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IPS-Nathan Lecture Series:

SEEKING A BETTER URBAN FUTURE

**Lecture III: SHAPING THE FUTURE OF
HEARTLAND LIVING**

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Introduction

Someone once told me that in Singapore, HDB flats are 'like the air we breathe'. They are so much a part of our life because more than 80 % of our residential population live in them. Even if you do not live in an HDB flat, you would have used some of the amenities in an HDB town, be it to frequent the market or hawker centre, the neighbourhood shop or clinic. The public housing programme implemented by the Housing & Development Board (HDB) over the last 57 years has provided affordable housing for the people of Singapore. By and large, HDB has provided a comfortable and convenient living environment for its residents.

Changing Needs and Rethinking the HDB Town

Going forward, there will be trends that will impact our HDB towns. In my second lecture, I touched on the trends that will affect us at a national level and the way we carry out urban planning for the future. These trends will also cascade down to a local town level. So what are the considerations that will influence the way in which we should plan and build our towns? In this lecture, I would like to focus on how HDB plan, design, harness technology and reach out to the community to help build better homes together.

Preparing for an Ageing Population

Singaporeans are living longer and having fewer babies. By 2030, the number of Singaporeans aged 65 and above will double to 900,000, making up 25 per cent of the population, from just one in eight today.¹

The planning of towns and estates must consider the change in social composition and demographics. We need to meet the continuum of needs of our residents as they age. Our designs should include suitable accommodation for them, complemented by services that take

¹ Source: <https://www.population.sg/articles/older-singaporeans-to-double-by-2030>

care of their social well-being and healthcare needs so that they can age-in-place. For example, elderly residents seeking independent living may now prefer to buy a smaller flat as it is easier to maintain. These should be close to neighbourhood amenities and public transport for convenience, and be served by healthcare and elderly activity centres. In terms of detail design, universal design principles should be applied within the flat and in public areas, so that mobility is not impeded. We want to encourage and enable the elderly to be physically and mentally active in and outside their homes, so that they are not socially isolated.

Creating Liveable Density

As a small city state, Singapore is inevitably a high density environment. However, through innovative planning and design solutions, planners and architects can create ‘liveable density’ so as to continue to ensure a pleasant living environment.

Mitigating Climate Change

Climate change is another phenomenon that we must consider in the formulation of our plans. Increased urbanisation and economic activities globally has led to higher carbon emissions and an upward trend in temperatures. Since 1972, Singapore has experienced an increase in warm days and warm nights, and a decrease in cool days and cool nights. From 1980 to 2016, annual total rainfall rose at an average rate of 101 millimetres per decade. It is projected that the intensity and frequency of heavy rainfall events will increase as the world gets warmer.

These climatic changes require us to plan and build in a more sustainable way. In my second lecture, I advocated a circular way of managing our water–energy–food–waste–energy nexus rather than a linear ‘use and throw’ culture, particularly as Singapore is a resource scarce country. Our buildings should be designed to reduce energy use and to encourage natural cooling rather than the use of air conditioning. Today, HDB already uses renewable energy, such as energy generated from solar panels. There are opportunities to use less water and

reduce waste, and to re-use and recycle whenever possible. Innovative ways, such as the adoption of water sensitive urban design could be used to mitigate floods. We should strive to build greater resilience into our infrastructure.

Upkeeping and Rejuvenating Physical Structures and Infrastructure

Recognising that our towns will mature and age over time, HDB has already been carrying out extensive estate renewal and upgrading of several towns since the 1990s. Where possible, the cycle of improvements and rejuvenation should continue, the pace of which will be subject to the availability of resources. This will ensure that our towns remain a pleasant place to live, and municipal and estate services are well maintained.

Enhance Social Cohesion

A more diverse population

We now have a much more diverse population as we begin to see more inter-ethnic and transnational marriages. More new citizens have also joined us in recent decades.² These trends will increase our diversity in culture, language and lifestyle.

The complexion of our estates will evolve organically with this change in social composition. We need to find ways to increase community connections so as to promote better understanding and social cohesion amongst residents in our towns. The use of design and technology to encourage greater inclusivity and to facilitate social interactions becomes even more important. If we can do this successfully, it will help to create a cultural richness and a new definition of the community spirit.

² Source: Department of Statistics, Population in Brief, 2017.

At the same time, with increasing wealth and education, we are mindful that people do value their privacy and personal space more. Whilst some may advocate the return of the traditional slab block and common corridor design to encourage more neighbourly encounters, the reality is that the majority of our residents prefer a building layout which gives them more privacy. Building the 'Kampung Spirit' will require new design interpretations. More creative designs should strike a balance between building community and making available multiple layers of different spaces - a gradation of public, semi-public and private space.

Who is my 'neighbour'? Rise of Geo-socialisation and social media

I mentioned in Lecture II that the recent trend of 'Geo-Socialisation' has changed the way people interact. More and more people are now connected through social media regardless of where they live. We can no longer define 'neighbours' by proximity and distance alone. Whilst promoting neighbourly ties by physical design remain important, we need to recognise the presence and power of online communities.

By leveraging technology, virtual communities can nourish a sense of belonging and civic-mindedness, involving more people to shape and take greater ownership of the environment that they are living in. Netizens with common interests can be brought together to enliven community life. A matching of skills to needs, and bringing together of residents with common interests across online communities, could also be constructive ways to engender a kampung spirit.

Anticipating Digital and Technology Changes

Technology and artificial intelligence (AI) will impact almost every aspect of the town affecting the way we live, work, play and learn.

The Future of Work

The nature of employment is likely to become more transient with the advent of the gig economy and new freelance jobs. It was reported that in 2017, there are about 167,000 individuals in freelance work as their primary job.³ More people will also turn to telecommuting and home offices to perform various jobs from the comfort of their home. These are potential considerations for future flat designs. In fact, some 17,000 HDB flats already operate as home-offices today. How can we better support citizens in these new roles? For example, we could provide more flexible living spaces that could accommodate suitable types of work that can be done in a home environment, supported by digital infrastructure. As the home businesses grow, we could consider providing shared working spaces nearby in the neighbourhood or town centres which allow these businesses to expand into, and provide connectivity facilities and spaces for larger group meetings. These spaces would encourage greater entrepreneurship and facilitate start-ups.

The Future of Retail

Our commercial complexes and shops in the heartlands serve an important social role. They provide convenience and more affordable goods and services for residents. Entrepreneurs just starting out can find more affordable rentals within the heartland shops. Many of the shops serve as social nodes, particularly the coffee shops where people meet over a cuppa. Residents enjoy familiarity with the shop keepers unlike larger shopping malls with chain stores.

At the same time, omni-channel shopping has been growing in popularity. Some have projected that by 2028, the e-commerce market will grow by more than five times, it would be worth up to \$7.5 billion, and make up 6.7 per cent of all retail in Singapore.⁴ HDB shops need to evolve to cater to the changing shopping preferences of consumers. We could rethink the

³ www.todayonline.com/singapore/big-read-unstoppable-march-gig-economy

⁴ www.gov.sg/news/content/today-online-spore-ecommerce-market-will-grow=s75b-in-10-years

design of our HDB commercial centres towards a more 'experiential' focus, to attract footfall. In terms of trade mix, more personalised services could be introduced. For example, Nespresso provides a personalised coffee experience by baristas at a tasting bar.

With online shopping, the design of neighbourhoods should be more delivery-friendly. This could mean providing more drop-off and parcel collection points for each block and precinct.

The government is also looking into an island-wide federated parcel locker network to ease the last-mile delivery challenges. Even retailers like NTUC Fairprice are rolling out Click & Collect lockers that enable you to collect your groceries after you order them online. The lockers come with refrigerated storage to keep chilled products like milk and cheese cold.

The Future of Mobility

The potential introduction of autonomous vehicles will also impact the way we plan our towns for commute. The Land Transport Authority's (LTA) push towards a car-lite environment and the introduction of autonomous buses require us to rethink the road system in our towns. For example, priority may be given to bus transit corridors while reducing the number of lanes for cars. Many of our multi-storey car parks could be repurposed or redeveloped, should car ownership fall.

A New Generation of Public Housing – HDB's Roadmap to Better Living

HDB ramped up its building programme from 2010 onwards to meet the surge in demand for public housing. Between 2010 and 2017, we launched about 167,000 units of flats. This is equivalent to about five Toa Payoh towns, all launched within the short span of eight years. This is a massive building programme. However, it provided a golden opportunity for HDB to develop a new generation of public housing that would take into consideration the various trends I highlighted above. Rather than just doing more of the same, we wanted to refresh our

public housing towns and developments so that they will meet the changing lifestyle needs and rising aspirations of our people. In 2011, we launched the HDB *Road Map to Better Living*, which will guide our large development programme over the next few decades. The goal is to build well-designed and community centric towns which are sustainable and smart. Let me share how this roadmap will impact the future of Heartland Living.

THRUST 1: WELL DESIGNED TOWNS

Broad Principles for Planning

HDB does not only build housing. As a master planner and developer, HDB is in the business of developing entire townships. Over the years, the physical planning of HDB towns has evolved in tandem with the changing socio-economic and demographic conditions of Singapore. However, a few key principles continue to guide the planning and development of our HDB towns. These are:

- i) **Planning for Self-Sufficiency** – HDB towns are developed as a total living environment to meet our people's daily needs. Each town should be reasonably self-sufficient. In addition to housing, residents will be well served by shops, schools, social and recreational facilities, etc.

- ii) **Neighbourhood Concept** – At the heart of each town is the town centre, which is the key commercial and activity hub. Around it are smaller neighbourhoods of 4,000 – 6,000 units, each with its own shops, schools, and parks. Each neighbourhood further comprises precincts of about 400 to 800 units that are also served by a local shop cluster, precinct facilities and precinct green.

These principles have further evolved for the newer towns such as Punggol Town, where smaller and more intimate and walkable residential estates of 1,200 to 2,800 dwelling units were formed. Each shares a common green, school and precinct shop cluster.

iii) **Checkerboard Concept** – By juxtaposing low-rise, low-intensity land uses such as parks and schools with high-rise, high-density residential developments, visual and spatial relief can be achieved to create a pleasant living environment. Community spaces are also better distributed and more accessible to residents.

iii) **Hierarchy of Facilities** – Essentially, larger facilities/ amenities would serve a wider catchment of residents, while smaller-scale amenities cater to localised day-to-day needs. The facilities at different levels comprise:

- At Town level – a Town plaza, town park, sports complex, integrated transport hub, shopping centres.
- At Neighbourhood level - Neighbourhood centres, schools, parks.
- At Precinct level - Precinct pavilion, 3-generational play and fitness facilities, community gardens.

iv) **Planning for Connectivity** – Our towns are well served by an MRT network, highways and roads. This is now supplemented by more comprehensive cycling and pedestrian networks.

In addition to the broad principles that have guided the planning of HDB towns to date, we are introducing new strategies to constantly improve the design of our towns. These strategies aim to:

- 1) Develop a new generation of public housing;
- 2) Design an environment that is suitable for all ages;
- 3) Create synergies from integrated developments.

1) The New Generation Towns

With the ramp-up of our building programme since 2010, we have had the opportunity to formulate several new master plans for areas such as Punggol North, Bidadari, Tampines North and Tengah. These plans have incorporated new fresh ideas, including the following:

1.1) More distinctive neighbourhoods and districts

HDB aims to create more distinctive identities for a new generation of towns in green field sites and in larger areas of older estates that will undergo redevelopment and rejuvenation. Building 'identity' can help us to better root residents to home and community. In our planning, we capitalise on 'heritage and place character' to safeguard social memories and to create a stronger sense of belonging.

1.2) Living in Green to mitigate high densities

Our homes will be nestled within a garden as we introduce more tropical green and blue water elements in our planning and design. These elements provide the green lungs and recreational spaces to relieve urban density. More blue elements, such as ponds and streams, will be weaved in with the landscaping – these elements will be multi-functional, serving to collect storm water, and provide aesthetic and recreational features for the towns.

1.3) Focus on Quality Urban Design to sculpt distinctive towns

A key tool to shaping our town is the use of urban design. In contrast to architecture, which focuses on the design of individual buildings, urban design deals with shaping a larger group

of buildings, streets and public spaces at whole neighbourhoods and district scale, with the goal of making better places for people.

1.4) Develop New Building Typologies and Layouts

It is also important to carry out quality design at the building level and public space levels. We have adopted new building typologies and flat layouts to meet changing lifestyle needs, providing variety and choice, as well as adding interesting features to the townscape. In addition to the traditional tower and slab blocks, we have introduced typologies such as courtyard housing, terraced housing, housing with decked roof gardens, etc.

Sky gardens and terraces will also be selectively introduced to provide residents with more spaces to relax and to interact. These sky gardens will create new layers of green spaces to replace ground level green taken up by developments.

1.5) New Layouts for New Lifestyles

The interior of the flat unit is also undergoing change to meet new lifestyle needs and trends. Kitchen walls have recently been done away with as many young couples prefer open kitchens. Columns are pushed to the sides wherever possible so that residents can have more flexibility in reconfiguring their flat layout. All these improvements enable residents to stamp their flat's interior with their very own personality.

1.6) A car-lite environment

In line with national efforts, HDB also aims to develop a 'car-lite' environment by encouraging the use of public transport. Almost all our towns are well served by a rail network and well connected bus routes to encourage the use of public transport. Recognising that some may still need to use a car occasionally, LTA has worked with HDB to launch the national Electric Vehicle (EV) Car-Sharing Programme in 2017 where 1,000 cars supplied by BlueSG are being

deployed in stages for our residents' use. In addition, MOT/ LTA are exploring a pilot deployment of Autonomous Vehicles (AVs) as a form of public transport in Punggol and Tengah towns as well as in the Jurong Innovation District from 2022⁵.

To promote the use of alternative modes of transport, comprehensive cycling networks are being weaved into HDB towns to encourage cycling and the use of personal mobility devices. The cycling network will also link to parks and park connectors. Towns will be planned to be even more pedestrian-friendly with conveniently connected footpaths, covered link ways, and second storey connections where appropriate, which connect precincts and also lead directly to the aboveground MRT/ LRT stations.

To illustrate how the above ideas are incorporated into our plans, let us have a look at the examples of Punggol and Tengah Towns.

Case One: Punggol Town

Punggol is HDB's first eco town designed as a 'Sustainable Waterfront Town in the Tropics', a town which will house about 96,000 units. The development of Punggol commenced in the 1990s. However, a refreshed vision for Punggol Town's second phase of development was unveiled in 2012, guided by the new key thrusts of HDB's Roadmap for Better Living.

(a) Comprehensive amenities and transportation system

Punggol will continue to be comprehensively planned with amenities and well served by MRT, with good connectivity via roads and an extensive cycling network. The North-East MRT line will be extended with the addition of a station to serve the new Punggol Digital District and the Singapore Institute of Technology.

⁵ Joint Media Release by LTA and MOT: Autonomous vehicles to transform intra-town travel by 2022, 22 Nov 2017.

(b) Signature Housing Districts

Punggol residents can look forward to seven different waterfront housing districts – Waterway East and Waterway West, Northshore, Matilda, Punggol Point, Crescent and Canal Districts. Each district will have its own distinct character, shaped by urban design and new housing typologies.

Integrated green and blue elements will be weaved into Punggol. These include linear green corridors, town parks and waterfront promenades. Punggol Waterway is a man-made waterway which linked up two reservoirs, and have since become a key signature leisure facility in the town.

My Waterway@Punggol, Punggol Waterway Park, and sports and recreational facilities, such as SAFRA Punggol clubhouse and the upcoming Punggol Regional Sports Centre, will form the 'Green Heart' of Punggol. Pedestrian and cycling connectivity provided by 'Green Fingers' will also emanate from Punggol's 'Green Heart' towards the coastal promenade and Coney Island. One of the main 'Green Fingers' is the Old Punggol Road, which will be pedestrianised and established as a linear landscaped heritage trail, retaining the memory of the connection to the seafront at Punggol Point. This heritage road also runs through the Punggol Digital District and the Singapore Institute of Technology, serving as a linear heritage trail from the heart of town towards the old Punggol water front.

Working with other agencies and institutes of higher learning, HDB is developing a Biodiversity Index for its estates. Further research will help HDB to draw up a Biophilic Masterplan for Punggol, with a focus on urban greenery, harmonious eco-systems and greater biodiversity.

Urban design guidelines were set out to guide developments in the various districts. For example, developments along the entire stretch of Punggol Waterway were guided by three different themes (urban, undulating and rustic) with differing built forms (terraced, courtyard and contrasting). The end result is the creation of an interesting, changing visual experience as we traverse the waterway.

Case Two: Tengah – An Evergreen Forest Town

HDB's newest town at Tengah falls within a larger biodiversity corridor between the Western Catchment Area to the Central Catchment Area. Working with NParks, HDB formulated a master plan with a 100m-wide forest belt to safeguard this biodiversity corridor and to connect the green spaces within the town. The Forest theme will be experienced throughout the town. A huge central green lung – the Central Park – will be the green centre of Tengah. Even as Tengah is developed, some of the natural features like the topography and vegetation will be retained. Two storm water collection ponds will be designed to blend in with the landscape as water features and ponds.

Within the neighbourhoods, linear Community Farmways will be safeguarded for urban farming by the community and perhaps other interested groups, such as social enterprises. These community spaces could encourage residents to bond over shared activities.

A grid road network has been planned to serve Tengah. All the roads that are Dual-2 or wider will have dedicated bus lanes. Transit and mobility corridors will also be safeguarded throughout the town. These corridors include the rail network, bus-priority network and possible future forms of mobility such as Autonomous Vehicles (AV) or other personal mobility devices (PMD).

Tengah Town will feature the first car-free town centre in an effort to move towards a car-lite, greener and people-friendly environment. All the roads in Tengah will have dedicated walking and cycling paths on both sides of the road.

2) Designing an Environment for All Ages

Today, HDB already adopts universal design principles – to ensure that the built environment is usable and accessible to everyone, regardless of age and physical ability. All new flats come with no steps, toilets that can accommodate a wheelchair, and rocker switches which are suitable for the elderly. All existing towns have been retrofitted with ramps to facilitate wheelchair mobility. Through the Lift Upgrading Programme, the majority of flats have access to a lift on every floor.

HDB has actively looked into special housing typologies that are more tailored to elderly needs. Today, a range of housing choices are available for our elderly. For the elderly who would like to live with their families for mutual care and support, we have introduced the 3-Generation flat which has four bedrooms, two of which are en-suites, so that more people could be accommodated in the home.

For seniors who prefer to live independently, HDB implemented the Studio Apartment (SA) Scheme in 1998 to offer customised housing for seniors who are at least 55 years old. The SAs are generally located near amenities, such as neighbourhood centres, markets and transport nodes so that our seniors enjoy easy access to services, and to encourage them to stay active in the community.

In 2015, HDB merged SAs and 2-room flats under the 2-room Flexi Scheme, a new housing option to better cater to the diverse housing needs of families, singles and elderly. For seniors,

this new scheme allows them to purchase a 2-room Flexi flat with flexibility in the choice of lease of between 15 to 45 years in five-year increments based on their age, needs and preferences. 2-room Flexi flats are available in two sizes, 36 square metres and 45 square metres, and are fitted upfront with grab bars and optional items such as built-in kitchen cabinets and wardrobe.

HDB works closely with the Ministry of Health (MOH) to integrate social and community facilities, including senior care centres, within the HDB towns. We are also providing more 'Active Ageing Hubs' in some of the new projects, which are one-stop clubhouses for seniors with a range of activities and services, such as the one at St. George's Towers. MOH recently announced that it would be looking into assisted living for residents, supported by home care.⁶ Guided by this intention, HDB will be exploring new housing typologies with MOH.

3) Creating Synergies from Integrated Developments

HDB has been co-locating our residential blocks with smaller, compatible facilities such as precinct shops, childcare centres, active ageing hubs, and other social services. However, as integrated developments can yield greater convenience and potential synergies between mixed uses, HDB will consider building larger integrated developments where appropriate. More recently, HDB led the development of a large integrated development named Kampung Admiralty, which brings together senior housing with commercial uses, medical centre, childcare and an Active Ageing Hub (see Box story).

Going forward, there will be more opportunities to carry out integrated developments, particularly in the HDB neighbourhood centres. In 2013, HDB resumed the development of six

⁶ Source: *The Sunday Times*, 28 Jan 2018.

neighbourhood centres to better serve residents. These are Oasis Terraces, Buangkok Square, Canberra Plaza, Northshore Plaza, Hougang RiverCourt, and Anchorvale Village..

More will be developed in some of the newer areas in Tengah and Tampines North. We are taking this opportunity to introduce a new generation of neighbourhood centres characterised by the following principles:

- a) Co-location of multiple facilities – where feasible, HDB would integrate clusters of shops with other facilities such as medical facilities/ polyclinics, child care centres, community centres and elderly care facilities. Not only will these developments provide more varied uses for convenience, they optimise the use of land by co-locating multiple uses together. There are also opportunities to carry out cross-programming among the different facilities. At Kampung Admiralty, popular health talks, cookout sessions, and exercise programmes are held at the Community Plaza, residents are served by a medical centre and healthier food choices are available at the hawker centre.
- b) Public spaces will be provided within the integrated development to provide convenient and well-designed public spaces for the community to carry out their activities and to hang out with family and friends;
- c) Greater focus will be placed on community-centric design to create more unique developments.
- d) Inputs can be gathered from residents to help curate the tenant mix.

An upcoming neighbourhood centre that will be completed soon in 2018 is Oasis Terraces, next to the Punggol Waterway. Facilities such as shops and F&B outlets are co-located with

a polyclinic. A unique feature is the roof garden which terraces down towards Punggol Waterway. A well designed, high volume Civic Plaza will be an attractive public space for holding community activities. The food court and restaurants can be encouraged to tie up with the rooftop community farmers, to hold cross-programming events such as farmers' markets, and to cook and sell the community farmers' produce. With synergy from co-locator Punggol Polyclinic, health and wellness events such as Health Fairs, Zumba and Yoga can be organised at the large community plaza.

Kampung Admiralty Integrated Development

Kampung Admiralty is conceived as a 'modern kampong' which integrates a wide range of residential, social, healthcare, communal, commercial and retail facilities all under one roof.

These facilities include:

- **Two blocks of housing** offering about 100 studio apartments fitted with elderly-friendly features to facilitate independent and active living for seniors aged 55 years and above.
- A two-storey **Admiralty Medical Centre** (8,500 square metres), which is a one-stop diagnostic and treatment centre that brings specialist care closer to the community.
- An **Active Ageing Hub** (about 1,350 square metres) that provides active ageing programmes, such as preventive health and senior learning opportunities, along with centre-based and home care services for frail seniors.
- A **Childcare Centre** (about 1,000 square metres) that can cater for an estimated 200 childcare places.
- Dining and shopping facilities such as a **Hawker Centre** offering healthier dining options and **18 shops and F&B outlets** including a **bank** and a **supermarket**.
- A fully sheltered **Community Plaza** that serves as a gathering point for residents.

- A **Community Park and Community Garden** that also serves as a roof garden to create new leisure space. It is designed for residents to exercise and to encourage neighbourly interactions through community gardening.

The entire design facilitates interaction between residents and also among different age groups. Organised programmes, including a range of community health and education programmes by Yishun Health Campus will encourage residents to stay healthy.

THRUST 2: COMMUNITY- CENTRIC TOWNS

Greater community centric focus

Beyond being just a provider of homes, HDB also builds active and cohesive communities anchored on the three pillars of 'software, hardware and heartware'.

Software – To foster social cohesion, the Ethnic Integration Policy (EIP) has been a key policy pillar on which we have managed to maintain a good ethnic mix in HDB estates for racial integration and harmony. In recent years, we have introduced the Singapore Permanent Resident (SPR) Quota which was layered over the EIP to facilitate better integration of SPR households in public housing estates.

Hardware – With the community in mind, HDB plans and designs shared spaces and facilities such as civic plazas, void decks and community living rooms, common green spaces and even 3-generation playgrounds to encourage the mixing of different age groups. In addition, we have different flat types for each precinct and block to encourage a more socially inclusive environment.

HDB estates host a wealth of spaces where residents get to meet their neighbours incidentally (i.e. unplanned) and convivially (i.e. planned). In a HDB-NUS study in 2014,⁷ it was found that HDB lift lobbies and void decks are conducive spaces for interaction, followed by coffee shops and retail shops. There was positive correlation between amenities usage and a sense of attachment and belonging.

Therefore, well-planned and designed spaces and amenities are critical, as residents who reported a higher level of amenities usage also reported a higher sense of attachment and belonging to their community. In the design of its new generation towns, HDB has increased the provision of more social and communal places to encourage interaction. These include large town plazas for larger group activities, various roof and sky rise gardens and community living rooms for smaller groups of residents.

A new generation of playgrounds to inspire imagination and exploration

Playgrounds are also an important social space in HDB estates. They play a significant role in bringing families and the community together. From the mid-1970s to early 1980s, playgrounds took on identifiable forms such as dragons and fruits.

Playgrounds in the early 1990s feature more proprietary play equipment. 3-Generation playgrounds were introduced to bring together the young who play there and the older folk who exercise while looking after their children or grandchildren.

HDB has embarked on a new generation of thematic playgrounds in new housing estates. We believe that this will strengthen the town identity and enhance the play experience. As playgrounds are popular gathering points, they can help neighbours and families to develop

⁷ HDB/NUS Study on “Impact of Built Environment on Community Bonding”. Community Building Seminar slides (21 May 2014), Survey of 2,200 households.

closer bonds. For example, Keat Hong estate has a military-themed playground cluster, marking the area's history as a former military camp.

Heartware – The Heartware, comprising people and community, is what makes a town and place endearing to its residents. In the past five years, HDB has stepped up community-building efforts by organising activities such as Welcome Parties and HDB's Good Neighbours Awards.⁸

Citizen Engagement

Based on HDB's Sample Household Survey 2013, some 98% of the residents gave feedback that they feel a sense of belonging to their town. More than 85% of residents interacted with neighbours of other ethnic groups and nationalities. There is also increasing participation in community activities.

HDB continues to build on these positive trends by encouraging more citizen participation. We would like our residents to play an active role in shaping their environment and to take greater ownership in caring for their town and to contribute to building up their community. HDB therefore has many programmes to encourage greater citizen participation.

First, HDB works to nurture **change makers**. They help to promote the spirit of neighbourliness and eco-friendly living in the HDB estates. For example, we have 'ambassadors' comprising students from schools and retirees who volunteer and help spread the eco-living messages to residents. Some of our volunteers may also initiate activities that add liveliness to places like civic plazas, and foster care and neighbourly relations through organised activities. Other volunteers facilitate community conversations to build consensus on local development and rejuvenation plans. For example, our resident volunteers and student facilitators from the tertiary institutions help to lead focus group sessions with our residents on how to improve their living environment.

⁸ Source: HDB/NUS Study on "Impact of Built Environment on Community Bonding" Community Building Seminar (21 May 2014).

Residents are often invited to help co-create places in their estates. One interesting project was the development of a 'Social Linkway' along a pedestrian corridor at Tampines that was very well used by residents as it leads to their neighbourhood centre. Pop-up stations were set up along the corridor to gather ideas and inputs from residents who were making their way to the neighbourhood centre. Not only did the residents contribute ideas, they helped to implement several interesting activity nodes – one was for a neighbourhood incubator and others for play and learning. There is also an art link with artwork and murals contributed by the residents themselves.

To support ground-up ideas, HDB introduced a 'Friendly Faces, Lively Places Fund' in 2017. Residents are encouraged to draw on this fund to organise events together with their neighbours and the community. Last year, we launched the 'Build a Playground' project to involve the residents and their families in designing and building a playground in their estate. As very positive feedback was received from the first successful playground project built by the community at Canberra, more of such projects will be launched as part of HDB's Remaking Our Heartlands programme. HDB has also started to deploy Virtual Reality to help residents to better appreciate visually the community spaces that they are designing.

HDB also makes a point to consult the public on its plans. Numerous focus group discussions and exhibitions are held to gather ideas and suggestions for many of our plans before they are formulated or finalised.

THRUST 3: SUSTAINABLE AND SMART TOWNS

Greater Sustainability

As the largest housing developer in Singapore, HDB will play its part as a responsible developer to build sustainable towns. In 2011, HDB drew up a holistic and comprehensive Sustainable Development Framework to steer the development of HDB towns.

This framework sets out 10 key desired sustainability outcomes with clear strategies and KPIs, which are fully aligned with the national Sustainable Singapore Blueprint. Social sustainability aims to encourage greater inclusiveness and social integration. Economic sustainability strategies focus on creating economic vibrancy and business diversity through the provision

of innovative commercial facilities within the towns. Environmental sustainability strategies are wide-ranging and include reducing carbon emissions, optimising the use of resources and achieving effective energy, water and waste management. These will provide a clean, safe, healthy and comfortable living environment for our residents. Active research is being carried out by HDB in multiple areas on sustainability initiatives.

Various sustainability initiatives have already been adopted for Punggol town. These include extensive greenery to reduce heat build-up, LED lighting and elevator energy regenerative system in lifts to save energy, solar PV panels to generate renewable energy, centralised chutes for recyclables to increase recycling rates and rain water harvesting and water sensitive urban design features to manage storm water. Many of these initiatives were successfully tested in Punggol town and are now being rolled out to other new areas and new projects.

Enhancing Resilience

Mean sea level rise, particularly where it coincides with high tides, presents a risk of coastal inundation of buildings, infrastructure and assets. Various coastal adaptation measures are already being studied by multiple agencies, such as permanent and demountable floodwalls, earth bunds, and flood gates with pumping stations. Not many people are aware that HDB is one of the largest reclamation agencies in Singapore, having reclaimed much of the land in Singapore. HDB would raise the minimum platform levels of reclaimed land to PUB's prevailing codes to anticipate future sea level rise.

To cater to a rise in annual total rainfall, HDB has updated its design requirements to cater for this and reviewed its drainage requirements for all new projects. HDB is also building up a deeper understanding of climate change issues. For example, it is carrying out research in the use of Urban Water Modelling to simulate water flow and flooding in typical and extreme

rainfall conditions so that we can better optimise our water sensitive urban design, and detention and retention features to mitigate flood risks.

The Smart HDB Town

In line with Singapore's aspirations to become a Smart Nation, HDB will tap on significant innovations in Information and Communications Technology (ICT) to develop smarter HDB towns – making them more liveable, efficient, sustainable and safe. HDB plays a key role in developing smart applications nationally under the **Home and Environment** domain. To guide the deployment of smart initiatives, we established the **Smart Town Framework** which comprises two layers:

- **Enabling Infrastructure layer** – This includes the sensing layer (cameras, sensors, Internet of Things (IoT), etc.), connectivity and transmission of data, and collection of data to enable big data analytics.
- **Applications and Services layer** – This includes the applications introduced to serve residents better, and improve the planning, operations and maintenance of HDB towns. These services are grouped under five key dimensions as explained below.

(a) Smart Planning

Increasingly, HDB is using sophisticated state-of-the-art computer simulations and data analytics to improve the way we design and plan our towns, precincts and buildings. Collaborating with other agencies such as National Research Foundation (NRF), Singapore Land Authority (SLA) and the Urban Redevelopment Authority (URA), a 3-dimensional city model called Virtual Singapore has been developed which enables HDB to carry out applications like environmental modelling. Using various computer models, the effects of sun, wind and noise can be simulated virtually so that we can improve our plans before actual

development. For example, we could improve the placement and orientation of buildings to channel wind flow through the town to create a cooling effect and to improve air quality. More greenery could also be introduced at hot spots to reduce heat build-up.⁹

(b) Smart Environment

HDB is leveraging sensors to capture real time information about the environment, such as temperature and humidity. Environmental data collected can be used to validate environmental models and carry out proactive upgrading of infrastructure in response to changing weather conditions in order to create a more pleasant environment for residents.

c) Smart Estate

Using ICT, we can monitor various estate services such as lighting, pumps, solar panels and lifts to better manage the services within the town. HDB has developed a Smart Hub which will serve as a central repository of information received from these sensors, so that data analytics can be carried out to improve the performance and reliability of these services. With artificial intelligence, predictive studies can also be carried out. Such data analytics could facilitate pro-active detection and intervention to minimise disruption to services.

HDB is also looking into the use of drone technology for façade inspections. Working with the Town Councils, it will enable timely repairs to be made.

d) Smart Living

⁹ Examples of modelling tools include **Planning, Analysis and Exploration Tool (PLANet)**, HDB's map-centric application which integrates geo-spatial and textual data for town planning and analysis. The **Integrated Environmental Modeller (IEM)** can simulate the combined effects of wind flow, temperature fluctuations and solar irradiance on each other, as well on the surrounding urban landscape. HDB's **City Application Visual Interface (CAVI)** can assess the trade-offs among proposed sustainable features in HDB towns; and propose the **most cost effective combination** of solutions to achieve the desired sustainability targets.

HDB is building 'smart-enabled' homes in our test beds so that residents can benefit from the various smart home applications provided by commercial companies. Such applications include the Elderly Monitoring and Utility Management Systems.

e) Smart Community

With the collection of data and opinion surveys on demographics, social trends, and lifestyle preferences, HDB would be able to better understand residents' needs and preferences. Suitable applications can be developed to bring communities closer together and empower residents to take greater ownership of their environment, such as in the way common spaces are designed. Data can also be used to nudge residents with gamification tools to help promote eco living lifestyles.

HDB is mindful that its research cannot be limited to only technology and engineering solutions. To have a better understanding of societal needs and human behaviour, its research would include social and behavioural studies, which can then better inform HDB of its policy and spatial solutions. Hence, HDB has recently linked up with the Singapore University of Technology and Design (SUTD) to carry out an extensive research programme called the **New Urban Kampung Programme**. The findings from this research programme will help to steer HDB in its planning and design of the HDB towns.

Using a combination of data from traditional surveys, from sensor networks placed around the estate and through engaging the community on and offline, we can better understand our resident's preferences and formulate more targeted improvements in our towns. For example, residents may now place thermal comfort, access to amenities and urban greenery at higher priority. HDB's designs should take these preferences into consideration. Sensors that identify patterns of movement can help HDB to identify under-utilised spaces and to fine-tune the

design of these spaces to encourage higher usage. The design of void decks can hence be improved to foster interaction.

Living Laboratories

HDB has identified four Living laboratories to test bed our various innovations and smart ideas. These include existing estates at Yuhua and Teck Ghee and greenfield sites at Punggol and Tengah. Existing estates with live-in residents allows for immediate test-bedding and real time feedback from residents. This enables improvements to urban solutions and applications before these solutions are rolled out on a wider scale to other existing HDB estates/ towns in Singapore.

'Age proofing' older towns

Even as we develop a new generation of public housing, HDB has continued to upgrade our older towns/estates to keep them functional and pleasant to live in. HDB therefore has been 'age-proofing' its towns and flats since the 1990s through multiple upgrading programmes. These programmes focus on both the external areas and the interior of the flats and have benefitted thousands of units. These include:

1) **Main Upgrading Programme (MUP)** (1990 – 2007) –The MUP aimed to upgrade the living environment by providing improvements at the precinct, block and flat levels. The improvements included covered linkways, drop-off porches, fitness corners, residents' corners, toilet upgrading, etc.

2) **Interim Upgrading Programme (IUP)** (1993 - 2001) benefitting flats built between 1981 to 1986 – improvements were made to the blocks and precincts.

- 3) **Lift Upgrading Programme (LUP)** (introduced in 2001) – existing lifts are upgraded to provide direct lift access on every floor where feasible.

- 4) **Interim Upgrading Programme Plus** (2002 - 2006) – it combined the IUP and LUP programmes so that flat owners did not have to wait for the two separate programmes.

- 5) **Barrier-Free Estate Upgrading** (introduced in 2006) – This programme provided barrier-free routes within HDB estates, including the provision of ramps.

- 6) **Home Improvement Programme (HIP)** (introduced in 2007) – this programme focuses on the interior of the flats and addresses common maintenance problems in ageing flats in a systematic and comprehensive manner.

- 7) **Neighbourhood Renewal Programme (NRP)** (introduced in 2007) – Fully funded by the Government, this programme focuses on precinct and block improvements such as covered linkways, drop-off porches, playgrounds and fitness corners. It involves the active engagement of residents on the improvements to be provided.

- 8) **Selective En Bloc Redevelopment (SERS)** (launched in 1995) – selected old blocks are redeveloped en-bloc to optimise land use. Residents in these blocks are given the opportunity to buy new flats at subsidised prices and move to a better living environment served by modern facilities.

- 9) **Enhancement for Active Seniors (EASE)** (from 2012) – This programme provides improvement items that enhance the safety and comfort of seniors living in HDB flats to facilitate ageing-in-place. The items include the installation of grab bars, ramps which mitigate steps and slip resistant treatment to floor tiles in the toilets. The EASE programme is part of the Home Improvement Programme (HIP), but can also be offered through direct application if there is a need.

10) **HDB Green Print** – This is a programme which introduces sustainability initiatives to existing towns. These include initiatives that save energy (using LED lights, solar panels), save water (using a rainwater harvesting system) and improve waste management (with a pneumatic waste conveyance system). Vertical greenery is also introduced to reduce the urban heat island effect and cycling paths and bicycle racks are added to encourage greener commute. Yuhua and Teck Ghee were selected as the pilot projects.

11) **Revitalisation Of Shops (ROS)** – HDB works with shop owners and its own tenants to encourage the rejuvenation of the retail shops. This is done by co-funding the upgrading of the shopping environment and organising promotional activities, incentivising the renovation of the shops and providing a start-up fund for the formation of the Merchants' Association.

12) Remaking Our Heartland (ROH) – Blueprint for Renewal

To renew the HDB Heartlands in a more extensive and comprehensive way, HDB also launched the Remaking Our Heartland (ROH) programme in 2007. Extensive improvements are made to the towns. These could include the redevelopment and upgrading of existing town and neighbourhood centres, the injection of new developments, upgrading of parks and playgrounds, introduction of a cycling network, etc. Thus far, we have launched three ROHs benefitting nine towns:

ROH 1 – Dawson, Yishun and Punggol;

ROH 2 – Hougang, East Coast and Jurong Lake area;

ROH 3 – Toa Payoh, Pasir Ris and Woodlands.

For ROH 3, the plans were developed from ground-up as planners engaged the public through focus groups so that our residents can help to co-create the plan.

Conclusion

Our HDB towns will continue to be at the heart of Singapore living. HDB has a huge task to develop and maintain an environment that will enable our people to live comfortably and to build families and friendships. Planners and architects will need to draw on their creativity and resourcefulness to develop liveable environments within available land and resources. HDB will also look to technology to set the stage for new urban solutions.

Today, in partnership with communities and residents, HDB is developing many exciting plans for our estates. We know that HDB estates are not only about the physical buildings and

infrastructure. Our plans are only fully realised when they become homes for our communities and families. Our residents therefore play a very important role as they have a great impact on the living environment too. They greatly influence the towns and neighbourhoods through their civic actions and consideration for neighbours, and their sense of ownership by caring for both their home and the surrounding environs. HDB needs a strong partnership with Singaporeans to build a good home together.

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