CHAPTER 2

Planning & Urbanisation in Singapore: A 50-Year Journey

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Introduction

This year we celebrate the 50th anniversary of our nationhood. In a relatively short span of time, we have transformed from a backward British colony into a modern metropolis. While we are officially 50 years old, our urban upgrading work actually began five years earlier, in 1960. By 1985—within a time span of 25 years, or one generation—the basic groundwork of this transformation was by and large complete. Several key signs of progress had already emerged. All squatters were gone, our city was seen as clean and green, with flowing traffic and universal supply of water, electricity and gas. As pollution control was introduced almost from Day One, the overall quality of environment met world standards, and every citizen or permanent resident had a roof over his or her head. On top of that, our education system had greatly improved. Not surprisingly, our GDP multiplied 20 folds. Fast-forward to this day, our GDP per capita is slightly higher than that of the United States. The Singapore Story gradually attracted attention from around the world, first from other Asian cities, then the Middle East and more recently Eastern Europe, Africa, South America, and even developed nations.

Our achievements can be summed up in three words: Speed, Quantity and Quality. Like many other cities, we wanted the transformation to be fast, the extent to be broad so as to benefit as many people as possible, and the quality to be world-class. While these achievements are often credited to planners, architects, engineers and other professionals, in reality, our success is due more to the close collaboration between political leaders and professionals in a manner often referred to as Whole of Government, and indeed Whole of Society.

When a government passes regulations and legislations and where the results are not entirely satisfactory, it is sometimes feasible to make adjustments along the way. However, I can think of three areas which are rather intolerant of mistakes. First, if education policies were unsound, an entire generation of young people would lose

their precious youth, which is impossible to recover. Second, if ecology was damaged, it would be gone forever. Third, if the built environment had been poorly planned and developed, it would be extremely costly to modify massive concrete and steel structures, when mistakes are discovered some 20 or more years later. Yet, despite the gravity of this situation, urban decision makers can get away with giving subjective or experimental directions. For, by the time mistakes surface decades later, they would have either been promoted or moved on, and can no longer be held accountable for their actions. Fortunately in Singapore, we have managed this problem with extreme care, and therefore experience few regrets. On the occasion of our 50th anniversary, I look back at our carefully calibrated hard work indeed in great wonder and feel compelled to write about how we had done it.

Close and Compatible Collaboration

In the area of planning and urban development, the manner of collaboration between political leaders and professionals can be described in Figure 1.

To begin with, (Fig. 1, Step 1) our planning ideas came from two main sources, the first being problems that had already emerged and require urgent attention, and the second being potential problems anticipated by political leaders who went the extra mile, taking early action to nip them in the bud before they surfaced. In both cases, the Whole of Government characteristically never failed to face hard truths, looking at real causes rather than at superficial symptoms. Parallel to problem spotting, our political leaders meticulously took time to observe the strengths and weaknesses of urban strategies, asking serious questions about urban issues while studying and learning from the successful experiences of other cities. This approach required time and effort, especially when pains were taken to adapt findings to our local conditions. However, though tedious, it proved much more rewarding than simply copying seductive images from other cities, as it enabled us to explore new solutions and ultimately contribute to the world's body of knowledge on urban planning.

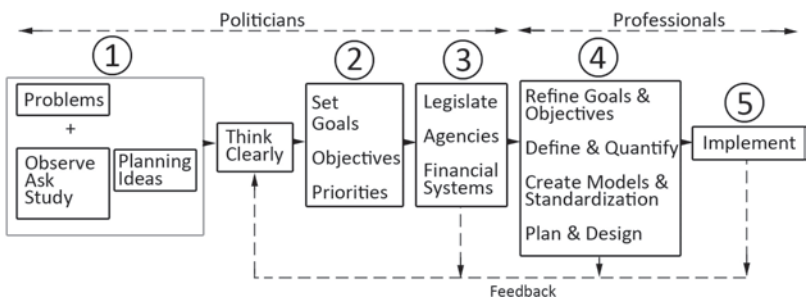

Figure 1. Culture of governance.

Source: Author.

Critical for a good start, ideas alone do not assure solutions. The next step was to think through the ideas carefully and clearly in order to set effective goals, objectives and priorities (Fig. 1, Step 2). For example, the key problem encountered in the 1960s was that out of 1.6 million citizens, about 1.15 million lived in squatter settlements. If Singapore was to become a world-class liveable city, it was necessary to move these squatters into decent housing. Given the large population size, low income and relatively high land price, the only way to meet this goal was to have a massive public housing programme, subsidized by the Government. The Housing and Development Board (HDB) was thus formed on a high priority basis in 1960, even though the entire construction industry then could barely cope with work of such a scale.

In this context, many who had worked closely with the late Mr. Lee Kuan Yew appreciate the fact that he was a worrier. He worried about problems long before they surfaced, and proceeded to find ways to tackle them way before they became serious. For example, in as early as the 1970s, glass curtain walls on high-rise buildings became popular, but heat transmitted through the glass panels into interior spaces required additional energy to cool down. At the same time, the heat reflected off the glass surface raised the temperature of the surrounding environment. To address these concerns, the Overall Thermal Transmission Value (OTTV) of curtain walls was introduced. This mandatory requirement took place well before the world raised the alarm on $C0_2$ emission or urban heat islands.

Parallel to solving fundamental urban issues, Mr. Lee and his colleagues were also eager to transform the image of the city in the shortest possible time. To this end, they put in place several quick-fix measures which proved highly effective. For one, they pushed for the Garden City concept through systematic tree planting and ground turfing, including on wastelands and brown fields. In Mr. Lee's own words, this was the cheapest and most effective way to transform the look of a city. At around the same time, a Walkway Committee was set up to improve all footpaths, making them comfortable for walking. Again, this idea appears to be ahead of its time, before 'Walkability' attracted world attention. On another front, a car parking standard was introduced for every new building, while a small number of common garages were built to address car parking needs of older buildings. This way, roadside parking mostly disappeared. Subsequently, by around the late 1970s, five-yearly repainting became a requirement for every building. Within a few years, dirty looking facades became a thing of the past. Thus, the image of Singapore improved dramatically without the aid of iconic architecture.

Having set clear goals, objectives and priorities, the government, almost without fail, proceeded to pass legislation and set up dedicated agencies responsible for the delivery of the various tasks, while providing financial and manpower support (Fig. 1, Step 3). Regarding legislation, both the Land Acquisition Act and the Resettlement Act had been critical in enabling the government to compulsorily acquire land for specified public

purposes, thereby successfully resettling squatters into flats, shops or factories developed by HDB. Although many cities do have these acts enacted, the Singapore government had been able to use them quite widely and effectively for the purpose of urban regeneration. This was possible by virtue of the fact that the government had been highly disciplined in using the land so acquired strictly for the stated purposes, besides ensuring that squatters were compensated fairly, thus earning the trust of citizens. This hard earned trust proved critical for our successful long-term redevelopment efforts.

In addition, the authority of the plan is crucial for its eventual execution. In Singapore, there is only one Master Plan, not several, as seen in some cities. There is also only one planning authority, the Urban Redevelopment Authority (URA), which has the clear mandate to require all development proposals, whether public or private, to comply with the Master Plan and its relevant detailed plans, rules and regulations. This effective arrangement, though often taken for granted by Singaporeans, has ensured a well-coordinated urban system, and therefore a functional and orderly city. Besides, given such an authority, pressure is exerted on politicians and planners to ensure that all plans and regulations introduced are fair, beneficial and highly credible to the people so affected. The Singapore Concept Plan or Master Plan must therefore be, and indeed was, carefully and Intelligently thought through.

With regard to the provision of financial and manpower resources to public agencies, it is noteworthy that every government proposal was put through a careful evaluation process, so as to ensure that it would be well used, especially where subsidies had been required. Clear priority was set to implement government plans on a just-in-time, just-in-need basis, minimizing wasteful investment. A virtuous cycle of funds thus became possible, enabling the government to embark on other new projects.

Next, it was up to the professionals to deliver their assigned responsibilities (Fig. 1, Step 4). We were given reasonable opportunity and time to refine and even to counter suggest goals and objectives to our political leaders. In the 1960s and 1970s, the professionals, myself included, were young and inexperienced. Hence, extensive research was required before we embarked on a planning assignment. For example, in the area of New Town planning, my colleagues and I spent several years conducting on-the-ground research and interviews while exploring written sources. This enabled us to gain a better grip on definitions, scales, dimensions and land use mix for New Towns, neighbourhoods, precincts, town centres, and so on. Various prototypes were thus created. Later, when I became the Chief Planner of URA, we repeated the same process, this time encompassing the entire island. At that time, the government wisely saw the need for the standardisation of urban components, thus came guidelines for tree planting and road sections across categories, to name but two examples. Both prototyping and standardisation were effective ways to ensure quality control when carrying out our tasks. Working under these circumstances, our planners, architects and engineers were better assured of creating a city both functional and beautiful.

While strong government support is important, planning as a profession also requires solid skills. Unfortunately, the importance of solid skills is often underrated or unappreciated in many parts of the world. As a master plan essentially consists of a few lines and colour patches on a flimsy piece of paper, it tends to suggest that anyone can do the job. As a result, architects or landscape architects, rather than planners, have been called upon to produce so-called master plans. This would hardly be conceivable in the medical field. If we liken a planner to an urban doctor, such a doctor would have spent years acquiring skills and knowledge which enable him to bring a sick city back to health. Nobody would think of asking a dentist to operate on his eyes or a chiropractor to extract his teeth, and no patient would think of dictating the diagnosis to a doctor. Yet, planners are often told what to draw. While the plan may seem innocent, its content would eventually be converted into nearly indestructible concrete and steel. When unsound decisions have been made and damage done, it would be very costly to rectify. To reinforce this point, I predict that there would always be two types of cities, one in which cars are driven on the right-hand side of the road, and the other with cars driven on the left. To convert either system to the other requires massive demolition of concrete and steel structures, which is simply unthinkable.

During the years when I was in the civil service, Singapore's government took urban planning matters very seriously and thus circumvented unfortunate errors. Politicians set clear directions and let the professionals work out solutions. In return, the professionals were expected to deliver their tasks at world standards. With a high degree of self-discipline, politicians respected the professionalism of planning, avoiding intervention on technical matters. Conversely, as professionals, we had sharpened our skills to become confident enough to stand firm on sound principles in the interest of the state. Therefore I often tell our overseas visitors that in Singapore, the highest authority of the land is not the Prime Minister, nor the President, but the Truth. Even the President or Prime Minister would bow to the Truth, so that the best ideas would triumph for the benefit of the country.

With the plans ready, the next task was to devise methods for implementation (Fig. 1, Step 5). This will be elaborated upon later when we discuss Figure 4.

The Four Main Objectives of Urbanisation

The four main interconnected objectives of Singapore's urbanisation are: to look after the Basic Needs of People; through infrastructure projects to maximise the Function of Land; to ensure Land Sustainability; and to Enhance Liveability. There is a strong complementary relationship between the construction of the physical environment (hardware) and the creation of supporting policies (software) in the formation of a city.

1. *Basic Needs of People*

City planning, especially for a small city-state like Singapore with limited land, requires both foresight and continuity. Thus the Concept Plan of Singapore is a legal blueprint for land use allocation and infrastructure development, which is never discarded but reviewed periodically and updated every 10 years.

Singapore's first Concept Plan was put together with the help of the United Nations Development Programme (UNDP) in 1971 for an estimated population of 3.4 million by the year 1992. A key strategic feature of this plan is the system of four urban corridors, with the inner two encircling the central catchment area and outer two extending to the city's east and west along the southern coast line. Along these corridors, high-density satellite towns were earmarked, mainly for the development of public housing. These towns were to be linked by Mass Rapid Transit lines (MRT), complemented by a comprehensive network of expressways.

However, Singapore's population had grown much faster than anticipated, reaching 2.9 million by 1982, thus necessitating an update of the 1971 Concept Plan. Between 1985 and 1989, quantitative studies were carried out by all ministries in order to estimate the population size, urban land required for development and the floor area needed for respective activities of all residents in our city. This heroic effort provided a solid quantitative basis for the preparation of the 1991 Concept Plan (Figure 2) for a projected population size of 5.5 million by year X, approximately 100 years later, to ensure a liveable environment for the future.

The aim of the 1991 Concept Plan was to alleviate congestion in the city core through decentralization, which requires the creation of a hierarchy of urban centres outside the central area. In the plan, the island-city was carved into five regions– Central, West, North, North-East and East. Each region was to accommodate around a million or more inhabitants, and was further subdivided into several highly self-sufficient New Towns featuring a mix of high, medium, and low density housing forms. Besides the Central Business District (CBD), the areas identified to become regional centres were Jurong East, Woodlands, Nee Soon and Tampines. To further decentralize, the plan also identified several sub-regional centres, namely Buona Vista, Bishan, Serangoon, Paya Lebar, and Marine Parade. Moreover, along the fringe of the CBD, a number of "fringe centres" were introduced to complement and enhance its functions. These include the Singapore River, Outram, Newton, Novena, Lavender and Orchard. Besides commercial centres, industrial developments were also hierarchically dispersed across the island, with light industries strategically located near homes for easy commute to and from work. Also, under the 'Green and Blue Plan', a framework was introduced to safeguard nature reserves while enhancing leisure opportunities through the creation of a comprehensive system of open spaces and waterways.

It must be noted that the Concept Plan was enhanced by a series of extremely sound decisions made by the government regarding the location of major installations. A good example would be the location of petro-chemical plants on Jurong Island, a

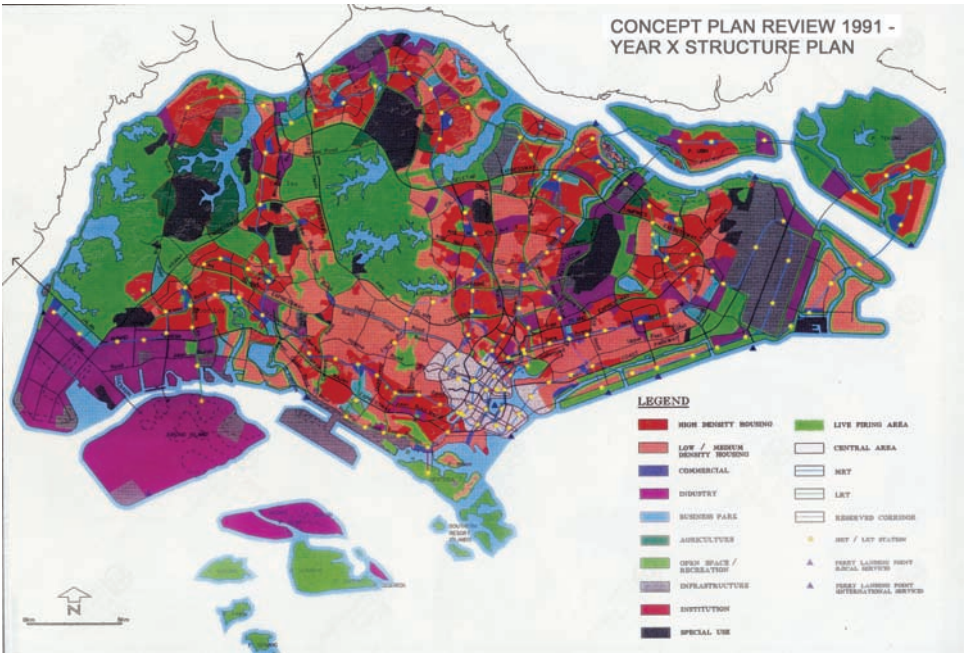

Figure 2. 1991 Concept plan.
Source: Urban Redevelopment Authority.

safe distance from heavily populated areas. Military training grounds, as another example, serve not only defense purposes but also conserve large tracts of tropical jungle. While the Central Catchment Area located in the middle of the Island was the choice of the British Colonial Government, the Singapore Government later expanded it northwards for better assurance of water supply. Moving further East, in the interest of spatial allowance for long-term expansion, Paya Lebar Airport was moved to Changi, at the extreme East of the Island. In so doing, the built-up area affected by noise disturbance and height restriction was minimized. These decisions, taken together, contributed to making Singapore a city where everything functions well with minimal disruption to daily life.

Under these circumstances, the 1991 Concept Plan was able to achieve its vision of 'A Tropical City Of Excellence', defined as "a city within an island which balances work and play, culture and commerce; a city of beauty, character and grace, with nature, water bodies and urban development weaved together".

To effectively cascade these macro visions and goals to the micro level, a total of 55 planning areas were carved out and their respective detailed local plans, called Development Guide Plans (DGPs), were prepared over a five-year period between 1993 and 1998. Data of every land plot was obtained to ensure that the final plans would be both forward looking and fair to private land owners. The completed DGPs were then incorporated into an Outline Plan, complete with control guidelines for

plot-specific parameters such as land use, development intensity and building height. This formed the legal base which guided decision-making on planning applications and appeals for specific development proposals.

In both the 1971 and 1991 Concept Plans, New Towns clearly played a key role as the city's basic urban building block, effectively solving the housing needs of the people while ensuring liveability of the environment. At the beginning, HDB's battle cry was 'Break the Backbone of the Housing Shortage'. By the late 1970s, when the government saw that HDB had managed to build up sufficient capability to move a large number of squatters into high-rise flats, the theme changed to 'Home Ownership for All'. By looking squarely at the desperate housing needs, the government decided that in order to house everyone, we had to make two choices that were contrary to world trends. The first was to build high-rise, high-density housing, a housing form condemned all over the western world in the 1960s and 70s because of its many associated social problems. Having made that decision, our task was to identify the problems brought about by such a housing form before proceeding to overcome them through urban planning and building design supported by human-centric rules and regulations. The second decision, made around 1964, was to build public housing for sale rather than for rent. In those days, and even today, such housing was built mainly for rent in many parts of the world. This decision was prompted by three factors: first, to encourage residents to take better care of their home environment; second, to make it worthwhile for them to upgrade their apartments as their economic positions improved; and third, to help citizens become strong stakeholders on this tiny multi-ethnic island. Through these policies, together with setting the selling prices at very affordable levels, over 90% of citizens and permanent residents own their homes today. This is clearly a world record.

To produce a good urban plan for successful urbanisation, I cannot emphasize enough the importance of "Intelligent Planning", by which I mean meticulously and rationally studying and thinking through urban issues. What happens typically is that the government of a certain city finds the will to create a good city, and then leaps straight into iconic architectural design, bypassing the fundamental planning process in between, with no careful translation of ideas into plans, and plans into built environment. This sort of hasty process, to a large extent accounts for the many poorly assembled cities that we see around us today. The more appropriate process of Intelligent Planning is shown in Figure 3. Step 1, setting a vision, includes sieving through ideas and finding the vision and needs of both the government and the people. Concurrently, the top city leaders and their planners must quantify the components of the urban plan, as shown in Step 2. They have to determine the population size of the city, its suitable density and land area. These processes have been discussed earlier.

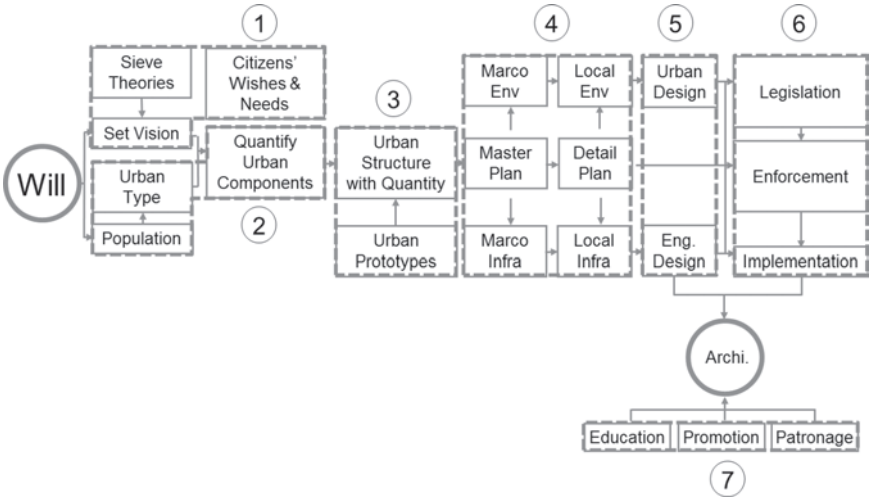

Figure 3. Intelligent planning.

Source: Author.

This brings us to Step 3 where a planner is to work out a logical urban structure for the city, guided by relevant information such as urban components (or land use), the numbers required, and the dimensions expected. Before embarking on this task, the planner will be well advised to determine for himself an ideal urban prototype as a point of reference. This is important, yet often neglected. I have, for instance, asked many experienced planners about the optimal distance between two parallel expressways. Only a very small handful had a credible answer. If we do not even know these requirements, how can we plan a city? With a workable prototype, we shall then decide on the planning approach and determine the general urban structure, taking into account the population size, density, the requisite urban components, their respective quantity and dimensions, as well as the characteristics of the terrain.

Having devised our strategies, we start formulating the Master Plan followed by Detailed Plans as shown in Step 4. As we do this, we must carefully consider and incorporate the social, economic, environmental, ecological, and other factors into the plans. Thereafter, we begin working on Step 5, urban design. At the next and final stage, Step 6, we introduce legislation to guide the enforcement of the urban plans and devise an effective implementation system for the governing authorities to ensure that every individual project complies with the requirements of the Master Plan, Detailed Plans and Urban Design Guidelines.

As shown in Table 1, it is gratifying that despite the substantial population increase and the accompanying higher population density, our urban environment has actually improved. By 1985, virtually all squatters were cleared, with 81% of the population living in public housing and the unemployment rate lowered to an

Table 1. Scale and dimension: land, population, economy. *Source*: Centre for Liveable Cities.

	Year	Units	1965	1985	2005	2014
Land	Population	Persons	**1,886,900**	**2,735,957**	**4,265,762**	**5,469,724**
	Land Area	sqkm	**581.5**	**620.5**	**696.9**	**718.3**
	Urbanized Area	sqkm	**177.4**	**298.8**	**NA**	**518**[*1] (2015)
	Density	Persons/sqkm	**3,245**	**4,409**	**6,121**	**7,615**
Population	% of Resident Population living In HDB Housing	%	**23**	**81**	**83**	**82**
	Home Ownership (Total, including HDB, private apartments, landed properties)	%	**29.4**[*2] (1970)	**58.8**[*3] (1980)	**91.1**	**90.5**
Economy	GDP	Mil USD	**974.2**	**18,554.6**	**127,402.4**	**307,859.8**
	GDP Per Capita	USD	**516**	**6,782**	**29,866**	**56,284**
	Unemployment	%	**8.9** (1966)	**4.1**	**3.1**	**2.0**

[*1] http://www.demographia.com/db-worldua.pdf
[*2] http://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/population_and_population_structure/population2014.pdf
[*3] Ibid.

acceptable level of around 4%, strongly indicating that, by and large, the basic needs of the people had been adequately met.

2. *Basic Functions of Land*

In the preparation of the Concept Plan, or each New Town Plan, the essential urban functions such as infrastructure, municipal functions, amenities and transportation system have to be simultaneously incorporated and integrated.

For our city to thrive economically, in addition to the domestic transportation system, external linkages like airports, seaports, cruise terminals and ferry terminals to nearby islands are vital. We are not just congested on land, but equally congested at sea and in the sky. We need sufficient seafront area for our port development and relatively clear skies for flight and microwave paths. These services were invariably planned for the long-term for at least two reasons. The first is to minimize any negative impact these plants or facilities may have on surrounding areas; the second to prevent the need to relocate these facilities as the city expanded into outlying areas.

In addition to creating Intelligent urban plans, it is equally important to devise an Intelligent implementation process. This was another exhausting but necessary task. As shown in Figure 4, through this process, we were more likely to create a city both functional and beautiful. We began by spelling out our vision. This was followed by creating the Master Plan, then Detailed Plans, and Urban Design Guidelines. Concurrently, we worked on the Infrastructural Master Plan and Detailed Plans to ensure that the city's infrastructure would function well, be integrated with the Land-use Plan and delivered on a timely basis. Further, as we work on urban design, engineering design should come on board too. Thereafter, we systematically passed legislation, carried out promotion, and finally, began development.

A very important contributor to our urban development process was, again, our Public Housing Policy. The ambitious construction programme comfortably met the

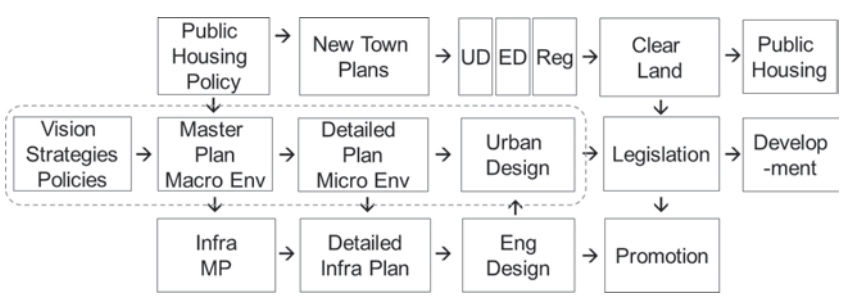

Figure 4. Intelligent implementation process.

Source: Author.

rehousing needs of squatters. Through massive resettlement, it became possible to clear large tracts of land, not just for public housing, but also for commercial, industrial and infrastructural developments.

The delivery of these tasks required the input of many governmental departments. Fortunately, all of us worked closely together. 'Silo Syndrome' was hardly known at that time. In fact, visitors to Singapore often envied this close collaborative working relationship. For instance, while infrastructural projects were designed by engineers, aesthetic sensitivity was very much required. While in the government, I worked with engineers on their designs to achieve the multiple goals of being functional, user-friendly and beautiful. In doing so, many of these engineers became and remain good friends until today.

Table 2 speaks volumes for the steady upgrading of infrastructure provision. We had managed to achieve full utility provision to every home and business premise by the time we cleared all squatters in 1985. Public transportation also continued to improve and our international transportation linkages expanded continuously to the extent that our seaport became the largest transshipment port in the world. The only unfortunate aspect is that Singapore was a slow starter in the promotion of cycling.

3. *Sustainability of Land*

While we depend on the land for various functions, we must ensure its sustainability. Singapore is often described as a city in a garden, with gardens in the city. Such an accolade does not come about without some serious planning and hard work. In the preparation of the 1991 Concept Plan, one of our first tasks was to identify all historical buildings and natural areas worthy of protection. Since the early 1990s, some 7,000 buildings have been gazetted for conservation. With regard to the conservation of nature, our Water Catchment Plan immediately comes to mind, incorporating Bukit Timah Nature Reserve, Labrador Nature Reserve, Telok Blangah Hill, Bukit Gombak Hill and Mount Faber Park.

Further, we managed to protect most, if not all, the rivers in their natural state, except where they ran through urbanized areas and embankments became necessary. As for land reclamation, in as early as the mid-1960s, long before rising sea levels became a global issue, our government decided to set the platform level of the East Coast reclamation area at eight feet above sea level at high tide. With virtual simulation, we could envision the effects of wave action on the shoreline over time. During the preparation of the 1991 Concept Plan, my colleagues and I also decided to conserve a stretch of the original beach near Changi Creek so that future generations could know and understand the appearance of Singapore's original shores. Moreover,

Table 2. Transportation, utilities.

Source: Centre for Liveable Cities.

	Year	Units	1965	1985	2005	2014
Transport-Domestic	Private Cars (excluding taxis)	No.	**104,723**	**221,279**	**432,287**	**600,176**
	MRT Lines/Length	Kilometres	**NA**	**67** (1990)	**109.4**	**154.2**
	MRT Average Daily Ridership	'000 passenger-trips	**NA**	**740** (1995)	**1,321**	**2,762**
	Bus Average Daily Ridership	'000 passenger-trips	**NA**	**3,009** (1995)	**2,779**	**3,751**
	Bicycle Path	km	**NA**	**NA**	**NA**	**230**
Transport-External	Airport: Number of Passenger Arrivals	Million passengers	**0.8**	**4.32**	**15.36**	**26.67**
	Seaport: Annual No. of TEUs handled	Million	**NA**	**1.6**	**23.2**	**33.9**
	Cruise	Thousand passengers	**NA**	**NA**	**6,526**	**6,820**
Utilities	Electricity Generation Capacity	MW	**NA**	**2,571**	**NA**	**11,283**
	Electricity Consumption	GWh	**913**	**8,821**	**35,489**	**44,923**
	Length of public sewer system	km	**561**	**1923**	**3100**	**3400**
	Domestic Water Use	Litres per day per capita	**197**	**104**	**155**	**151**

a number of islands are still kept in their original condition, namely St John's Island, Kusu Island, Pulau Tekong and Pulau Ubin.

Besides nature conservation, new parks and water catchment ponds were created all over the island. Neighbourhood parks, New Town parks and a number of Regional or Citywide parks were added. To name a few, they are East Coast Park, Bishan Park and Sungai Seletar. During the preparation of the 1991 Concept Plan, the land area of Bukit Timah Nature Reserve was increased to encompass the entire hill. While preparing the Bukit Batok New Town Plan, a disused stone quarry was converted into a park with a stone cliff and a deep-water pond. The scenery is so picturesque that it has been fondly nicknamed Little Guilin. We can also speak of a few beautiful gardens such as the historical Botanic Gardens, which first appeared during the British colonial times, as well as newer entries like the Chinese Garden, Japanese Garden, Gardens by the Bay, the Mandai Zoo and Jurong Bird Park.

The quality of the physical environment depends not just on well-conceived new urban areas or the conservation of heritage and green areas, but also on the quality of air and water. In this respect, the government started pollution control basically from Day One. Although we were extremely poor and desperately in need of foreign investment, there was an instance when a multinational corporation looked to set up a factory right in the middle of the city in the Golden Mile area. While the government badly wanted this investment, it stood firm on its principle against this choice of location. In the end, through negotiation and tax incentives, we managed to convince the investor to locate the factory in the Jurong Industrial Area. This incident, with a host of other government measures, reinforces the point that good environment does not happen without a clear understanding of important principles. The end results are very gratifying, as shown in Table 3.

Table 3. Conservation, Ecology. *Source*: Centre for Liveable Cities.

	Year	Units	1965	1985	2005	2014
Conservation	Heritage Buildings	No.	**0**	**3,200**	**NA**	**7,100**
	Total Green Coverage*[1]	%	**NA**	**35.7** (1986)	**46.5** (2007)	**42.2** (2012)
	Total Park Area*[2]	Ha	**NA**	**3,720**	**1,841.9**	**2,363**
Ecology	CO_2 emissions per capita*[3]	Metric tons	**1.34**	**12.21**	**7.12**	**4.32** (2011)

*[1] A City in a Garden, Developing Gardens—Unpublished internal document, (S:NParks).
*[2] Parks, playgrounds, open spaces, fitness corners and park connectors, excludes nature reserves.
*[3] Data from the World Bank.

4. *Liveability for People*

In addition to getting the big picture right in areas such as employment, education, housing, transport and so on, the quality of life of the people should be enhanced with excellent facilities and amenities located at convenient distances from homes. At the city scale, schools, universities, public libraries, and cultural institutions are considered high priority amenities. Over the years, these facilities have been incrementally upgraded to reach world standards. Our new National Gallery is now able to permanently exhibit works of Singaporean and Southeast Asian artists while the Performing Arts Centre at the Esplanade has become an attractive venue for world-class performers.

In the push for citizens to keep themselves healthy, the government also introduced sports grounds and indoor stadia in every New Town. To maintain the traditional lifestyle of eating hawker food and buying fresh produce in markets, we invented the cooked food centre as well as the wet market. Over time, our eating houses and coffee shops have become icons of our traditional way of life, not unlike the open air cafés of Paris. They may look old fashioned but are very much loved by locals and foreigners alike.

In view of the massive resettlement of people from squatter colonies, the government, together with its planners, was looking for ways to nurture community spirit in the new high-rise environment. New towns were therefore sub-divided into neighbourhoods, which were in turn further sub-divided into precincts. Each precinct, at about 3-5 hectares in size, could give the residents a sense of attachment to the land as well as neighbourliness with surrounding households. To reinforce this objective, town centres and neighbourhood centres were designed for the dual purposes of commercial and civic activities. Residents can not only shop in these areas, they can also meet friends and relatives in eating outlets and small squares. Other facilities such as institutional sites, religious sites for different religions, and petrol stations were also carefully studied and incorporated into each New Town. The prototype of a New Town can be seen in Figure 5. When such a prototype is applied to the actual site to blend in with local historical and geographical characteristics, each can look very different from another, as shown in the Bishan New Town Plan in Figure 6.

Conceived as a basic urban building block, every New Town was planned to be highly self-sufficient through the provision of a wide, highly comprehensive range of amenities. Liveability was thus ingrained throughout the city and a form of high-rise, high-density housing emerged without its associated urban ills, despite the rapid pace of development in the 1960s, 70s and 80s.

A quick overview of the provision of facilities for health, education and culture is shown in Table 4. One can easily see that there has been a steady improvement for the ever growing population, with perhaps one exception. That is, with the lower birth rate, the number of primary and secondary school students has dipped slightly in recent years.

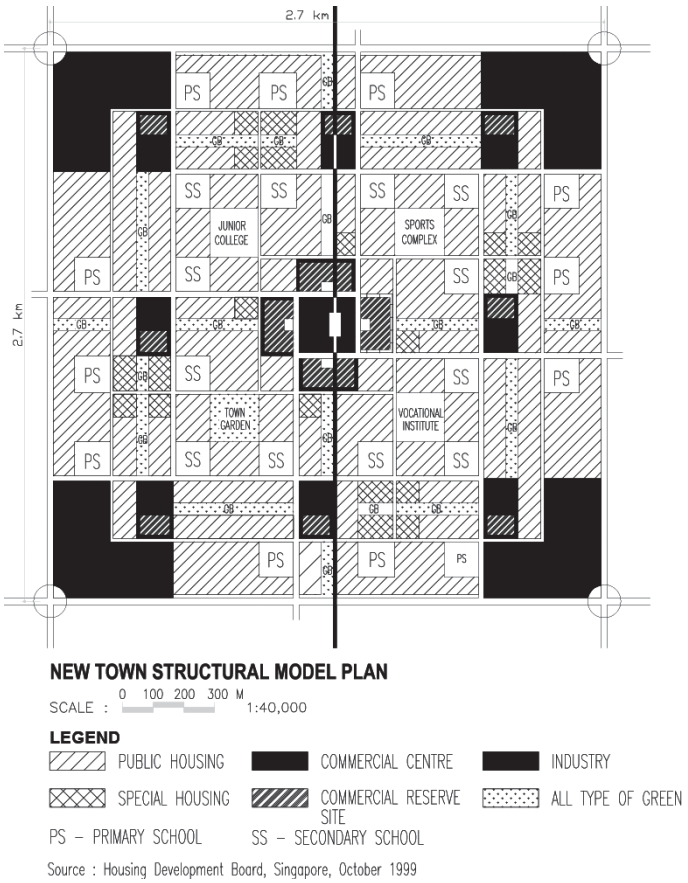

Figure 5. HDB New town prototype.

Source: Housing Development Board, Adapted by RSP.

A Rewarding Journey

I am more familiar with Singapore's planning and urbanisation efforts up to 1992 when I left the government. In looking back, I am thankful that we had started on sound footing. We had focused more on solving real problems and meeting basic needs of the people and land, rather than allowing ourselves to be seduced by glamorous projects. Tackling basic needs is often both unglamorous and requires much more hard work, while embracing the superficial and glamorous may earn one instant praise, and can be done with relative ease. It is now fashionable to say that we must look to the future. However, if we do not understand the past and the present well, how can we really know the future?

Figure 7 summarises the handsome rewards of our arduous urbanisation journey. Imagine the triangle as an iceberg. The portion in grey is below sea level and cannot

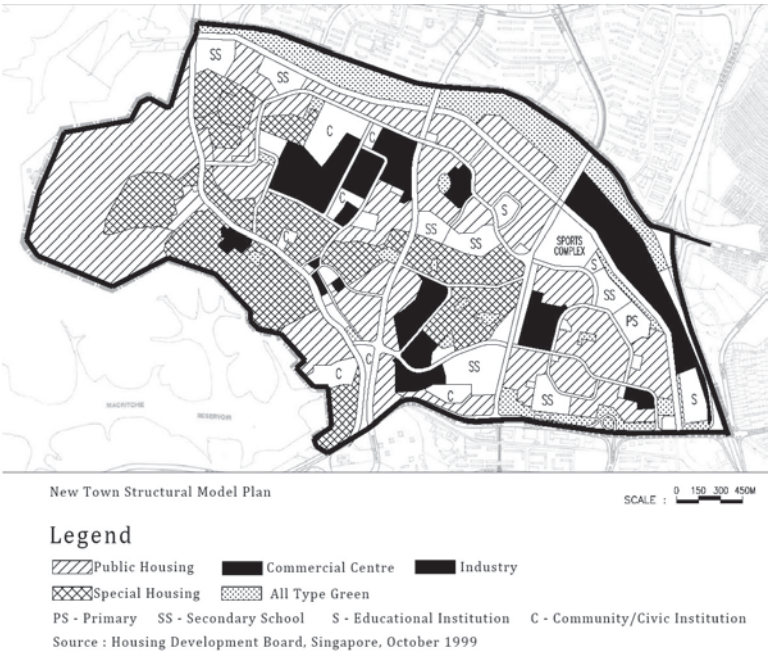

Figure 6. Bishan new town plan.

Source: Urban Redevelopment Authority, Adapted by RSP.

be easily seen, whereas the portion in white is above sea level and can be readily appreciated. The foundation of our urbanisation effort rests on having a group of pragmatic, far sighted and disciplined political leaders. They developed our city according to sound principles with an effective system of delivery.

At the beginning, our government was very concerned with the issue of survival. How could our tiny island, with multi-ethnic groups and without a clear sense of nationhood, survive? To make matters worse, the industrial and service sectors were practically nonexistent. But survive we must. It was not a choice. The government then set goals and priorities for the physical development of projects according to the urgency of needs and availability of resources. At the same time, the physical environment was supported by corresponding legislation, education and requisite resources. In moving forward steadily and surely, by 1985, Singapore was accepted by people around the world to be a modern metropolis. Having gained a stronger sense of nationhood, not only were we more confident of our survival, we had also managed to nurture a creative and highly energised citizenry which in turn attracts global talents to Singapore.

With these measures and developments in place, the world could clearly see that Singapore took excellent care of its ecology, urban environment and education, resulting in economic prosperity. However, I feel that the highest reward for having a city planned and developed well is earning unconditional esteem from people around the

Table 4. Health, education, culture.

Source: Centre for Liveable Cities.

	Year	Units	1965	1985	2005	2014
Health	Hospitals	No.	**14**	**16**	**22**	**29**
	Clinics	No.	**NA**	**NA**	**NA**	**3404** (2013)
	Public Swimming Pools	No.	**4**	**14** (1982)	**NA**	**25**
Education	Universities	Institutions	**2**	**2**	**3**	**5**
		Students	**NA**	**16,958**	**59,441**	**77,619**
	Polytechnics	Institutions	**2**	**2**	**5**	**5**
		Students	**NA**	**21,610**	**64,422**	**87,183**
	ITEs	Institutions	**NA**	**15**	**3**	**3**
		Students	**NA**	**18,894**	**21,603**	**26,288**
	Primary & Secondary Schools	Institutions	**NA**	**385**	**342**	**336**
		Students	**NA**	**441,465**	**503,324**	**414,534**
Culture	Performing Arts Venues	No.	**NA**	**8** (1984)	**NA**	**65**
	Annual Performances	No.	**NA**	**2,510** (1997)	**6,102**	**8530** (2012)
	Audience Sizes	No.	**NA**	**721,500** (1990)	**1,190,000**	**1,950,100** (2012)
	Museums	No.	**NA**	**1** (1984)	**36**	**55** (2012)
	Libraries	No.	**1 Central 2 Branch 3 Mobile**	**1 Central 8 Branch 8 Mobile**	**1 National 22 Community 16 Children's**	**1 National 26 Public** (2015)

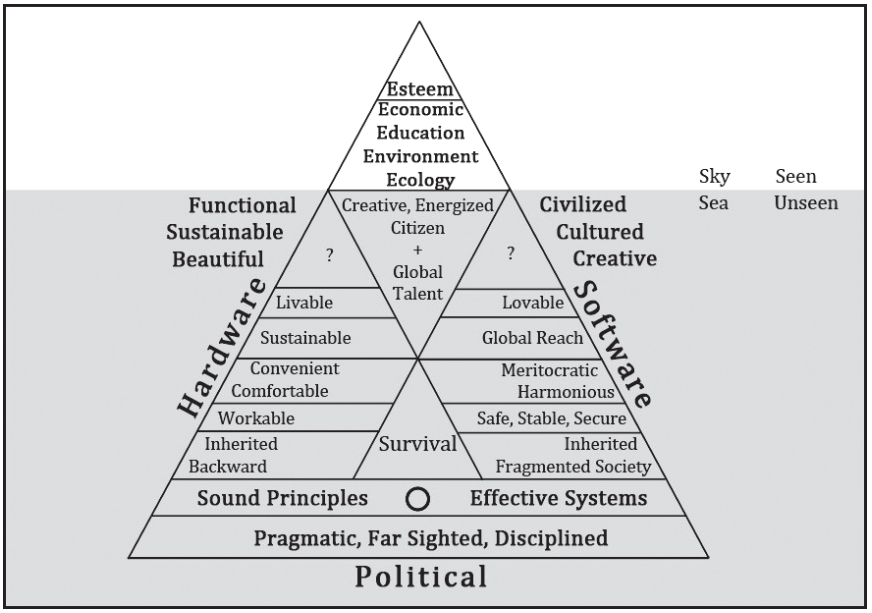

Figure 7. Hard work pays off.

Source: Author.

world, for the people living in the city. I would like to add that the concern for survival and the need to continue planning ahead for our physical environment and our software support should be deemed as a perpetual and unending process. The fact that Singapore seems to have arrived does not mean that we can afford to take things easily. We must not forget the key lessons learned in the last 50 years. They are: good governance, effective collaboration between politicians and professionals, Intelligent Planning, Intelligent Implementation, with an Intelligent approach. To add an important footnote, both the politicians and professionals obtained their ideas from listening to the people as well as experts, learning from successful examples in other cities and sieving out good principles through rigorous research as described in Figure 1.

Further, I would like to elaborate on the issue of an Intelligent approach as shown in Figure 8. In the preparation of urban plans, three considerations are critical. First, setting goals and objectives with the right values requires the heart of a humanist. Second, the planning of a city is akin to assembling a large machine for living, which requires the head of a scientist. Third, making a city beautiful and in harmony with nature and heritage requires the eye of an artist.

When I was a student of architecture, we were taught: Form Follows Function. I would suggest that the word Form applies to both architecture and city planning. Function, it would seem to me, means enabling people to have a fun experience in a city or a building. We could therefore rightly say: Form Follows Function Follows Fun.

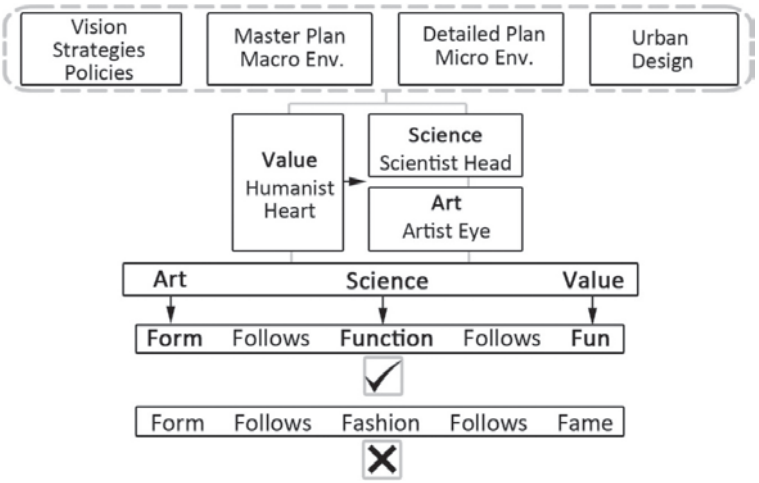

Figure 8. Planning and design philosophy.

Source: Author.

In this case, Fun is related to Value, Function to Science, and Form to Art. However, I am concerned about the prevailing trend today, in both architecture and city planning. A fair number of practitioners lean more towards the practice of Form Follows Fashion Follows Fame. In other words, if a person plans a city or designs a building according to the prevailing fashion, he is more likely to enjoy instant fame. This is certainly very tempting, but not necessarily done in the best interest of the people or the land.

In both city planning and architecture, the word Design to my mind suggests producing a clever and simple urban solution which is convenient, comfortable and easy to use, while satisfying the complex needs of our lives today. This task is not unlike a doctor's; having felt the pulse of the patient, he would have to find the single most appropriate treatment to help the patient become healthy and beautiful again, with minimum fuss.

In this respect, many of us involved in the urban planning of Singapore do feel that we had been offered a very good Urban Laboratory to carry out research in order to find the most appropriate and effective urban solutions for our needs. Undoubtedly, we had picked up many urban theories from the west. However, after going through the test of our urban laboratory, something rather different emerged—our own 'Asianised' theories.

This shows that when there is a will to get things done right, there will be success, regardless of geographical location. In the case of Singapore, while we have used our city as an urban laboratory and to some extent experimented on ourselves, our research has become valuable know-how, to be shared with other cities. Besides, the

need for good urban planning seems to be particularly great in Asia. As of today, 60% of the world's population lives in Asia on only 30% of its total land. The urban density in Asia is therefore unavoidably high. The rate of urbanisation is also very high, due to massive and rapid rural-urban migration. In the next few decades, if Asian cities can plan and develop well, it will contribute significantly to a better environment for the world. On the contrary, if this is not done well, it may accelerate the further deterioration of our global environment. The implication is immense.

I will conclude by looking briefly at Singapore's future. We should begin every urban planning effort with a long term projection of population size over a period of around a century. On the issue of population growth, we can learn valuable lessons from the growth trends of other countries. The respective population sizes of Scandinavian countries have been growing continuously for at least the last 60 years, despite their remote location on the world map. Based on these trends, and considering how Singapore sits in the middle of a highly populated continent, it would be unrealistic for us to think that our population growth can be effectively curbed. Further, the more limited the territory of a country, the more one must plan for the long-term. Therefore, I propose that we project our population size from the current 5.5 million to 10 million persons, over a time frame of at least 100 years. This growth rate can sustain our economic growth for the next century, and hopefully beyond.

The harsh fact is that if we aspire for Singapore to remain a sovereign country forever, we have to plan our city for a longer term than that of other cities. The sooner we make this bold decision, the more options we will have to keep our jungles, hills, lakes, rivers, military grounds and golf courses; to protect our historical areas and landed properties; and to disperse the requisite land area of higher density over a larger area, including land yet to be reclaimed. In doing so, we may be able to avoid being forced at a later stage to squeeze developments of very high intensity in remnant corners of our tiny island. If we act fast and boldly, we may still retain the quality of our urban environment, despite the much larger population size and higher overall density. Good urban environment, after all, contributes to economic prosperity.

To ensure the survival of our country, in addition to physical planning, we also need the support of our whole society, especially in areas such as better education for a value-added economy, economic restructuring for higher productivity and so on, to try to reduce, but not to stop, population growth, thereby enjoying the twin benefits of economic prosperity and higher quality of life.

In addition, it is also my wish to enhance our urban environment with great streets, parks, plazas, architecture and works of art that make Singapore a great city like historical London, Paris, Rome, Beijing, etc. To do so, we must not only maintain, but transcend, rationality. To this end, a bolder vision, stronger cultural tradition

and greater intellectual depth would come into play. At the same time, we must never forget to keep the rigour and good practices behind our success story.

Finally, if I were to use two words to describe Singapore's urbanisation experience over the last 50 years, they are simply CLARITY = COURAGE.

Acknowledgement

I would like to thank Prof. Heng Chye Kiang and Ms. Poh Hui Min for their assistance during the preparation of this paper.