integration of diverse data sources, including land use data, anthropogenic heat profiles, meteorological data and urban geometry.³¹⁹ Leveraging these data sources, DUCT possesses the capability to simulate the effects of the UHI, OTC and climate scenarios,³²⁰ furnishing valuable insights for future climate analysis.³²¹ The system enables the testing of various cooling measures, including innovative transportation systems, advanced building technologies, vegetation typologies, materials for buildings and pavements, and climate-sensitive urban design solutions, across spatial scales.³²² This simulation capability empowers the formulation of targeted urban design guidelines to address anticipated climate developments.³²³ In addition to computer-based software, a DUCT Explorer app is being developed in close collaboration with Singapore government agencies to ensure its relevance.³²⁴

CONCLUSION

The Cooling Singapore project aims to equip relevant planning agencies with the tools needed to devise effective solutions to combat rising temperatures. By using DUCT to simulate climate scenarios and test various cooling measures, policymakers are able to implement more targeted interventions, such as integrating green infrastructure and modifying building design to mitigate the adverse effects of urban heat, and safeguard the thermal comfort and well-being of residents in the city.

APPLICATION OF SCIENCE AND TECHNOLOGY TO ENHANCE PLANNING AND MANAGEMENT OF THE BUILT ENVIRONMENT

Integrating science and technology into planning and management processes can enhance Singapore's urban liveability by facilitating safety, efficiency and sustainability in the built environment. Innovations such as smart city infrastructure, including Internet of Things (IoT) sensors and artificial intelligence (AI), can be used to enable real-time monitoring and analysis of various data, such as traffic flow, air quality and energy consumption, to effectively respond to and manage urban challenges.



[Prime Minister Lee] advised me to extract the key metrics from the vast amount of maintenance data and present them graphically. He even designed the graphs for us so that they could show dynamically the impact of our efforts, whether we were making progress or not, week by week, rather than quarterly as in the past... This way, we could provide feedback more promptly to the maintenance engineers, thus speeding up our corrective efforts.”³²⁵

Khaw Boon Wan

Minister for Transport (2015–2020)

In Copenhagen, the implementation of intelligent transport systems, including the installation of new controllers in traffic signals, has effectively optimised real-time traffic flow for bicycles and buses, and resulted in a one-third reduction of energy usage by traffic signals.³²⁶ Oslo has also harnessed the power of technology to regulate and enhance various aspects of the city's operations and encourage more efficient consumption of resources.

BOX STORY

OSLO'S SMART CITY INITIATIVES

Oslo has ranked highly across various Smart City indices due to the city's dedicated efforts to improve sustainability and resilience. There are a wide range of projects implemented in Oslo which aim to improve the daily lives of residents, following the key principles of openness, connectedness, sustainability and innovation.³²⁷ Information and communication technology and IoT solutions are seamlessly integrated into Oslo's built environment to regulate and enhance various aspects of the city's operations.

IMPLEMENTING OSLO'S SMART CITY INITIATIVES

Oslo's projects centre on intelligent systems that are integrated across the city.³²⁸ An energy-efficient street lighting system remotely monitors and adjusts lighting levels in response to traffic and weather conditions. Additionally, data is transmitted via powerline to a geographic information system (GIS) database, which tracks the operational lifespan of each fixture. This feature has been estimated to improve overall efficiency by 30%. Since the project's implementation, Oslo has successfully reduced energy consumption by 70% and carbon dioxide emissions by 1,440 tons per year.³²⁹

Data plays a key role in the implementation of Oslo's Smart City strategies, such as the FutureBuilt programme which supports the completion of projects that are aimed at reducing the greenhouse gas emissions of buildings by at least 50%. Through FutureBuilt, a building's carbon footprint is estimated with the use of greenhouse gas accounting tools, and emissions are tracked at three main phases of the development process—"reference building",



Come 2030, Oslo aims to reduce emissions by 95%

Photo courtesy of Pexels

“projected building” and “as built”.³³⁰ Reference building involves the use of an equivalent building located in the same area as a digital model, whereas the projected building phase refers to the proposed new design, which should halve greenhouse gas emissions. At the as-built phase, actual emissions are calculated to assess the project’s performance. FutureBuilt is thus a pioneering programme that establishes greenhouse gas calculation as a requirement before beginning development. As of March 2024, 75 of 100 targeted pilot projects have been completed or are undergoing implementation.³³¹

To effectively measure the impact of all ongoing projects, Oslo has also developed a Climate Dashboard, which tracks and displays environmental data in real time.³³² The dashboard provides an overview of how climate-related indicators like air quality, cyclist and pedestrian share, and the number of active charging stations for electric vehicles have changed over time.

CONCLUSION

Oslo’s smart city initiatives demonstrate how climate-neutral urban areas can be developed through robust experimentation and innovation. By implementing demand-controlled technology across city-wide systems and in public and commercial buildings, Oslo has also increased energy efficiency and lowered overall consumption. With strategic use of data-driven solutions and thoughtful integration of IoT into urban spaces, the city succeeds in reducing its overall carbon footprint while creating attractive, liveable neighbourhoods.

When Smart Nation first launched in 2014, it was developed to help Singapore leverage technology and push for digitalisation across domains like health, transport, education, finance, infrastructure and the environment. Ten years on, technology continues to play an important role in creating smart, sustainable and liveable environments for Singaporeans. For instance, during the COVID-19 pandemic, Singapore utilised AI to develop the Safe Distance @ Parks application, which was used to manage crowds in green spaces by analysing data from closed-circuit televisions (CCTVs), electronic parking systems and central video analytics systems.³³³

Singapore uses smart technologies to plan, develop, and manage newer Housing & Development Board (HDB) towns to create better living environments for residents. For example, sensors promptly inform town councils of faults in estate services such as water pumps and lifts, enabling quick responses. The Smart Hub developed by HDB also acts as a “brain” for municipal operations and is used by planners to better understand the usage patterns of common amenities to schedule maintenance works promptly and even pre-emptively.

The JTC Corporation (JTC), which manages industrial estates, also uses a range of digital tools to track, analyse and optimise performance of buildings, gather feedback from tenants, and automatically route the information to its facilities team for quick action. JTC has launched Punggol Digital District (PDD)—Singapore’s first smart district. Envisioned as a living lab, PDD enables the test-bedding of digital and smart urban solutions to guide the development of future new towns and districts, as well as the redevelopment of existing ones across Singapore. The Open Digital Platform (ODP), jointly developed by JTC and the Government Technology Agency (GovTech), is an award-winning smart city operating system that integrates various district management operations into a single platform and serves as the digital backbone of the smart district.

BOX STORY

THE OPEN DIGITAL PLATFORM AT PUNGGOL DIGITAL DISTRICT (PDD)

Master-planned and developed by JTC, PDD is envisaged as Singapore's first smart and sustainable district, where innovators and the community can meet, interact and turn ideas into reality, with the aim of bringing exciting changes to living and working spaces. PDD will serve as a vibrant hub for business innovation activities and house key growth sectors of the digital economy, leveraging the broader Punggol Town as a living laboratory for cybersecurity, smart living and smart estates solutions.³³⁴

APPLYING THE OPEN DIGITAL PLATFORM

The ODP is a smart city operating system that integrates various district management operations into a single platform. Developed by JTC and GovTech, the ODP will serve as the digital backbone for PDD and is intended to play a crucial role in driving Singapore's Smart Nation ambitions.³³⁵ The key aim is for the ODP to facilitate the digitalisation and centralisation of district operations to (1) empower estate managers to run and operate estates effectively and efficiently, and (2) ease the delivery of estate services and amenities through open and secure data-sharing frameworks. As a key enabler, the ODP aims to deliver convenience to citizens, businesses and other government services, with the utilisation of real-time data from sensors and IoT devices to quickly identify and react to potential problems on the ground. The ODP was test-bedded at the JTC Summit and Woodlands North Coast in 2022 and 2023, respectively, and is set to be rolled out in PDD from 2025 onwards.



Cross-section of JTC Summit's Digital Twin, showing almost real time data of the cooling system in the building

Image courtesy of JTC

[Click here for video on the Open Digital Platform](#)

A key feature of the ODP is the Digital Twin, which offers a true-to-life three-dimensional (3D) representation of the entire PDD, enabling scenario simulations, test-bedding of new technologies and real-time monitoring.³³⁶ Facility managers can navigate the built environment of PDD in 3D and monitor estate systems almost in real time, while also simulating scenarios and evaluating mitigating actions.^{337,338}

CONCLUSION

The ODP's implementation in PDD is intended to enhance estate services, operations and management efficiency. Due to its adaptability, the ODP holds the potential to revolutionise urban management practices, offering scalable solutions to optimise resource utilisation and bolster resilience in the face of evolving urban challenges.³³⁹

HARNESSING CITIZEN AND SOCIO-BEHAVIOURAL SCIENCES



Citizen science may be essential to bridge the gaps in understanding and acceptance of technological and scientific innovations. Strong citizen participation in the early policy design process increases the chance of successful translation of R&D into policy.”³⁴⁰

Vanessa Evers

Founding Director, Nanyang Technological University's Institute of Science and Technology for Humanity (2019–present), and Member, Centre for Liveable Cities' World Cities Summit Knowledge Council (2022–2024)

Cities are complex systems with people at their centre, and thus it is imperative that people are involved in the planning process. By actively engaging residents, cities can gain insights into the dynamics that shape their quality of life and ultimately impact liveability. Citizen science is a collaborative approach that involves everyday people in the process of data collection, analysis and/or interpretation. Not only does it help to advance scientific knowledge, but it also empowers citizens to make meaningful contributions to policy research efforts.

Another way that residents can be involved in decision-making processes is through safe and seamless platforms that facilitate participation. Such platforms allow autonomy for residents while enabling them to help create measures that address issues and concerns that directly impact their daily lives. In Busan, South Korea, a smart village is being used as a real-life living lab to engage citizens in test-bedding innovative technology solutions for everyday life that could create fundamental shifts in the way people live, work and interact with one another.

BOX STORY

BUSAN ECO DELTA CITY— A SMART VILLAGE AND LIVING LAB

The Eco Delta City (EDC) is situated at the convergence of three rivers in Busan, the largest port city in South Korea. Pushing boundaries as the new frontier for a smart and eco-friendly waterfront city, the EDC includes a 2.8-km² area that has been identified as a pilot site under South Korea's National Pilot Smart City Project.³⁴¹ The objective of the pilot site is to test-bed innovative technologies to support the building of future smart cities, and it includes a Smart Village, an Urban Tech House and a Smart Park.

The Smart Village is the first residential complex under the National Pilot Smart City Project, which is also doubling up as an experiential living lab. Unveiled in December 2021, the Smart Village accommodates 56 households consisting of 200 residents in housing ranging from single-person units to three-bedroom homes. In addition to housing, there is a community centre with a wellness centre, gym, café, convenience store, and platform where all the sensor data and other information collected in the Smart Village is monitored in real time.



Drone view of the Busan Eco Delta Smart Village
Image courtesy of K-water

INVOLVING CITIZENS IN TEST-BEDDING SOLUTIONS

There are over 40 innovative technologies and services introduced into the Smart Village, including net-zero houses, smart home appliances with personalised real-time health care services, and an AI-operated gym and café. The essence of the project is that it will be shaped by the residents' interaction with the state-of-the-art technologies and services provided, as the data collected will be used to assess and validate if they can be applied throughout the Busan EDC. Hence, much of the future plans for the Busan EDC will depend on this citizen participation.

The residents are selected on a voluntary basis and get to live rent-free for three years, with an option to extend their stay for two more years, in exchange for their feedback and the collection of data ranging from their energy consumption patterns to health, home appliances usage and other behavioural information. Regular monthly meetings are held, gathering all stakeholders from the public and the private sector, including K-water as the government administrative body, private companies such as Samsung Electronics, experts from universities, as well as the residents, to discuss progress, satisfaction levels and potential improvements.

As the project has progressed, residents have also taken initiative to propose and implement their own smart solutions within the village. This bottom-up approach empowers the residents to contribute their skills, expertise and creativity to enhance the smart village concept further.

CONCLUSION

The Busan EDC and Smart Village pioneer an innovative approach that harnesses citizen participation to cultivate a Smart City that authentically caters to residents' needs and lifestyle preferences. This initiative represents an experimental and iterative process, gauging resident feedback on technologies and services while guiding government and private sectors towards more efficient infrastructure and service delivery. The ultimate aim is a future Smart City that is both liveable and sustainable.

As technologies advance, cities must continue to improve their digital platforms to harness the power of citizen science and crowdsourcing as a planning resource. To this end, Singapore has been working hard to ensure that its technologies benefit everyone.

The SG Digital Office (SDO), under the Infocomm Media Development Authority (IMDA), was established in 2020 to drive the government's concerted efforts to accelerate digital adoption, by building on and ramping up existing initiatives to equip individuals with digital skills as the society digitalises. To date, the SDO has engaged more than 370,000 seniors under the Seniors Go Digital programme. The SDO's Digital Ambassadors are stationed at over 30 SG Digital Community Hubs and about 200 roving counters across Singapore to help those who require more guidance to go digital.

Recognising the valuable impact and advantages of learning from one another, Silver Infocomm Wellness Ambassadors (SIWAs) are volunteers appointed under a joint initiative by the IMDA and People's Association. The SIWAs, aged 50 and above, teach and encourage their peers in acquiring digital skills. They also help lead Digital for Life: Digital Clubs, with over 3,000 members across 40 Community Clubs to date.

The national Digital for Life (DfL) movement was also launched in 2021 to galvanise the public and private sectors, along with individuals across the community, to help Singaporeans embrace digital learning as a lifelong pursuit and enrich lives through digital technology. The DfL movement doubled the number of partners to over 300 and helped more than 400,000 beneficiaries gain access to digital connectivity, learn digital skills and have exposure to emerging technology.

In 2024, IMDA launched the Digital Skills for Life (DSL) framework which aims to equip all Singaporeans with essential digital knowledge and skills to conduct daily online tasks, navigate the digital space, and safeguard oneself against online risks. The DSL framework has since been enhanced to offer learning resources on Generative AI. Singaporeans can learn digital skills under the DSL framework through resources available on the DfL portal at www.digitalforlife.gov.sg.

Cities are also starting to apply social and behavioural science principles and methods to gain a deeper understanding of how individuals and communities interact with their environment to inform the design of urban spaces that are more inclusive and people-centric. In the academic realm, social science refers to the study of human society and the relationship between individuals and with society as a whole. Behavioural science, on the other hand, is the study of the actions of humans so as to better understand, predict and influence behaviour. Taken together, socio-behavioural science involves studying how human behaviour impacts the thoughts, decisions, interactions and actions of individuals, communities and society as a whole.



Because cities are about people, cities should be built with people in mind. To understand people, we must appreciate and embrace social and behavioural science.”

Peter Ho

Chair, Urban Redevelopment Authority (2012–2025), and
Senior Advisor, Centre for Strategic Futures (2010–present)

Information about how people make decisions and behave is embedded into all parts of the city.³⁴² Incorporating social and behavioural science principles and methodologies in the context of building liveable and sustainable cities allows city planners to have a deeper understanding of how various stakeholders interact with the built environment—interactions that need to be monitored over time because changing demographics, needs, lifestyles and preferences introduce additional complexity in the interpretation of what it means to be liveable and sustainable.

Singapore has incorporated the use of behavioural insights in its research and planning works to drive positive outcomes in building a liveable and people-centric city. The HDB’s New Urban Kampung Research Programme is a notable project that relied on the use of socio-behavioural data to recognise dynamic and ever-changing residential profiles and improve initiatives implemented in HDB towns to meet the needs of future residents.

BOX STORY

THE HOUSING & DEVELOPMENT BOARD'S NEW URBAN KAMPUNG RESEARCH PROGRAMME

As Singapore's social make up becomes more diverse, there is an increasing need to rethink the future of housing so that residents at different stages of life can live well and stay connected with the larger community. The New Urban Kampung Research Programme is a collaboration between the HDB and SUTD. It aims to leverage technology and social and behavioural sciences to better understand residents and develop towns that are designed for community bonding and high quality of living.³⁴³ The initiative is supported by the MND and NRF, and comes under the Prime Minister's Office's Land and Liveability National Innovation Challenge Research Programme.

REDEFINING RESIDENT SEGMENTS

The study recognised that traditional profiling of residents based on demographics such as age, gender or ethnicity is no longer adequate to understand their circumstances and choices, or for assessing their quality of life. Instead, the study identified eight emerging resident archetypes with a detailed understanding of their diverse perceptions and needs. This was done by drawing data from 5,155 door-to-door and street-intercept surveys conducted across 3 residential towns with different life stages, demographic profiles and town planning concepts. The aim was to better understand and anticipate the emerging resident archetypes and their needs, aspirations and lifestyles for more targeted design and planning of HDB towns.



Resident archetypes identified in the New Urban Kampung Research Programme³⁴⁴

Image courtesy of Housing & Development Board

ESTABLISHING A NEW QUALITY OF LIFE FRAMEWORK

Based on surveys and 241 additional in-depth interviews with residents, the study also developed a new Quality of Life framework that is unique to HDB living and can be used to assess the current state of quality of life and identify opportunities to improve liveability in HDB towns and estates. The bottom-up data analytics process revealed various factors affecting the residents' quality of life, which can be measured through objective and subjective indicators.



Urban analytics tools were developed to simulate the impacts of urban systems on socio-behavioural changes

Image courtesy of Housing & Development Board

UTILISING URBAN ANALYTICS

By consolidating survey, interview, behavioural and sensor data, the project developed urban analytics tools to simulate the complex interaction of urban systems on socio-behavioural changes. These tools will aid decision-making for the planning and design of HDB towns and estates, allow the HDB to assess

how well the towns and residents are performing across various aspects of life, understand the impact of initiatives put in place, and track quality of life across time. Ultimately, the aim is to develop a sense of the town life cycle and allow the HDB to better design and plan towns in anticipation of the future needs of the communities they serve.

BUILDING SELF-ENABLED COMMUNITIES

By tapping on the collective knowledge of the residents, the project also established an online community platform and framework to empower HDB residents to stay connected with like-minded neighbours, and organise ground-up activities to build self-enabled communities. An example is the NuKampung mobile app, a one-stop platform that provides updates on all events and activities run by different organisations within a neighbourhood.³⁴⁵

CONCLUSION

The fast-changing urban landscape brings along with it increasingly complex housing issues and needs. With social and behavioural science studies and data analysis, the HDB can better understand residents' needs and changing lifestyles, as well as their responses to various plans and initiatives. As the urban landscape in Singapore evolves, the HDB will continue to tap on the power of technological innovation, and work together with industry experts and community partners to create well-designed, community-centric and sustainable homes for residents.

OPINION

JOINING THE DOTS ON URBAN INTELLIGENCE

By Dr Bree Trevena

Associate Principal and Australasia Foresight Leader, Arup, and Member,
Centre for Liveable Cities' World Cities Summit Knowledge Council (2024–2026)

I began studying urban places in the 1990s. The concept of the “city as a computer” had taken hold at that time, describing the city as a complicated but predictable system that can be reduced to discrete, functional parts for optimisation of inputs and outputs.

Today, the city is understood not as a computer but as a place of convergence, where changing cultural norms and institutional practices collide with emerging technologies, economic uncertainties, geopolitical dynamics and accelerating climate change.

Cities are places where natural, human and built systems intermingle in complex, adaptive and non-linear ways. Outcomes are often unexpected until they land on our doorstep—a phenomenon known as “emergence”. Like the people that inhabit them, our cities are complex.

Yet cities are durable, as sociologist Saskia Sassen reminds us, precisely because they are complex. They have the capacity for change because they build adaptive and anticipatory muscle. Still, becoming “future fit” today compels an expanded planning mindset, skillset and toolset. Urban leaders in pursuit of liveability must embrace entanglement, wrangle with uncertainty and harness the knowledge that comes out of emergence.

This calls for globally networked approaches being embedded in local governance, and the blending of data with the technological affordances of AI as well as the experiential aspects of qualitative science. It requires integrated planning that balances the past, present and future—in other words, being able to tie our shoelaces while looking to the horizon.

USING FUTURE-FLUENCY TO PREPARE FOR THE NEXT FIFTY YEARS

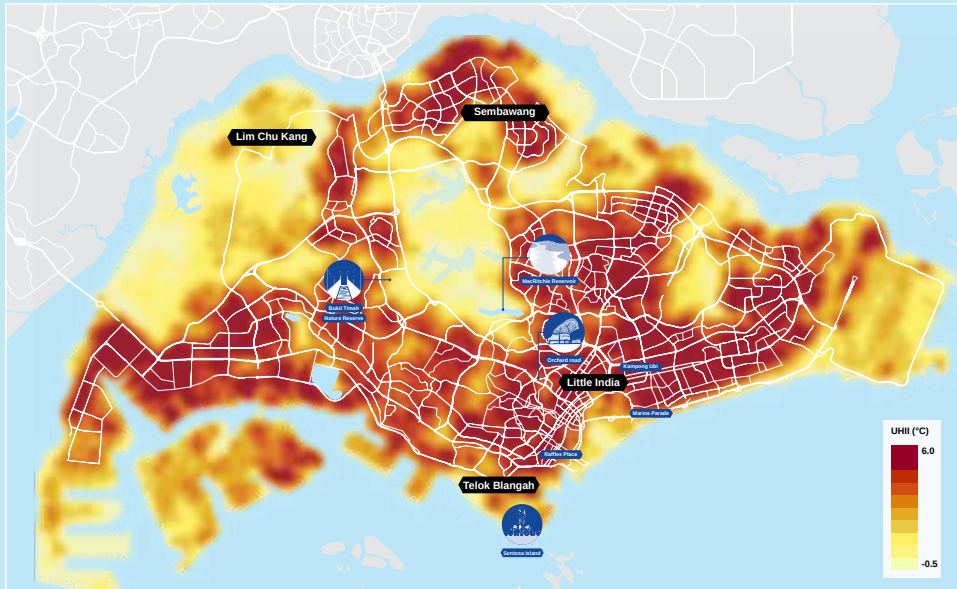
The future isn't something we can see with a crystal ball. We can, however, better connect the dots between forces shaping our direction of travel. We can scan for weak signals of change to reduce blind spots. We can collectively imagine the futures we want and take active steps to capitalise on change.

Governments in Singapore as well as the United Kingdom, United States, United Arab Emirates and Europe are combining strategic foresight with a future-fluent mindset to practically bridge coming change with more immediate decisions and implementation. In planning a new health district, for instance, horizon scanning can shift the brief by surfacing unexpected movements in family composition, highlighting the need for emerging skills, and centring a rise in synthetic biology.

Visioning for the future can act as a vehicle for strategic dialogue between government, industry and civic voices, leading to radical new healthcare models informed by local knowledge on topics like carer support and demand for hyper-personalised patient care. Furthermore, forward-thinking via scenario modelling can combine data from disparate fields to prototype health options in vivid colour, bringing trade-offs to life for decision makers and citizens while stress-testing tenability of strategies against different possible futures.

ASKING THE RIGHT QUESTIONS WITH DATA AND TECHNOLOGY

Advances in urban analytics are creating radically new lenses to reveal hidden patterns of place. Countries like Singapore that have collected deep and structured data over many years are well positioned to unknot the complex urban structures which hold some of our trickiest challenges.



Cooling interventions supported through the use of satellite imagery and open-source climate data

Image courtesy of Arup

For instance, agent-based modelling is already replicating the multitude of interactions that happen between individuals within a city to investigate transport policy options. On another front, merging data on walkability and air pollution is heightening our understanding of the relationship between the urban environment and health outcomes for residents.

Liveability is both deeply personal and collective, felt from the perspective of the individual, the neighbourhood and the city. Blending the “what” and “how” of big data with the contextual “why” of social data can be a powerful correlative for liveability. One example is the provision of shade.

Increasing canopy cover is one of the most effective strategies to mitigate urban heat. Localised data on trees, public health and real estate can be layered with AI-powered remote sensing for hyper-personalised inputs on how shade influences physical, cognitive, ecological and commercial well-being.

Richer analysis might illuminate the tacit knowledge and lived experiences that underpin urban dynamics with contextual data—for example, the experiential qualities that make one shady spot more appealing than another for a specific group. At both the macro and micro levels, big data and contextual data can then be synthesised for inclusive, technically rigorous interventions that consider shade as an economic infrastructure, a social resource and a common ecological good.

CONSIDERING THE NEXT BOUND OF LIVEABILITY

Our idea of liveability moves as values shift, economic conditions change and environmental pressures become more acute. The science of cities needs to move with it.

With regard to civic participation and social values, we must consider how cities would evolve if more people were involved in shaping places conducive to liveability. No one actor has the capability or capacity to tackle today's challenges. Cities are increasingly partnering with citizens to deepen situational knowledge and co-create solutions directed to mission-led innovation. Transdisciplinary approaches, in particular, offer new ways to pool intelligence across the public service, academia, industry and civil society.

In cultivating economic complexity, we must think about how land-use policies can incentivise the development of radical mixed-use spaces to meet liveability ambitions. Central business districts are re-organising around experiences over office towers. Industries are becoming cleaner and quieter. Fifteen-minute cities are rising.

Cities intent on resilience are challenging “single use” spatial policies by radically diversifying economic activity and land uses for greater innovation, creativity and participation in convivial civic life.

Towards creating regenerative cities, we might reflect on what liveability would look like if cities measured the quality of the urban experience for both human and more-than-human populations. The vigour of people, economies and the built environment is inseparable from the health of our natural ecosystems. With this view, what voice could we give Singapore’s natural systems and inhabitants? For example, the Wanganui River in New Zealand is accorded legal personhood with representation in planning considerations.

Beyond allocating space and managing traffic, planning has a role to play in stewarding inspiring places that elevate human aspiration and well-being. To do this, we must break through our silos to connect the different types of urban intelligence baked into our social, built and natural systems.



The next bound of liveability will involve a shift from sustainable to regenerative cities

Photo courtesy of Arup

THE ROLE OF CITY INDICES IN MEASURING URBAN LIVEABILITY

Cities are increasingly turning to data-driven approaches to shape policy and enhance liveability. While the Science of Cities offers methods to harness and utilise data, indicators that track and measure a city's performance have also emerged as powerful tools to benchmark progress against other cities and guide evidence-based policymaking. These indicators serve as a reflection of urban liveability, offering quantifiable insights into residents' quality of life.

Liveability indices, which measure various aspects of urban life—from housing affordability and public transport efficiency to green space accessibility and cultural vibrancy—have become crucial instruments for evaluating and comparing cities worldwide. Their significance extends beyond mere measurement, with the potential to shape policy and public perceptions of a city. City leaders and policymakers can utilise these indices to guide strategic planning and identify areas for interventions, while also facilitating cross-learning by drawing insights from global benchmarks and successful initiatives in other cities.

As global trends reshape cities, they also give rise to evolving concepts of urban attractiveness and liveability. This necessitates continued re-evaluation of how to measure and track cities' performance. New approaches to assessing liveability, including indicators that capture cities' intangible qualities, are needed to better reflect liveability outcomes and residents' lived experiences. As what is measured gets managed, in examining current liveability indices and emerging evaluation methods, cities must consider how to better measure what truly matters to their residents.*

*This section includes insights from the "Future of Liveability: Redefining Urban Indices" session at the World Cities Summit 2024 in Singapore.

THE BUSINESS OF BENCHMARKING CITIES

While there is no universally agreed definition of what makes a city “liveable”, numerous organisations have developed their own methods of measurement. This has resulted in a diverse range of indices and ranking systems, each using an expanding set of statistical indicators and metrics. These indices often measure different aspects of city living, reflecting the complexity of urban environments and the range of priorities to consider in assessing overall liveability. For instance, the Economist Intelligence Unit’s Global Liveability Index places a greater emphasis on stability and culture and environment, followed by healthcare, infrastructure and education.

Several indices also incorporate subjective components, demonstrating a more holistic way of understanding cities. For example, the World’s Best Cities Index by Resonance Consulting includes online sources such as Google, Tripadvisor and Instagram



Urban data collection demands a high level of resource investment from cities—from sensor networks and data infrastructure to skilled personnel and maintenance of smart systems

Photo courtesy of Unsplash

to measure quality of place. Some indices are more specialised, such as the Global Power City Index by the Mori Memorial Foundation, which studies a city's "magnetism" in attracting creative individuals and enterprises from around the world. Others, like the International Institute for Management Development's Smart City Index, place a stronger emphasis on perceiving the scope and impact of efforts to make cities smart.

While liveability indices can reveal valuable findings, they also have their limitations. For example, current methodologies often demonstrate a reliance on factors correlated with gross domestic product, such as healthcare and infrastructure. This potentially skews the rankings in favour of more economically developed cities, overlooking crucial factors that also contribute to liveability but may not be directly tied to economic output.

Furthermore, many organisations tend to converge on a similar set of metrics or indicators to enable cross-city comparisons. While useful for benchmarking, they may overlook local nuances and realities. This homogeneity in measurement may also fail to cover the unique characteristics and strengths of different cities. In response, most cities have developed their own indicators to track policy effectiveness and measure outcomes that matter most to their communities. As such, liveability indices should be viewed as complementary tools that supplement, rather than replace, the context-specific metrics curated by each city.

At the same time, while correlations to liveability outcomes could be inferred through indices, determining direct causal relationships is a more complicated and challenging undertaking. Therefore, there are constraints in using indices to predict the outcomes of interventions and policies, and these could lead to misinterpretation of data or oversimplification of urban dynamics.

The demanding nature of data collection also presents a fundamental challenge. Cities must commit substantial resources to gather and maintain comprehensive, up-to-date information—which can prove to be burdensome for those with limited means or basic data infrastructure. As such, these cities may inadvertently be underrepresented in global indices.

EMERGING ASPECTS OF LIVEABILITY

The evolving nature and perceptions of liveability also add complexity in trying to accurately capture the intricacies of city living. Traditional metrics need to be reimaged to accommodate new priorities that reflect contemporary values and lifestyles. For instance, wellness has gained prominence as a central concern among city dwellers of all ages, going beyond basic healthcare access to include the concept of holistic well-being. As such, cities are now evaluated on their ability to support both physical and mental health through features such as green spaces and work-life balance initiatives.

This shift is coupled with the rise of remote work and digital nomadism, which has fundamentally altered how people interact with cities. No longer bound by traditional office locations, people are choosing to stay in cities with strong lifestyle offerings and amenities, rather than physical proximity to work. In turn, this has prompted cities to compete on new fronts, where features like robust digital infrastructure, cultural experiences, as well as family-friendly and intergenerational spaces will significantly enhance appeal to a more footloose workforce.

The emergence of “loveability” as a concept also marks a significant departure from conventional measurements of liveability. While traditional liveability metrics typically focus on quantifiable outputs like transport networks, crime rates (as a proxy for safety) and economic indicators, attention is turning towards the emotional and psychological connections that people form with their cities. While physical spaces and infrastructure are essential for day-to-day needs, elements like public art, creative placemaking and cultural programming transform them into meaningful places. They also enhance the qualities that give neighbourhoods their distinct character, cultivating a deeper sense of belonging for residents.



Singapore's Light to Night Festival is an annual event that transforms the Civic District into an immersive canvas of light and art, reflecting the growing importance of fostering cultural vibrancy and emotional attachment to place

Photo courtesy of Unsplash



A wall mural in Chinatown exemplifies how public art serves as a powerful placemaking tool, transforming everyday spaces into vibrant storytelling canvases; beyond beautifying the streetscape, the mural strengthens neighbourhood identity by capturing the cultural heritage and community stories of this historic precinct

Photo courtesy of Unsplash

MEASURING WHAT MATTERS—URBAN LIVEABILITY OUTCOMES

From social media analytics to sensor networks, advancements in technology and new data capabilities are allowing cities to capture previously hard-to-measure aspects of urban life. Hence, measurement approaches should adapt accordingly, depending on the city's aspirations and goals. This is showcased in how cities and global indices now study both cultural consumption

and production, which provides a more nuanced understanding of a city's cultural vitality. The UNESCO Culture|2030 Indicators framework exemplifies this, measuring not only how residents engage with culture through participation rates and accessibility, but also how cities generate culture through their creative industries and heritage preservation efforts.

Additionally, while established metrics tend to focus on institutional cultural production, cities increasingly recognise that creative expression and cultural activities flourish in unexpected and informal spaces that form vital but often unmeasured cultural networks. Some cities have started to broaden their approach towards assessing their creative ecosystems. For instance, a report on New York City's creative footprint analysed 25,000 data points from nearly 500 active venues that regularly host musical events across the city.³⁴⁶ The research combined both qualitative and quantitative data, encompassing physical spaces, artistic content, and enabling factors such as funding and infrastructure, to create a comprehensive snapshot of its live music ecosystem's health and vibrancy.

As cities become increasingly digitalised, the widespread use of smartphones, social media platforms, and smart city technologies supports the tracking of how people interact with their environment. Many cities now have access to vast amounts of digital information that can reveal patterns of cultural engagement and social interaction at a scale and granularity previously unimaginable. The integration of geolocation and social media data also unlocks real-time insights into city dynamics. In one example, researchers used location-based social media data from WeChat to determine the levels of demand for different types of cultural resources in Beijing, and compared them with the existing supply. These insights were used to inform recommendations for future cultural planning and financing decisions.³⁴⁷

Measuring what matters may also require looking beyond conventional metrics of urban liveability. For instance, in comparing the price of everyday items across global locations, the

“Latte Index”³⁴⁸ and “Big Mac” index³⁴⁹ by *The Wall Street Journal* and *The Economist*, respectively, simplify the complex economic concept of purchasing power parity and provide a relatable metric for cost of living and currency valuation differences. In a similar vein, the “Popsicle Index” measures neighbourhood safety through a simple yet powerful question: “Can a child safely walk to a local shop to buy a popsicle and return home without incident?”³⁵⁰ While not based on quantifiable data, this novel metric moves away from conventional crime statistics to instead consider the perceived safety, walkability and social trust within a neighbourhood.



The widespread adoption of mobile devices and social media generates useful data for cities to better understand movement patterns, service usage and community needs

Photo courtesy of Unsplash

Finally, while output-based metrics remain important, they need to be complemented with outcome-focused measurements of liveability. Traditional metrics tend to focus on quantifiable outputs that are typically easy to measure and serve as clear indicators of progress, such as the number of parks built, or kilometres of cycling paths constructed. However, these measurements alone may not capture the impact on community well-being. An outcome-based approach examines how these infrastructural investments translate into societal benefits—whether parks enhance mental health and social cohesion, or if cycling paths genuinely improve physical activity levels and reduce carbon emissions. This helps policymakers and planners evaluate not just what has been built, but how effectively these interventions serve their intended purposes.

THE NEXT BOUND—BALANCING GLOBAL STANDARDS WITH LOCAL REALITIES

Liveability indices hold significant potential for cities: they provide a basis for benchmarking in policy design and for citizen engagement. However, establishing consistent definitions and methods that enable meaningful comparisons while respecting local contexts continues to be a challenge. In this respect, data sharing and collaboration between cities could expand the pool of indicators available.

Indicators also need to acknowledge diverse lived experiences and move beyond one-size-fits-all approaches. Ultimately, indices cannot be viewed as authoritative “truths”; doing so will only constrain perspectives of liveability. Rather, to more fully appreciate the value of indices, they should be treated as an evolving suite of instruments that can guide and enable cities towards more liveable futures.

OPINION

UNLOCKING NEW DIMENSIONS OF LIVEABILITY—BEING VERSUS DOING

By Anupam Yog

Managing Partner, XDG Labs

What if the city was reimagined as a collection of nudges that supported healthy behaviours? If that city possessed intelligence, artificial or natural, how would it enable humans in making wiser choices to prevent the onset of disease, increase longevity and improve healthspan?

We now know certain evidence-based realities of what it takes to be a sustainable and liveable city on a rapidly urbanising planet with finite resources. These include liveable density, compact urban form, accessible public transport with an emphasis on walkability, well-connected open spaces, and a vibrant culture and economy, delivered and managed through effective administration and governance. Indeed, if liveability 1.0 was measured by the quality and performance of the physical, social and economic environment in service of human “doing”—living, learning, working and playing—liveability 2.0 should be concerned with the felt impact of this environment on human “being”. The performance of such an environment would perhaps include the quality of inhabitants’ rest and opportunities for renewal; their emotional, mental and social health; and their levels of attention and awareness. Cognitive engagement and response to public spaces and urban places that make humans feel better is evidence of an intentional, high quality and liveable urban environment—a conscious city.



Liveable density in land constrained Singapore: HDB flats at night

Photo courtesy of Pixabay

BEING VERSUS DOING

Urban life keeps us in cycles of continuous physical and mental activity, with productivity and achievement often being the key measures of success, urging us to constantly strive for results. The default pursuit of “more” fuels a perpetual sense of insufficiency—a sense of never having or being enough. The impacts of a doing-oriented world are chronic tension, depletion and the tendency to operate on autopilot mode, mindlessly reacting to life rather than fully engaging with it.

Liveability 2.0 calls for a fundamental shift, perhaps even an overhaul, of this conditioned mode of urban living, by reorienting the way we move through our spaces and inhabit the city. The human “being” understands the necessity of slowing down and recognises the value of stillness and rest. Success is no longer measured only by accumulation or quantifiable achievements, but by the quality of experiences and their impact on our health and well-being. Instead of asking how much we have accomplished, we begin to reflect on how nourished we feel.



Intentional recreational public spaces such as the Marina Barrage in Singapore enable human “being”

Photo courtesy of Pixabay

SHIFTING URBANISMS

This is a paradigm I call “conscious and regenerative urbanism”. It brings together ancient wisdom and modern science by broadening the scope of placemaking. It infuses insights gained from mindfulness and neuroscience into the practice of urban design, real estate and finance. Through this lens, placemaking is an emergent concept that acknowledges and recognises the city as a complex system. Harnessing this system requires counter-intuitive ideas to achieve sustainable urban development as we know it, and more dynamic approaches to delivering liveability.

For example, in its evolution from a City in a Garden into a City in Nature, Singapore prioritises the value of natural capital as it continues to transform its urban landscape to be purpose-fit for a variety of life. This pursuit happens concurrently with the expansion and regeneration of public housing estates, new towns and private developments curated as mixed-use, mixed-income and mixed-generation neighbourhoods. Connectivity between humans and with nature, alongside a diverse and ever-improving mobility network, produces opportunities for economies of scope as a potential source of competitive advantage. There is an inherent wisdom to this type of development, which brings together seemingly disparate physical, social and economic dimensions and systems, balancing the doing with the being to produce conditions for liveability 2.0 at scale.



Urban parks like Fort Canning in Singapore serve as a reminder of the primal position of nature in a conscious city

Photo courtesy of Unsplash

THE BIG SIT: REIMAGINING THIRD SPACES

The Big Sit (TBS) is a social experiment that began during the pandemic to explore how we can change our relationship with ourselves, and with our environment. By merely sitting in a public space in the Central Business District (CBD), mindfully and intentionally, we observe how our internal experiential landscape is impacted by our surroundings. Through this simple, yet surprisingly difficult act, we grow in patience and tolerance, acquiring new skills to navigate our urban life responsively rather than reactively. As a formal programmatic yet organic intervention, TBS creatively enables a new dimension of experience of being within the CBD, in contrast to constantly doing or moving within such an environment.



The Big Sit at Guoco Tower's City Living Room in Tanjong Pagar, Singapore
Photo courtesy of The Big Sit, www.thebigsit.co



Fostering connections at The Big Sit

Photo courtesy of The Big Sit, www.thebigsit.co

The pandemic introduced new types of social behaviours. Lockdowns and physical distancing became a universal urban response, while technology facilitated connection and co-existence. People everywhere were forced to re-evaluate how to use private space—the home—which had an impact on the perception and utility of shared space—the office. At the same time, the value and role of parks and other types of public space—which have been labelled the “third space”—came into sharp focus. The third space gives people context, even meaning and purpose. Think of any major high street or commercial precinct. If you change the use of the street space, perhaps by restricting vehicle access, it changes the way users perceive the space. Over time, the use of the buildings evolves in response to the change in context. Zoom out and think of the city, and then consider the role of open space. All the green spaces, parks and plazas—these are the places that make the city, give it its unique identity, and foster social connection.

The pandemic induced extraordinary responses from cities that re-imagined and experimented with new ways to organise the relationship between people and public space. TBS is one such experiment born in Singapore, and has since evolved into a “slow-growing social health movement”.

While it is true that many people spend much of their time in their own personal bubbles, it is the time spent outdoors and in other communal spaces, such as parks, markets, theatres and museums, or merely sitting in public spaces, that often makes life more meaningful, purposeful and happy. It may be that the brief time together being in community, intentionally, helps transform loneliness into aloneness, in turn fostering a recognition that responding to urban social isolation may involve acquiring new skills to just “be” in the city, on your own, and know that there is a place for you.

COMPASSION MADE POSSIBLE

Whether we consider a global city-state such as Singapore, or human habitats of different scales, scopes and complexities, it is the relationship with our nature that is a key parameter to explore for liveability 2.0. Much as Singapore has evolved from a City in a Garden into a City in Nature, perhaps its socio-economic and cultural vision is similarly shifting to embrace an idea of Compassion Made Possible. Such a transformation entails the production of place more than space, a concept that is particularly fitting for a nation like Singapore with land and resource constraints. It is informed by the desire to be distinctive, yet guided by a pragmatic understanding of the limitations of traditional economic growth that invites deeper engagement with new frontiers of creativity and innovation.

As we move into a post-pandemic world, where context is rapidly changing, how, when and where do we measure liveability? Indeed, what constitutes liveability itself?



Urban art invites positive cognitive engagement such as in Singapore's art and heritage precinct, Bugis

Photo courtesy of Unsplash

Perhaps liveability 2.0 should acknowledge that a meaningful premise for a measurement system could be to understand the value of a pause in the pursuit of happiness in favour of just being happy. Such a shift would entail a significant recalibration of the experience of being in a city, where rest and renewal are normalised and life can flourish.

Rather than the stability and expanse of a city's infrastructure, which is increasingly vulnerable to climate risk no matter its economic strength, is it more pertinent to measure the response-ability of the city's social fabric to enable a more compact form and greater community well-being? As society transitions into a new age of AI, would a city that values serendipity over predictability be more attractive to high-quality talent seeking to produce, make, design, create and invent?

CONCLUSION



With complex systems like cities, exploration and experimentation are often more valuable than relying on predictions of analytical models. There needs to be a willingness to try things out, to experiment with new approaches and solutions. The approach is to probe, sense patterns, and to act, even in the absence of complete information. If they work, they are evidence that the hypothesis can be scaled up. If they fail, then the damage is mitigated.”

Peter Ho

Chair, Urban Redevelopment Authority (2012–2025), and
Senior Advisor, Centre for Strategic Futures (2010–present)

This chapter recognises cities as intricate and complex systems with interconnected components that interact with each other in dynamic and often unpredictable ways, leading to emergent behaviours and patterns. With emerging global trends and challenges such as shifting demographics and climate change, it is increasingly important to harness the power of technology and evidence-based approaches to obtain holistic insights that are supported by scientific principles, and that can be used to develop solutions for shaping liveable and sustainable cities. However, it is important to note that technology will continue to evolve and new methods will emerge. Thus, it is critical that urban leaders and policymakers continue to embrace change and be open to experimenting with new approaches.

In the upcoming chapter, the focus will shift to case studies from around the world. Besides focusing on how cities employ planning, governance and partnership principles in their own contexts, it will also look at how some of these cities are leveraging new science-based approaches and innovative tools, among other strategies, to augment their systems and deliver more sustainable liveability outcomes.



Thinking of cities as complex systems enables more holistic and responsive planning approaches

Photo courtesy of Unsplash



[CHAPTER 5]

CASE STUDIES

FROM AROUND THE WORLD

INTRODUCTION

While the Liveability Framework discussed in this publication was developed based on Singapore's urban development experience, many of the principles may resonate with other cities too. Most cities around the world share common desired liveability outcomes with Singapore, and these cities also often employ integrated master planning and development approaches, have dynamic urban governance and leverage collaborative ecosystems to achieve their goals.

The Laureates of the Lee Kuan Yew World City Prize, which are highly regarded for their exemplary urban initiatives, are role models. Through strategically leveraging their successful initiatives, these cities have been able to bring about social, economic and environmental benefits in a holistic way to their communities.

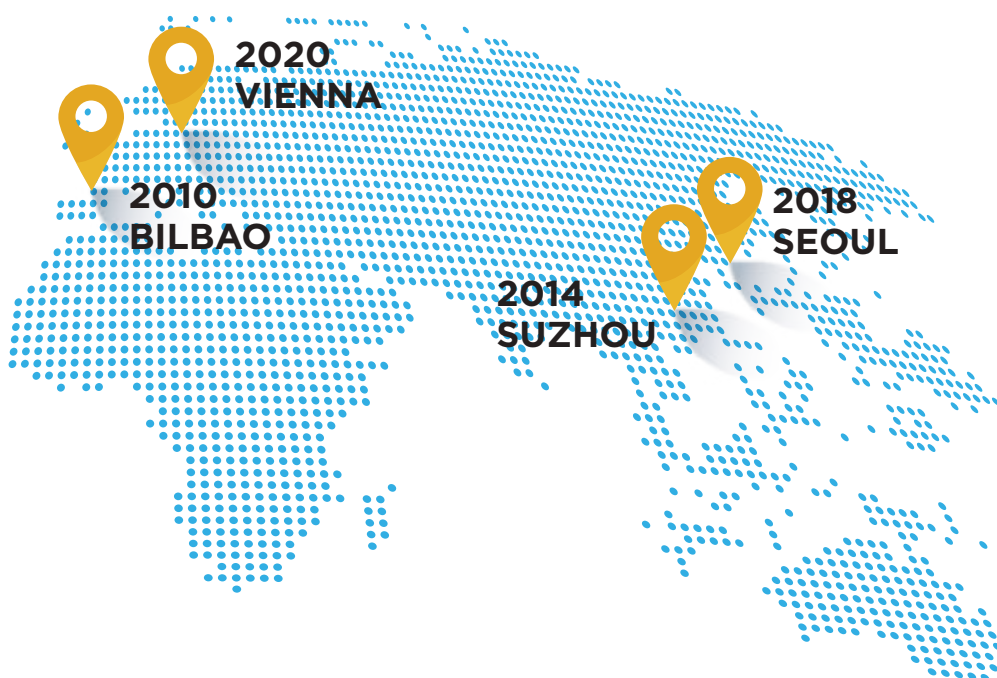
Besides case studies from the 7 Prize Laureate cities—Bilbao (2010), New York City (2012), Suzhou (2014), Medellín (2016), Seoul (2018), Vienna (2020) and Mexico City (2024), this chapter



also features caselets from other cities, all of which have been actively reinventing themselves to deliver more liveable and sustainable outcomes for their residents.

After distilling their success factors in tackling urban challenges to achieve liveability goals, it became apparent that these corroborated to a large extent with the principles outlined in the Liveability Framework. What was interesting is that a large number of the principles were applicable, even though many of these cities have different developmental pathways, historical and socio-economic contexts, governance structures and expected impacts from climate change.

The Liveability Framework is not a prescriptive model for all cities. It can, however, serve as a reference of important considerations for cities to use as they chart their own development trajectories. It is hoped that these case studies become a valuable resource for cities around the world as policymakers and planners strive together to create more vibrant, sustainable and liveable places for people.



BOX STORY

THE LEE KUAN YEW WORLD CITY PRIZE

Inaugurated in 2010, the Lee Kuan Yew World City Prize is a biennial international award that honours outstanding achievements and contributions towards the creation of liveable, vibrant and sustainable urban communities around the world. The Prize is awarded to cities, and recognises their key leaders and organisations for displaying foresight, good governance and innovation in tackling urban challenges holistically to bring social, economic and environmental benefits to their communities.

To facilitate the sharing of best practices in urban solutions that can be replicated in other cities, the Prize places an emphasis on practical and cost-effective solutions and ideas. Through the Prize, Singapore hopes to promote exemplary thought-leadership and exchange of ideas among cities, to spur further innovation in sustainable urban development.

The Prize has a rigorous evaluation process, featuring a Nominating Committee that reviews and examines submissions, and recommends potential Laureates to the Prize Council. The Prize Council then reviews and selects the Prize Laureate based on these recommendations. Both panels comprise distinguished individuals from a wide range of disciplines in the public and private sectors.

As of 2024, 7 cities have been awarded the Prize and 20 cities given Special Mentions. The Prize is co-organised by the Centre for Liveable Cities and Urban Redevelopment Authority.

For more information, visit www.worldcityprize.sg

“The Lee Kuan Yew World City Prize emphasises the importance of long-term vision and holistic transformation, principles that echo Singapore’s own urban development as captured in the Liveability Framework.”

Cheong Koon Hean

Chair, Lee Kuan Yew Centre for Innovative Cities,
Chair, Advisory Panel for the Centre for Liveable Cities, and
Professor of Practice, Singapore University of Technology and Design



LEE KUAN YEW
WORLD CITY
PRIZE

BILBAO



The revitalised Abandoibarra district
Photo courtesy of David Vives

The city of Bilbao was named the inaugural Prize Laureate in 2010, in recognition of its integrated and holistic approach to urban regeneration. Achieved through effective governance and integrated planning over some 25 years, Bilbao's urban transformation has enhanced the quality of life for its people, reinvented its economy and beautified its cityscape.

Strategically located along the Nervión River in northern Spain, Bilbao had its beginnings in the 1850s as a port city with booming mining, steel and shipbuilding industries.

However, industrial decline in the 1970s, and a major flood in 1983, caused the dilapidation of urban spaces, pollution of the river and social issues such as rising unemployment and population shrinkage. Staying resilient, the Bilbao city government drew up an ambitious plan in 1989 to regenerate the city, and successfully executed it over the following few decades.³⁵¹ The role of Bilbao Ría 2000, as an innovative governance model in bringing key stakeholders to work collectively in long-term integrated planning, was integral to Bilbao's urban regeneration.

REJUVENATING THE CITY THROUGH INNOVATIVE URBAN GOVERNANCE AND SOUND INSTITUTIONS

Established as a public company in 1992 by the then-Ministry of Public Works and Transport, and the Ministry of the Environment, Bilbao Ría 2000 is tasked with managing the recovery of degraded or old industrial areas of the city. It is responsible for coordinating and executing projects related to town planning, transportation and the environment, focusing on urban directives drawn up by the planning authorities. It is publicly funded, and comprises government ministries, public agencies and private enterprises.³⁵²



Bilbao's shared bicycle infrastructure alongside the electric tramway system

Photo courtesy of Jose Javier Miguel De La Huerta

As a strong public-private partnership (PPP), Bilbao Ría 2000 became a platform for key decision-making, allowing alignment and conflict resolution for land development. Represented by high-level board members, Bilbao Ría 2000 institutionalised agreement by consensus as a process to mandate land development, reducing decisions influenced by political inclinations and thus ensuring that a long-term approach to planning could be taken.³⁵³ To ensure sustainable financing for city regeneration projects, Bilbao Ría 2000 upgraded plots of public land and sold parts of them to private developers.³⁵⁴ It used the proceeds to reinvest in recovered areas or fund strategic urban initiatives, such as the restructuring of railway lines, rehabilitation of the historic district, as well as development of the Abandoibarra waterfront promenade and new urban parks.³⁵⁵ Bilbao Ría 2000 was an innovative governance model which aligned and facilitated the government, businesses and the community to work together to transform the city.

EFFECTIVELY EXECUTING AN INTEGRATED MASTER PLANNING APPROACH

The revitalised Abandoibarra mixed-use district, a project that spanned 14 years, is often seen as an icon of Bilbao's urban regeneration efforts. Once obsolete and decrepit as a port area, the project involved relocation of the port from the city centre, which opened the waterfront as a key area of opportunity for urban renewal.³⁵⁶

The development of iconic cultural landmarks such as the Guggenheim Museum, Bilbao Maritime Museum, and Euskalduna Conference Centre and Concert Hall, along with offices, luxury housing units and leisure facilities, raised Bilbao's international profile while boosting the city's visitor and employment numbers.

At the same time, the government invested in critical infrastructure to modernise the city, including a new metro system and water sanitation system. Railway tracks were re-routed around the city to allow development of the waterfront, while major arterial roads were buried underground to create a more pedestrian-friendly

urban environment.³⁵⁷ Social infrastructure was also put in place, such as Bank Park, with connected promenades along 800 m of the waterfront, and a series of bridges and walkways linking up both sides of the river.

Such measures have highlighted the symbiotic relationship between dynamic urban governance and integrated master planning and development, which work hand-in-hand to facilitate more liveable and sustainable urban environments.

Hence, beyond the much acclaimed “Guggenheim effect”, a deeper analysis of the Abandoibarra case has revealed that the “Bilbao effect” required effective governance in executing long-term integrated planning of different kinds of infrastructure.

CREATING A FUTURE BILBAO

Bilbao is not resting on its laurels but thinking long term to guide its reinvention and meet the needs and challenges of the future.

A research project by the government and scientists found that the Nervión River will pose increasing flood risks due to climate change. By 2050, the city could experience 10% more downpours, and the river could be 22% higher at its peak flow compared to current levels.³⁵⁸ To build resilience against the effects of climate change, the city government is implementing a comprehensive flood control plan which includes lowering the river height by 1 m around the Zorrotzaurre peninsula, to transform it into a flood-proof residential quarter. Additionally, three stormwater tanks will be built across the city to hold rainwater and prevent downpours from overwhelming the drainage system. The first tank, in the district of Etxebarri, has a capacity of 75,000 m³.³⁵⁹

The Zorrotzaurre peninsula project will also have zero-emissions buildings, facilities for electric cars, an electric public transport system comprising a tramway, electric buses and shared bicycles, and a smart public lighting system that uses energy-efficient LED bulbs.³⁶⁰

To give residents greater access to green spaces for physical and mental well-being, the Green Ring project connects forest parks around Bilbao with urban parks and other green spaces within the city to produce a 99.3-km green loop, signposted with information about interesting places in the area.³⁶¹

Bilbao also continues to forge international partnerships. For instance, the city hosted the Urban Revolution Aurrera! International Congress in 2023 and 2024, during which the Bay Urban Visioning Awards and the Urban Revolution Aurrera! Manifesto were launched as initiatives to build a community of stakeholders across the world for advancing urban innovation.

In the past, Bilbao's dynamic urban governance and integrated approach to development enabled it to effectively execute its rejuvenation plans. It is now making itself more resilient to the challenges ahead by continuing to employ these principles, and actively leveraging its local and global networks to seek integrated urban solutions that will make the city liveable, vibrant and sustainable into the future.



View of Bilbao's Guggenheim Museum on the banks of the Nervión River

Photo courtesy of Unsplash

NEW YORK CITY



New York City's distinctive grid layout

Photo courtesy of Barron Roth

New York City is a preeminent global city. From its founding as a Dutch trading post in the 1660s, New York City has been associated with the promise of opportunity and global influence. At the same time, it has faced periodic catastrophes such as devastating fires, economic crashes and the September 11 terror attack, as well as ongoing challenges like crime and strained infrastructure. New York City has remained resilient throughout due to an integrated master planning approach and a dynamic urban governance that has enabled it to continuously rebuild and reinvent itself.



The High Line

Photo courtesy of Elizabeth Villalta

New York City's allure as a port city was key to its early prosperity. However, by the 1800s, uncoordinated growth and land ownership began to strain its development. This led to the Commissioners' Plan of 1811, which facilitated an orderly expansion and formed New York City's defining feature of a grid layout. This made it easier to predict property values and plan for infrastructure, while also anticipating the city's growth and need for public spaces.

DEVELOPING TOOLS TO GUIDE LONG-TERM PLANNING INITIATIVES

In 2007, the city launched a holistic and interdisciplinary blueprint for a more liveable, vibrant and sustainable New York City, known as PlaNYC.³⁶² This plan was aimed at accommodating a million

more residents by 2030, addressing the need for 21st century jobs as well as renewal of physical infrastructure, and preparing for climate change. To achieve these outcomes, the plan integrated various disciplines, such as land use planning, transportation investment, environmental stewardship and public health, into a single document.³⁶³

New York City also tracked various metrics to gauge the effectiveness of its PlaNYC initiatives, and to measure progress. For example, its suite of environmental performance indicators included measures of air and water quality, while progress on its sustainable transport ambitions involved measuring ridership numbers on public transport.³⁶⁴

This combination of thinking long term, innovating systematically, and executing efficiently and effectively, has been key in ensuring that New York City maintains its status as a leading global city.

BUILDING FOR CLIMATE CHANGE RESILIENCY THROUGH COLLABORATIVE ECOSYSTEMS

New York City has introduced many initiatives to ensure that the city is resilient against the effects of the climate crisis.

Together with property owners, the government has improved flood protection through its Zone In initiative, which requires elevating of critical building systems. It is also attempting to reduce the city's urban heat island effect by incentivising the installation of reflective roofs through its Cool Roofs programme.³⁶⁵

The city also works closely with its wider ecosystem of stakeholders on the common goal of climate resiliency. For instance, it is collaborating on various projects with Rebuild by Design, a non-profit that has helped to foster innovative solutions for storm protection not just in New York City but across the state of New York.³⁶⁶ This includes the Big U proposal for a system to protect low-lying parts of Manhattan from flooding, storms and other climate change impacts.³⁶⁷

This commitment to building for resilience is further exemplified by zoning changes under the City of Yes for Carbon Neutrality initiative, which facilitates climate action, clean energy, and further resiliency by removing barriers to greener and more efficient urban systems.³⁶⁸ Approved in 2023, it includes policy changes such as removing or reducing restrictions on building elements to add flexibility for potential modifications to create cleaner buildings, as well as the doubling of commercially zoned land where electric vehicle charging facilities can be located.

ACHIEVING DYNAMIC GOVERNANCE THROUGH COMMUNITY PARTNERSHIPS

Another key tenet of New York City's dynamic urban governance is its commitment to partnering and engaging with the community. With a high capacity for dialogue between the government and civic groups, bottom-up, high-impact initiatives can take root. One such example is the High Line, a neighbourhood renewal project intended to stimulate the city's economy, transform underutilised areas and roads into public spaces, and forge a close partnership between community and business groups to provide ongoing programming and maintenance of these places.³⁶⁹

New York City also has a Civic Engagement Commission, which works on enhancing civic participation, promoting public trust and strengthening democracy in the city.³⁷⁰ One such programme is a participatory budgeting initiative known as The People's Money, which invites community members to decide how to spend part of the city's budget.³⁷¹ Additionally, the city has an Open Data Portal that makes public over 2,000 data assets related to the city's operations, with the belief that every New Yorker can benefit from access to this data, including being able to use it to advocate for change.³⁷²

WORKING HARD FOR THE FUTURE

The New York Climate Exchange is a PPP model aiming to address the impacts of climate change. Comprising partners from academic, corporate and non-profit organisations, it was selected in April 2023 to set up a centre for climate solutions on Manhattan's Governors Island.³⁷³ Its programmes include the Mayor's Fund to Advance New York City, which will support initiatives to improve the lives of New Yorkers from all walks of life.³⁷⁴

In addition, the active participation of civic organisations such as the more-than-100-year-old Regional Plan Association, which contributes expertise and leverages its knowledge networks within the New York metropolitan area, will enable New York City to develop robust, forward-thinking plans.³⁷⁵

New York City's dynamic urban governance, collaborative ecosystems, and integrated and holistic approach to development ensure that it is well supported in achieving and maintaining its liveability goals into the future.



View of New York City's skyline

Photo courtesy of Unsplash

SUZHOU



Birds-eye view of Suzhou
Photo courtesy of Z Ruikoto

Suzhou is a city known for its rich cultural heritage, with meticulously designed classical Chinese gardens, its network of canals and bridges, and tangible remnants of its ancient arts and crafts history. As one of the first movers in the economic reform of China, Suzhou has also become an industry powerhouse, ranking 6th in GDP among Chinese cities and attracting a resident population of over 10 million.³⁷⁶

After decades of rapid urban expansion to accommodate population growth and industrial development, Suzhou's development strategy has matured—pivoting away from a single-

minded focus on economic competitiveness and towards the consideration of holistic liveability outcomes.

Emphasising technological innovation in urban planning and management, Suzhou aims to attract talent and foster a vibrant ecosystem for PPPs and enterprise development. This positions the city as a key player in leading innovation and entrepreneurship within China. In addition, new innovations, such as smart city development, clean energy adoption and carbon reduction initiatives, underscore Suzhou's commitment to staying ahead in the rapidly evolving global economy.³⁷⁷

INTEGRATING TECHNOLOGY FOR SYSTEMIC INNOVATION

In recent years, Suzhou has emerged as a leader in smart city development, seamlessly integrating digital technologies across urban systems. These advancements also improve emergency response, cross-system collaboration and service delivery in areas such as healthcare, education and governance.



Suzhou has had significant advancements in virtual reality technologies

Photo courtesy of Giu Vicente

A standout innovation is Suzhou's digital twin city application, the City Information Model (CIM), which replicates the city in a virtual model for real-time monitoring and analysis. Covering 420 km², the CIM provides detailed 3D models of buildings, roads and water systems to support informed decision-making on rejuvenation of ageing buildings, improvement of traffic congestion and management of flooding.³⁷⁸

Digitalisation drives innovation in social governance, enhancing urban operations monitoring by reconstructing key elements like roads, buildings and infrastructure. The CIM visualises underground infrastructure, integrates above-ground and underground components, and locates non-spatial data for refined management. It also supports the development of "15-minute convenient living circles" around individual neighbourhoods, improving quality of life and sustainability of urban operations.³⁷⁹

In early 2023, Suzhou announced a plan to become a hub for metaverse development and innovation, aiming to attract more than 200 companies working in the virtual reality technology



View of the Suzhou Industrial Park

Photo courtesy of 钉钉

industry by 2025. Digital technology has enriched cultural tourism experiences and has also created new opportunities for local enterprises and SMEs to offer their products and services through e-commerce on the virtual platform.³⁸⁰ Through such plans, Suzhou is able to further utilise digitalisation to feed back into existing systems to generate a more than proportionate return on liveability outcomes. This is done by leveraging its integrated urban systems through systemic innovation, and propelling itself to the forefront of urban liveability.

WORKING WITH THE MARKET TO FOSTER A VIBRANT BUSINESS ECOSYSTEM

A key driver behind Suzhou's urban development success is its embrace of PPPs to finance and execute projects. By leveraging the expertise and resources of private enterprises, Suzhou has accelerated the pace of infrastructure development and innovation. The Suzhou government has actively promoted PPPs through various initiatives and incentives, encouraging private sector participation in urban development projects. This collaborative approach has enabled Suzhou to tap into private sector innovation and funding while sharing risks and rewards effectively.

The Suzhou Center project, a joint venture between the Suzhou Industrial Park and Singapore-based CapitaLand, showcases the potential for partnership in a large-scale urban development. The Suzhou Center was master-developed by the Suzhou Hengtai Holding Group, which is owned by the Suzhou Industrial Park government. CapitaLand, through its wholly owned shopping business CapitaLand Mall Asia, is the co-owner and co-developer for the shopping mall and two 21-storey office towers.³⁸¹

Comprising commercial, residential and cultural spaces located right next to the historic Jinji Lake and traditional Suzhou City, Suzhou Center has revitalised the city's waterfront area and become a symbol of Suzhou's economic prosperity and modernisation.

PAVING THE WAY FOR LOW CARBON TRANSITION EFFORTS—SUZHOU INDUSTRIAL PARK

Suzhou's urban development efforts are guided by a forward-looking 2035 master plan that emphasises sustainability, resilience and inclusivity. The city aims to continue leveraging digital technologies and fostering PPPs to address emerging challenges such as population growth, limited space, environmental degradation and increasing pressure to meet national carbon transition targets.

Suzhou Industrial Park, the first governmental cooperation project between Singapore and China, continues to pave the way to lead economic development while taking proactive steps towards a low carbon transition. In an interview with *People's Daily*, the Deputy Mayor of Suzhou, Mr Zhang Qiao, mentioned that the industrial park had adopted a voluntary carbon trading system, starting with distributed photovoltaic installations of relatively small capacities in late 2022. In 2023, the system included 45 registered users and had certified 17,000 tonnes of emission reductions, with 6,020 tonnes already traded.³⁸²

Suzhou's transformation over the years shows a consistent commitment to employing dynamic urban governance approaches and leveraging on collaborative ecosystems. With a clear vision of a smarter and greener future, the city is systematically innovating through digital transformation and adoption of low carbon technologies. It also recognises the power of collaboration to accelerate its development by forging international partnerships and working with the market through strategic PPPs. These approaches have brought Suzhou success today, and will continue to do so in the future.

MEDELLÍN



The Medellín MetroCable project

Photo courtesy of Alvaro Palacios

Medellín, Colombia, has a dynamic urban history characterised by industrial growth followed by challenges like drug-related violence in the late 20th century. It has since undergone a notable transformation, gaining praise for its innovative urban development initiatives. Despite its progress, the city faces persistent liveability concerns and continues to strive towards eradicating crime and social inequality, ensuring equal access to essential services, controlling urban sprawl and providing sufficient housing. Sustainable development efforts are crucial for addressing these challenges and ensuring a better quality of life for all residents. Medellín's urban development journey reflects both its successes and ongoing struggles while emphasising the importance of inclusive, sustainable urban planning to create a more liveable city.

SEEKING “WIN-WIN” SCENARIOS THROUGH INTEGRATED SOLUTIONS AND WHOLE-OF-SYSTEM THINKING

Since the 1990s, Medellín has spearheaded a variety of initiatives and policies aimed at reducing crime and improving sprawling informal settlements to enhance social equity, the economy and sustainability.

One remarkable initiative was the introduction of the Medellín MetroCable, the world’s pioneer cable car mass transit system—connecting previously isolated hillside communities to the city’s main metro line and surrounding neighbourhoods. This initiative significantly enhanced residents’ quality of life, bolstered the economy and improved the environment.

Accompanying the development of the MetroCable were investments in social infrastructure, such as playgrounds and sports facilities at the base of the cable car pylons. Education was also prioritised in the process through the establishment of new schools, library parks and small libraries at metro stations.³⁸³ These investments not only encouraged residents to engage in positive activities, but for some, also facilitated their transition into becoming productive citizens, giving rise to a “win-win” scenario towards meeting both social and economic objectives.

Prior to the installation of the cable cars, navigating between Medellín’s hillsides and the city centre required multiple bus transfers, impeding access to employment, education and healthcare opportunities.³⁸⁴ The planning and development process for the project took this into consideration, along with other stakeholders’ needs. For instance, although the cable cars had a lower carrying capacity, their shorter design resulted in a smaller footprint required for the pylons and stations, reducing construction periods as well as impacts to properties and infrastructure within densely populated neighbourhoods. This approach not only saved considerable time and money, it significantly decreased the carbon footprint associated with demolition and relocation.

Preserving the existing urban fabric while minimising evictions and relocations was essential for safeguarding the social cohesion of the hillside communities.³⁸⁵ Moreover, community buy-in was recognised as integral to the project’s success. Social workers

conducted workshops and gathered vital transport data to better understand residents' mobility patterns and needs, while outreach efforts aimed to educate residents on how to use the system responsibly.³⁸⁶ The success of the MetroCable underscores the importance of coordination among various stakeholders and institutions in effecting transformative change in cities.

The MetroCable project highlights two key lessons: firstly, the importance of implementing complementary public projects to enhance urban areas, alleviate poverty and reduce car dependency; and secondly, that minimising the land acquisition required for the project, primarily for station construction, allowed the MetroCable to seamlessly integrate into existing communities—mitigating negative displacement effects and ensuring win-win outcomes for all stakeholders involved. These lessons reinforce the importance of a whole-of-systems thinking approach to urban solutions, with the two lessons working in conjunction to facilitate an integrated master planning and development environment, as well as a dynamic urban governance approach to achieve urban liveability outcomes.



A MetroCable station

Photo courtesy of Jose Figueroa

SAFEGUARDING MEDELLÍN'S FUTURE LIVEABILITY

Medellín's urban development initiatives have significantly enhanced the city's liveability outcomes, particularly through successful projects like the MetroCable. However, as the city continues to evolve and grow, it faces several liveability challenges.

First and foremost is the continued strain on transport infrastructure due to population growth and urban sprawl. Traffic congestion, inadequate public transportation, and limited access to transportation options in peripheral areas pose significant obstacles to mobility and economic opportunities for residents. To address these challenges, the city's policymakers, planners and other stakeholders are focusing their efforts on improving mobility and transport, and building cycling routes. Some of the strategies being considered include expanding public transit networks, promoting active transportation options like cycling and walking, and implementing innovative solutions such as congestion pricing and car-sharing programmes.

Additionally, climate resilience and adaptation measures are being integrated into city planning and infrastructure projects. Given the risks posed by climate change, including flooding, heatwaves and landslides, incorporating green infrastructure and other resilience measures is crucial to safeguarding the future of Medellín's residents and infrastructure. By proactively addressing these challenges and implementing strategic planning measures, Medellín continues to enhance its liveability outcomes to ensure a sustainable future for its residents.

SEOUL



The busy streets of Seoul
Photo courtesy of Unsplash

At 605 km², the city of Seoul comprises just 0.6% of South Korea's total surface area but houses 22% of the country's population, about 10 million individuals.³⁸⁷ Seoul is thus one of the densest cities in the world.³⁸⁸

Yet, Seoul has demonstrated that a high population density need not hinder liveability. It provides an excellent example of how commitment to citizen engagement and data-supported problem-solving decisions can transform the built environment and improve quality of life for residents of dense urban areas.

HARNESSING DATA FOR SYSTEMIC INNOVATION IN TRANSPORT PLANNING

Seoul has harnessed the power of data to improve transport network planning. This is most notably done through Seoul's Intelligent Transportation System, TOPIS (Transport Operation and Information Service). TOPIS is a smart metropolitan city management hub that manages transportation, disasters and other security-related events in an integrated manner. It also takes an innovative approach by applying cutting-edge technology to manage travel demand and improve traffic flows at an affordable cost.³⁸⁹



TOPIS processes information related to bus operations in real time, and provides it to the operator, bus companies and bus drivers

Photo courtesy of Allen Yoo

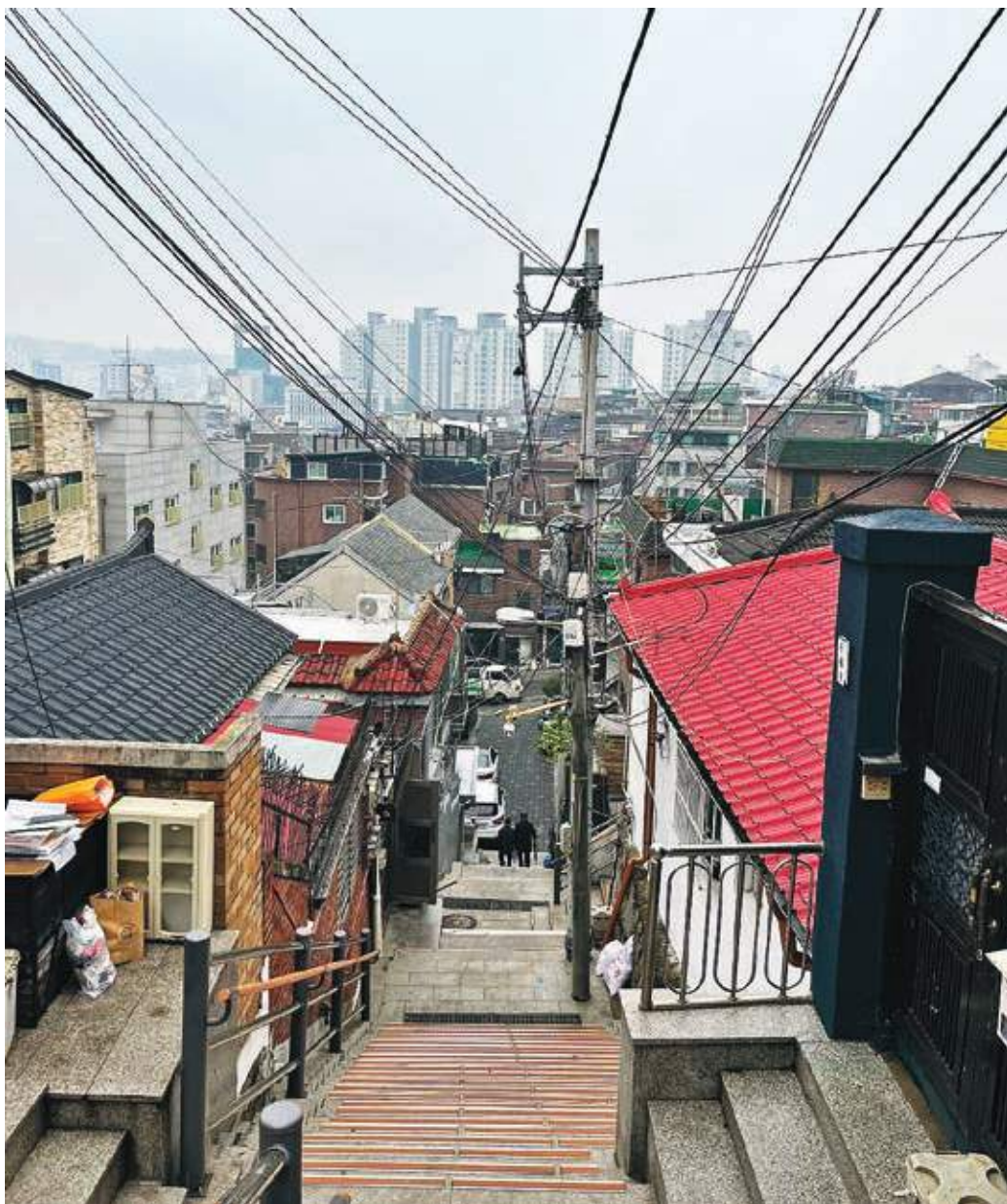
TOPIS predicts and prevents transportation problems before they occur through big data analysis. For example, it gathers and processes real-time road traffic and subway train information to enable the city to efficiently manage intervals between buses, relieve congestion and take timely action when accidents occur. It also allows passengers to select their optimal route based on real-time traffic levels and other variables.

PARTNERING WITH THE COMMUNITY FOR INCLUSIVE DEVELOPMENT

The Seoul Plan 2030 marked a turning point in the city's urban planning processes. It was the first master plan that resulted from working closely with citizens to develop the vision and action plans for the city. This milestone required commitment by the leadership of the Seoul Metropolitan Government (SMG). The decision to actively involve citizens was made despite the uncertainties of an untested multi-stakeholder planning process, which stood in contrast to tried-and-tested passive engagement methods like surveys and exhibitions.

Development of the Seoul Plan 2030 involved a Citizen Participatory Group comprising 100 members who were convened to chart the future of Seoul, identify its challenges and propose solutions. This was done together with city officials, planning experts and local politicians.

Seoul also has a Participatory Budget System which allows citizens to decide on the use of up to 5% of the city's annual budget. Since 2012, about ₩50–60 billion (approximately S\$58–72 million) is set aside each year for projects proposed by citizens. To complement this initiative, the SMG enables citizens to improve their neighbourhoods through the Community Building Project, which provides training and consulting services to help residents generate ideas and implement initiatives.



Co-designed and co-managed by residents, 369 Village is a community development project aimed at revitalising a formerly neglected area into a vibrant cultural and artistic hub

Photo from Centre for Liveable Cities

MAKING ONGOING EFFORTS TO ADDRESS KEY URBAN CHALLENGES

Despite its achievements, the city continues to face new challenges. Given its high population density, housing availability and affordability are critical issues for the SMG. Over the past decades, Seoul has stepped up its provision of public housing and introduced numerous cooling measures to improve housing availability and affordability. Despite these efforts, Seoul's housing price to income ratio continues to be high—in 2021 it was 30.56, significantly higher than Singapore's 17.17 and London's 14.34. It is also still working to catch up to the high homeownership rate of 56.6% that it had in 2008, with rates climbing from 54.7% in 2021 to 55.8% in 2022.³⁹⁰

Other challenges persist in the housing landscape as well, including social segregation, housing accessibility for youths, financing of public housing construction and deterioration of old housing stock. In response, the government has rolled out initiatives to entrench the city's hard-won advances and to prepare for the future. These comprehensive measures run the gamut from housing to trade to the environment. For example, to provide more affordable housing and boost the economy, the government is turning 6.9 million m² of unused or underused state-owned land, including a traffic island in the Yeonhui-dong area, into public housing and offices. This project, slated to be completed by 2028, is expected to produce 22,000 homes and 205,000 jobs.³⁹¹

ENVISIONING A SHARED FUTURE FOR THE CITY

Seoul is set on a firm path of transforming itself into a city with high standards of liveability for the benefit of its residents. By engaging citizens as active participants of the city's development, Seoul demonstrates that a bottom-up approach is not only feasible but leads to positive outcomes that empower residents to own a shared future for the city.

Through comprehensive measures to address issues that span from housing and transport to trade and the environment, as well as its participatory governance policies, Seoul is not just a model of urban development, but a shining example of a liveable and inclusive metropolis.

VIENNA



Vienna along the Danube River
Photo courtesy of Christian Lendl

The Austrian capital of Vienna is renowned for its rich cultural heritage and classical music legacy. The city also boasts efficient public transportation and a plethora of public spaces that are hubs for social interaction and recreation.

Since the 19th century, the city has demonstrated a strong commitment to social housing, with significant efforts made to provide affordable homes in the interwar and post-war periods. In recent decades, Vienna has also intensified efforts to address climate change and harness technology to create a smart city that sustains its residents' high quality of life.³⁹²

BUILDING FOR RESILIENCE, BUILDING FOR COMMUNITY

Vienna's creation of the New Danube and Danube Island, its construction of renewable energy plants through public financing, and its Grätzloase (neighbourhood oasis) programme are some of the examples that highlight the city's continuous efforts to take a long-term view, build for resilience and engage with the community to enhance liveability for all.³⁹³

Faced with frequent flooding of the Danube River, Vienna embarked on a plan in 1969 to excavate a 21-km-long flood control channel known as the New Danube. The excavated soil was used to create Danube Island, a long and narrow artificial island that was designed to reinforce Vienna's flood protection system.³⁹⁴

Completed in 1988, the New Danube was designed to handle flood volumes of up to 14,000 m³ of water per second. The channel runs alongside the Danube River and can be activated by weirs to absorb excess water during floods, thus enhancing Vienna's resilience against major flood events. For example, the New Danube helped to minimise damage from record torrential downpours in July 2021.³⁹⁵

In addition to its flood control functions, the New Danube was designed as a large waterbody that could be used for water sports, while Danube Island was planned as a large public park with forested zones. Today, both are popular lifestyle destinations for leisure activities and events, including a free music festival held annually. The New Danube and Danube Island project demonstrates the value of foresight and long-term thinking in creating a liveable city that is not only climate resilient, but also prioritises the needs of the community.³⁹⁶

The city continues to be forward-looking in its plans for Danube Island. In 2018, it initiated a project to expand the green spaces on the island and install a wind-powered ditch irrigation system. Such measures will help to decrease up to 20% of the island's carbon emissions and contribute towards Vienna's goal of being carbon neutral by 2040.



Community greening initiatives in a neighbourhood in Vienna include the implementation of compost bins, which decompose organic material that can then be used as natural fertiliser for plants in the neighbourhood

Photo from Centre for Liveable Cities

COLLECTIVELY SHAPING AND STEWARDING PLACES

To address climate change and meet its sustainability goals, Vienna actively engages the community in its plans. For instance, in the last 10 years, the public has helped to finance the construction of 4 wind turbines and 28 solar power plants. More than 11,000 individuals have invested over €39 million (about S\$57 million) into the latter, which have produced over 60,000 megawatts of renewable energy and reduced at least 17,000 tonnes of carbon emissions so far. These collectively owned plants reflect Vienna's efforts to nurture collective stewardship, allowing the community to contribute towards renewable energy while benefitting financially through annual dividend payouts.

Partnering with the community is also fundamental to Vienna's urban planning process. For example, the city initiated the Grätzloase (neighbourhood oasis) programme in 2015, allowing citizens to apply for funding of up to €4,000 (about S\$5,800) to revitalise public spaces within their communities. Through this programme, residents have turned parking lanes into green parklets and organised neighbourhood street festivals and other events. To ease the application process, the city has implemented an online portal for residents to submit a single application form, instead of having to seek separate approvals from multiple government agencies. This demonstrates how Vienna leverages technology to actively engage the community as stakeholders in shaping public spaces that all can enjoy.³⁹⁷

PREPARING FOR FUTURE CHALLENGES

While Vienna has been successful in ensuring a high quality of life for its residents, its population growth in recent years is likely to pose challenges on liveability. Vienna is currently the 5th largest city in the European Union, with its population reaching more than 2 million people in 2023. This creates pressure on policymakers to uphold its longstanding commitment to social housing while also conserving Vienna's green spaces, which comprise about 50% of the municipal territory. The city will have to navigate an increasing demand for housing affordability while prioritising sustainable development.

The city is also facing the need to further strengthen its climate resilience and become carbon neutral. Towards achieving these goals, it aims to double the generation of renewable energy in its metropolitan area by 2030 and reduce carbon emissions from the transport sector by 100% by 2050.

Vienna's demonstrated capacity to partner with the community, think long term and build for resilience place it in good stead to meet future challenges while sustaining a high quality of life for its residents.

MEXICO CITY



Aerial View of Mexico City
Photo courtesy of Unsplash

Mexico City is known for its vibrant and rich cultural heritage. At the same time, with its urban population doubling between 1980 and 2010, Mexico City has suffered in recent years from urban sprawl, social fragmentation and environmental challenges that have led to a sense of disconnectedness within the city.³⁹⁸ Yet Mexico City has responded to these challenges by taking strides in implementing initiatives for the creation of a liveable, vibrant and sustainable urban community.

IMPROVING ACCESSIBILITY FOR CITIZENS

As a key part of Mexico City's efforts to enhance its liveability, the government has launched an array of initiatives and policies to catalyse change through infrastructure.

For example, it has made bold investments in public transportation to improve accessibility. In 2021, a new cable car line was launched to provide low-income neighbourhoods greater connectivity to more amenities in the city.³⁹⁹ To encourage sustainable mobility, the government initiated Ecobici, a bicycle-sharing programme offering bicycles for public use, and established dedicated bike lanes throughout the city.⁴⁰⁰ Mexico City's Bus Rapid Transit (BRT) system, operational since 2005, is a high-capacity bus system that operates on dedicated lanes to provide fast, efficient and reliable public transportation across the city. Altogether, Mexico City's transportation initiatives demonstrate a commitment to creating a more efficient, sustainable and accessible urban transport system.

Since 2019, Mexico City has rapidly expanded its free public Wi-Fi hotspot network to bridge the digital divide and provide residents with equitable access to digital services. With over 31,000 free public Wi-Fi hotspots, Mexico City gained recognition as the world's most connected city in 2021—a Guinness World Record achievement.



A park in Mexico City

Photo courtesy of Unsplash

INCREASING CLIMATE AND SOCIAL RESILIENCY THROUGH URBAN GREENERY

As with other cities, Mexico City continues to face challenges despite the urban transformation it has gone through in recent years. One key challenge is climate resilience, and on this front Mexico City is continuously implementing initiatives to both mitigate and adapt to climate change. These efforts include revegetation, river rescues, sustainable water management, hydraulic infrastructure upgrades, zero waste policies, circular economy development, air quality improvement measures and solar energy initiatives.

Mexico City recognises the role of green spaces to engender social resilience. This has driven an investment in the development of parks to create safe and vibrant spaces for the community. For example, Mexico City transformed an abandoned sewerage drain that once divided neighbourhoods along a 1.8-km route into a linear green park known as Parque Lineal Gran Canal. This park has aided the environmental regeneration of the area by replacing concrete with permeable soil, and introducing greenery that will provide shade and reduce the ambient temperature by an expected 4–5°C.⁴⁰¹

This park is also well-utilised for recreational activities by over 100,000 residents from surrounding neighbourhoods,⁴⁰² offering activity spaces for a range of social groups including seniors, children and youths.

NURTURING COLLECTIVE STEWARDSHIP AND PEOPLE-DRIVEN CHANGE

Even as Mexico City's leadership offers a vision and sound institutions for planning and development, the government recognises the importance of building a community that will collectively steward the city's infrastructure and spaces. To this end, it launched PILARES (Puntos de Innovación, Libertad, Arte, Educación y Saberes, or Points of Innovation, Freedom, Art, Education and Knowledge) in 2019, an initiative that aims to restore the social fabric at a neighbourhood level. It empowers marginalised communities and supports vulnerable youths through community centres that are strategically located across Mexico City, especially in underserved areas. So far, 294 community centres have been opened throughout the city. The centres serve as integral components of the city's educational landscape, offering diverse programmes such as self-defense, coding, painting workshops and exercise classes.

Mexico City's response to the challenges posed by rapid urbanisation is to be proactive and integrated with regard to its development. Recognising that this approach can reap multiple benefits, Mexico City has invested in public transportation infrastructure, promoted sustainable mobility and rejuvenated underutilised spaces. By doing so, the city has enhanced connectivity and reduced environmental impact, while at the same time creating spaces that foster social cohesion and environmental stewardship. By leading with vision and pragmatism, Mexico City has been able to improve the quality of life with, and for, its residents.

This section features 20 cities from various regions that exemplify the use of innovative solutions to address urban challenges, from economic revitalisation and urban rejuvenation projects to social inclusion and integrated approaches in urban planning. The range of approaches adopted also demonstrate the framework's applicability across different urban contexts, serving as a practical guide for tackling future urban issues.

THE AMERICAS



Vancouver's city planning is informed by its natural landscapes, emphasising the beauty of its surroundings⁴⁰³

Photo courtesy of Unsplash

VANCOUVER

Vancouver has demonstrated progressive urban planning strategies, resisting urban sprawl and freeway expansion to favour inner-city densification instead. The city's bold approach, which at one time included embracing congestion as a counter-intuitive strategy to discourage car use, has led to significant shifts in commuting habits. Vancouver's success stems from active citizen engagement, progressive leadership and the institutionalisation of key processes which have enabled it to implement long-term plans consistently while remaining adaptable to changing needs.⁴⁰⁴



The Imagine Boston 2030 plan strives to boost the city's liveability

Photo courtesy of Pexels

BOSTON

Imagine Boston 2030 is a visionary, city-wide plan that strives to boost Boston's liveability by tackling climate resilience, housing affordability and sustainable mobility.⁴⁰⁵ The plan focuses on growth in three distinct areas—the commercial core, existing neighbourhoods and new waterfront spaces—to increase economic opportunities, foster inclusive growth and promote sustainability. Through collaborative efforts among its stakeholders, Boston aims to build a more inclusive and adaptable city, enhancing quality of life while preparing for future challenges.⁴⁰⁶



The Reviver Centro project in Rio de Janeiro aims to attract more residents back to the city centre

Photo courtesy of Unsplash

RIO DE JANEIRO

Rio de Janeiro reimagined its urban core through the Reviver Centro rejuvenation project. Since its implementation in 2021, the project has revitalised the downtown area by repurposing underutilised commercial buildings into residential spaces.⁴⁰⁷ The project aims to attract residents to the city centre by transforming the area into a vibrant, diverse and sustainable core through incentivised housing initiatives and community-building efforts.⁴⁰⁸



With a renewed vision, Toronto is preparing for the next phase of its waterfront revitalisation⁴⁰⁹

Photo courtesy of Unsplash

TORONTO

Toronto's waterfront revitalisation, led by Waterfront Toronto, focuses on transforming the formerly industrial lakeshore into a vibrant, liveable district that balances urban growth with environmental sustainability.⁴¹⁰ This includes projects like Quayside which, when complete, will be Canada's largest carbon-free planned community, providing more than 800 affordable housing units, 1,600 jobs and 2 acres of green space.⁴¹¹ This rejuvenation aims to establish dynamic, integrated and sustainable neighbourhoods that serve residents as well as visitors while fostering economic growth.

ASIA



The Atal Pedestrian Bridge was built across the Sabarmati Riverfront

Photo courtesy of Unsplash

AHMEDABAD

The Ahmedabad Municipal Corporation (AMC) achieved notable early successes in implementing the comprehensive City Development Plan for Ahmedabad. The plan transformed the city into a more liveable, equitable and sustainable metropolis with a diversified economy. To address the needs of a rapidly growing population, the Bus Rapid Transit System was implemented in 2009 to meet public transportation demand. Urban renewal projects such as the Kankaria Lake Redevelopment and Sabarmati Riverfront also helped to improve infrastructure while tackling environmental issues and enhancing quality of life. AMC's forward-thinking approach and holistic vision demonstrates strong leadership to address urban challenges.⁴¹²



Surabaya's Kampung Improvement Programme has helped to enhance the liveability of the city

Photo courtesy of Unsplash

SURABAYA

Surabaya is improving liveability by integrating cultural appreciation with sustainable urban development, particularly in its kampungs. The comprehensive Kampung Improvement Programme, a collaboration between the community and government, transformed these villages into clean, thriving and economically viable environments. Surabaya also invested significantly in education, providing free resources to improve literacy rates and enhance the development of residents.⁴¹³



Tokyo's long-term development strategy demonstrates the strength of its urban systems

Photo courtesy of Unsplash

TOKYO

The megacity of Tokyo demonstrates effective governance and management through initiatives like Future Tokyo: Tokyo's Long-Term Strategy.^{414,415} The strategy outlines sustainable, inclusive growth that addresses Tokyo's scale by focusing on digital innovation, climate resilience and improved public services. In particular, the Tokyo Bay eSG Project under the strategy exemplifies this vision by leveraging on technology such as 5G, digital twins and autonomous vehicles to create an innovative urban ecosystem that enhances Tokyo's infrastructure, services and overall quality of life.⁴¹⁶



The Minato Mirai 21 project was key to the revitalisation of Yokohama's city centre

Photo courtesy of Kakidai (CC BY-SA 4.0) / Wikimedia Commons

YOKOHAMA

Yokohama has successfully revitalised its city centre through the Minato Mirai 21 project, a collaborative urban development initiative. In 2009, the Yokohama Minato Mirai 21 General Incorporated Association was established by landowners, building owners and facilities managers to oversee integrated area management, including urban development, environmental measures and cultural promotion.⁴¹⁷ This collaborative approach facilitated negotiations with stakeholders to free up land for downtown development; as of March 2024, 94% of the land development had been completed for uses such as transport, parks and greenery, and port facilities.^{418,419}



The Port House stands at the intersection of Antwerp's historic Eilandje district and its port area⁴²⁰

Photo courtesy of Pixabay

ANTWERP

Antwerp's strategic urban renewal projects exemplify the city's consultative approach to revitalising the port. For instance, to secure buy-in, the Scheldt Quays project involved both private and public stakeholders in creating a redevelopment master plan. The historic dockland area of the Het Eilandje district has also been rejuvenated, by incorporating green areas and waterfront spaces while restoring cultural elements of the dock edges, showcasing the city's commitment to sustainable growth and community-oriented urban development.^{421,422}



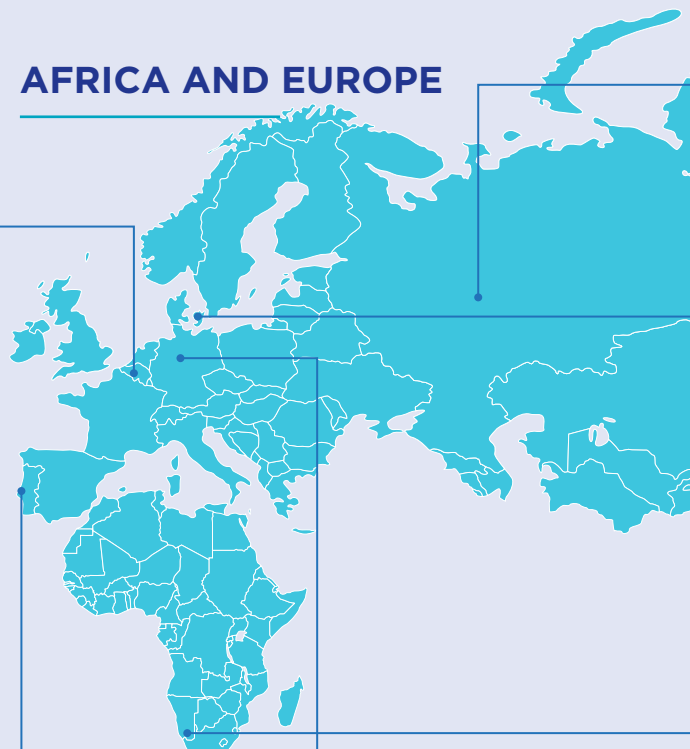
The Colina do Castelo area in Lisbon integrates heritage conservation with sustainable urban design of the city

Photo courtesy of Pexels

LISBON

Lisbon's resurgence over the past decade has helped the city to remain an attractive urban hub despite its resource limitations.⁴²³ For example, ongoing efforts to revitalise and preserve the historic Colina do Castelo area exemplify the city's approach to integrate heritage conservation with sustainable urban design, aiming to enhance both tourism appeal and residents' quality of life.⁴²⁴ As a significant historical and cultural area, Colina do Castelo contributes to Lisbon's overall liveability and vibrancy, aligning with the city's broader urban development goals.⁴²⁵

AFRICA AND EUROPE



The redevelopment of HafenCity will see additional residential units built and more quality workplaces provided

Photo courtesy of Pixabay

HAMBURG

The dynamic port city of Hamburg has evolved into a vibrant hub of opportunity as a result of adaptability in urban planning.^{426,427} For instance, the masterplan for the HafenCity inner-city redevelopment project, which was first introduced in 2000, was revised in 2010 to account for new needs and address emerging challenges. The revisions allowed for an increase in useable space so that, when completed, HafenCity will be able to accommodate 6,000 housing spaces and 45,000 workplaces.^{428,429}



The Øresund bridge facilitates travel by car and train between Copenhagen and Malmö⁴³⁰

Photo courtesy of Unsplash

COPENHAGEN AND MALMÖ

Copenhagen and Malmö are advancing regional connectivity and collaboration with the Øresund Metro, a project set to improve cross-border transit and integration across the Øresund Strait that separates the two cities.⁴³¹ Expected to be operational around 2035, this new metro line is aimed at reducing travel time between the cities to just 20 minutes. The improved connectivity will aid in fostering regional economic growth and expand Copenhagen and Malmö's international influence through enhanced cross-border cooperation.⁴³²



The 2018 FIFA World Cup match between Poland and Colombia was held in the Kazan Arena

Photo courtesy of John Perry (CC BY-SA 2.0) / Wikimedia Commons

KAZAN

Kazan has transformed from a city struggling with youth delinquency and health issues into one that is cohesive and healthy by prioritising sports in its policies. Through a multifaceted approach, Kazan leveraged on international sporting events to make infrastructural upgrades that would promote active lifestyles, while concurrently implementing comprehensive health and nutrition programmes. The city improved mortality rates, reduced crime and increased participation in sports, resulting in a healthier and more vibrant urban environment.⁴³³



Theewaterskloof Dam in South Africa is one of the key dams supplying water to Cape Town⁴³⁴

Photo courtesy of Olga Ernst (CC BY-SA 4.0) / Wikimedia Commons

CAPE TOWN

Cape Town's strategic and adaptive responses to climate change impacts and crisis management are exemplified by its effective handling of the 2017–2018 water crisis. The city's agile governance led to strict water usage regulations and the implementation of the Water Augmentation Plan, featuring projects like the Faure New Water Scheme to diversify water sources.⁴³⁵ These initiatives further build upon emergency measures to create lasting solutions that will help ensure Cape Town's future water security.⁴³⁶



Light rail tracks and pedestrians at George Street

Photo courtesy of Unsplash

SYDNEY

The Sustainable Sydney 2030–2050 vision builds on Sydney's past successes like the Light Rail and pedestrianisation of George Street, introducing new projects to maintain the city's global status through strong leadership and stakeholder collaboration. The vision prioritises Indigenous recognition, cultural revitalisation and enhancement of Sydney Harbour through projects such as the Eora Journey. It also emphasises pedestrian-friendly spaces, expanding green spaces and improved connectivity to transform the city's landscape and gateways, enhancing overall liveability and resilience.⁴³⁷



Melbourne is consistently ranked as one of the world's most liveable cities

Photo courtesy of Unsplash

MELBOURNE

Melbourne's resilience and innovative approaches have helped it redefine urban life and solidify its position as one of the world's most liveable cities. For instance, the Flash Forward Laneways initiative sought to revitalise Melbourne's vibrancy after COVID-19 by employing the city's creative sector, a key contributor to both its economy and identity. Creative professionals employed under the initiative were reported to have enhanced their capabilities and expertise, and increased prospects for future employment in the process.⁴³⁸



The Kangaroo Point Bridge, a project under the Brisbane City Plan, opened in December 2024 with dedicated paths for pedestrians and cyclists⁴³⁹

Photo courtesy of Chris Olszewski (CC BY-SA 4.0) / Wikimedia Commons

BRISBANE

The Brisbane City Council's City Plan 2014 charts out Brisbane's transition into a vibrant and sustainable city that balances economic growth with liveability and environmental stewardship. Key initiatives include developing mixed-use areas, improving public transport, and emphasising heritage preservation as well as green space expansion. This strategic framework, which is updated regularly to address evolving urban challenges, is enabling Brisbane to become an inclusive and revitalised city that drives economic prosperity and enhances urban life.⁴⁴⁰

OCEANIA



Auckland's Super City model takes an integrated approach that supports the city's growth

Photo courtesy of elpinto007 (CC BY-SA 2.0) / Wikimedia Commons

AUCKLAND

Auckland's Super City model demonstrates a unified and innovative governance structure designed to address planning challenges through a collaborative strategy that streamlines decision-making. Launched in 2010, it merged the regional, city and district councils into a single Auckland Council, enabling a more integrated approach to urban planning.⁴⁴¹ This has supported the city's growth, along with the implementation of the Auckland Plan that outlines a course of development until 2050 to enhance liveability and sustainability.⁴⁴²



A kiwi foraging at the Zealandia Ecosanctuary

Photo courtesy of Judi Lapsley Miller (CC BY 4.0) / Wikimedia Commons

WELLINGTON

Wellington demonstrates an exceptional commitment to ecological restoration and coexistence with nature through projects like Zealandia Ecosanctuary and Predator Free Wellington. These examples foster greater knowledge and awareness of environmental issues within the community, enabling residents to engage actively in local conservation initiatives. Through community involvement and strong partnerships, Wellington has successfully restored natural habitats and worked towards sustainable urban development.⁴⁴³

CONCLUSION

While the Liveability Framework offers ideas for cities to consider as they navigate towards achieving urban excellence within their own contexts, the cities featured in this chapter are real-world benchmarks of success.

For example, Bilbao and New York City took an integrated master planning and development approach to their development. Both cities thought long term, as seen by Bilbao's systematic plan to innovate and effectively execute 25 urban projects over 25 years, and New York City's various efforts to build for resilience and track its liveability outcomes. Both cities efficiently and effectively executed these plans.

Examples of dynamic urban governance included how Medellín cultivated sound institutions that enabled it to reinvent itself. Seoul engaged and partnered with the community to create an inclusive, socially stable and highly innovative city. In Mexico City, its leaders and organisations led with vision and pragmatism to empower marginalised communities, enhance its environment and streamline its transport system.

The importance of collaborative ecosystems was illustrated by Suzhou, which forged international partnerships and worked with markets to accelerate its innovation and development. Vienna exemplified the nurturing of collective stewardship to ensure that social objectives are met as it reinvents itself for the 21st century.

From Melbourne's engagement with the creative sector to boost its competitive economy, to Wellington's efforts in environmental sustainability and ecological restoration, to Cape Town's diversification of water resources to improve resilience

and water security, these cities demonstrate how the framework's outcomes can be pursued through context-specific strategies. At the same time, the quality of life improvements seen in cities like Surabaya and Kazan underscore the importance of community-centric development. The integrated master planning and development approach exemplified by Hamburg and Boston, and the dynamic urban governance showcased by Tokyo and Auckland, highlight the critical role of robust urban systems. Copenhagen and Malmö further demonstrate how cross-border collaborations can also lead to collective outcomes.

These cities have all demonstrated how putting in place effective urban systems and employing key principles such as an integrated master planning and development approach, dynamic urban governance, and a collaborative ecosystem can help to achieve liveability outcomes for a competitive economy, a sustainable environment and a high quality of life. These urban systems and key principles are outlined in the Liveability Framework and their relevance is evident across cities from all parts of the world, despite their contextual differences.

Singapore believes that learning from the experiences of cities around the world can inspire even greater advancements in urban liveability. To sustain this spirit of learning from one another, the City Network for the Lee Kuan Yew World City Prize was launched in 2024 to provide a platform to engender continual knowledge exchange between cities. Collaboration and partnerships have brought successes to many cities of today, and together, cities can pool resources and share solutions to better face future urban challenges head on.



EPILOGUE



EPILOGUE

Cities are a growth industry—by mid-century, we expect two-thirds of the world's population to be living in urban areas. With falling birth rates in cities, we should expect that many future urban dwellers will come from places outside the city, or even from abroad, potentially bringing with them new social mores while helping to fulfil vital economic needs.

At the same time, cities are currently the biggest source of carbon emissions on the planet. City leaders will have to balance increasing population growth against the need to chart out a socially equitable, low carbon future. This will require the adoption of fundamentally different approaches and a shift in long-term thinking, even as cities adapt in the present to the direct effects of climate change. Cities will also need to become more resilient to second- and third-order effects such as disruptions to logistics supply chains, water availability, food production and power supplies.

Lastly, changes in the established nature of how a city runs will increasingly require buy-in from a more diverse but potentially more talented populace, as well as collaboration with other cities, regions and nations as inter-dependence continues to grow.

UPDATING THE LIVEABILITY FRAMEWORK FOR THE FUTURE

This review of the Liveability Framework by the Centre for Liveable Cities (CLC) is a timely endeavour to help prepare urban leaders and policymakers for the growing complexity of issues facing cities around the world. The refreshed framework recognises that our systems must support our response to challenges of achieving liveability in ways that are both balanced across different outcomes and resilient against disruption. Although prepared from the perspective of Singapore, which faces a complex set of domestic and external challenges, it may be relevant to other global cities with a similar context.

The refreshed framework weaves together the concepts of a competitive economy, sustainable environment and high quality of life, highlighting the dynamic interplay and potential dilemmas and opportunities that arise at their intersections. Recognising the need for cities to nurture and draw support from one another—now, more than ever—it also introduces the importance of a wider collaborative ecosystem as a feature of our urban systems. Within each city, community stewardship of issues and co-ownership of solutions will help to foster lifestyle and behavioural shifts that bring about more sustainable outcomes. Beyond each city, collaborations across a wider geographical span can better enable resilience in all aspects of urban development.

LEVERAGING THE SCIENCE OF CITIES

Interlacing the critical elements of collaborative ecosystems, dynamic urban governance and holistic long-term planning with the power of urban science equips city leaders and policymakers with the tools to unlock growth opportunities and directly address the needs and challenges of residents, some of which might remain unnoticed without the insights that they enable.

We refer to this broadly as leveraging the “Science of Cities”, a growing body of practical knowledge and data-driven tools that can support the planning, development and governance of future-ready urban environments. This will empower leaders to view their cities as complex systems, facilitating decisions that consider the full spectrum of urban life. This holistic, informed approach enables the crafting of urban spaces that are not only more sustainable and resilient but also more attuned to the evolving needs of their inhabitants.

Integrating urban science with participatory and collaborative approaches also marks a transformative shift in how we can create more liveable cities. Compared with more traditional top-down planning approaches, this enables a more robust social compact, characterised by trust between diverse stakeholders, to be fostered. By identifying common values and aspirations, city leaders and policymakers can engage the collective imagination, energy and wisdom of the community, facilitating a process that is both structured and vibrant, as well as thoughtful and effective. This shift is not merely theoretical but actively being embraced in practice by cities around the world.

Further enriching the Science of Cities toolkit, city leaders and policymakers can leverage strategic foresight and systems thinking as critical enablers to bolster their city's resilience against uncertainty over the future.

DEVELOPING MORE RESILIENT PLANS THROUGH STRATEGIC FORESIGHT

Strategic foresight enables urban leaders and policymakers to extend their vision beyond current challenges, preparing for a range of future scenarios by analysing present trends and drivers. This approach was exemplified in 2022 when CLC engaged stakeholders across Singapore's government, private and academic sectors to identify key city-level trends and driving forces across 5 themes anticipated to impact the city-state's infrastructure and environment sector by 2040. These themes, ranging from supply chain disruptions to social divisions, have not only shaped CLC's research agenda but also highlighted potential emerging issues. Recognising the multifaceted impact these themes could have on various city-level subsystems, CLC turned to systems thinking to navigate the complexity, interdependencies and interrelationships inherent in these challenges.

CONTINUING TO HONE THE ATTAINMENT OF LIVEABILITY

The Lee Kuan Yew World City Prize celebrates cities worldwide that have achieved significant progress in enhancing liveability. This biennial award, with its extensive online repository of case studies, has become a pivotal platform for urban leaders around the world to exchange novel ideas, share practical knowledge, and foster international collaboration. In this vein, we have also established a City Network for the Lee Kuan Yew World City Prize, to facilitate more regular cross-sharing of innovative ideas and approaches between cities.

Singapore's growth as a city benefited from the experience and example of other cities, adapted to our local context. This refreshed Liveability Framework also builds on a body of learning from our own trials and practical experiences of what worked or needed improvement. We hope that it provides a set of principles that can support the growth of other cities globally to the benefit of existing and future city-dwellers. The path to the future for our cities is not predetermined, offering a canvas of possibilities rather than a fixed trajectory. Rather than breeding passivity, this uncertainty should ignite a sense of empowerment and excitement among city leaders and urban stakeholders. It underscores the significant agency we possess to shape urban futures, guiding them towards more liveable and sustainable outcomes. This framework encourages us to embrace the myriad of potential futures with a proactive and strategic mindset to influence positive change in the urban landscapes that we steward.

We invite comments and contributions on how this framework can continue to serve and advise urban leaders and stakeholders around the globe, as we continue to seek a brighter and more resilient future for our cities.



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