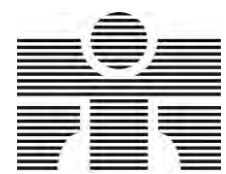


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Journal of the Hong Kong Institute of Planners





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Planning and Development

香港規劃師學會期刊

Journal of the Hong Kong Institute of Planners

二零一七年第三十一卷

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Message from the Editors


“Smart City” is not just a catchphrase of today. It is a strategic direction and a strong commitment to enhance the quality of living of city dwellers by applying Information Communication Technology (ICT) to various aspects of a city. According to Boyd Cohen, an urban strategist, Smart City can be divided into six major components, namely Smart Economy, Smart Environment, Smart People, Smart Mobility, Smart Living, and Smart Government. In view of this important trend, the current issue of our Journal (Vol. 31) is devoted to the theme of “Smart City Development”.

In the feature articles, renowned experts in this field share their insights on Smart City Development. Prof. Chris Webster and his co-authors showcase a few notable projects conducted by the researchers of the HKU UrbanLab on smart city planning and implementation. Together, they demonstrate *inter alia* how “Smart Healthy Cities” could be achieved through better knowledge, smarter analytics, fuller use of data, and successful implementation of policies and regulations. Readers would appreciate that in order to preserve individual characteristics, each project has slightly different styles and formats.

The article written by Dr. Winnie Tang, Chair of the Steering Committee of the Smart City Consortium, provides insights into the application of Geographic Information System (GIS) to empower cities to be smarter. On the other hand, Ir. Sam Pang, President of the Hong Kong Intelligent Transportation Systems (ITS), enlightens readers on the significance of ITS in Smart City Development and how it could enhance the existing transport infrastructure.

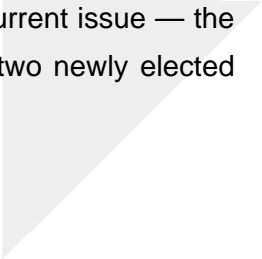
Our three columnists share their views on the concepts pertaining to Smart City Development. Jimmy Leung puts forward a framework for developing Hong Kong into a smarter city. Betty Ho’s view is that a truly smart city should be value-driven, emphasizing the predominant position of people and nature in smart city development. Andrew Lam brings up the major challenges that Hong Kong will face in the transformation of becoming smart.

Two papers are selected for the Student Corner — one by CUHK students on “Land Supply”,



an assignment for the urban planning workshop; and another one is a summary of the final report on “Smart City Development in Hong Kong” written by HKU students for the project assignment of the MSc (Urban Planning) Course “Regional and Territorial Planning Studio”.

Last but not least, we are pleased to include two special sections in the current issue — the coverage on the 2016 HKIP Award winners and the introduction on the two newly elected Honorary HKIP members, Prof. Roger Bristow and Dr. Shi Nan.



Editorial Board

March 2017



以心 Building Homes with Heart 建家

新鴻基地產發展有限公司秉承「以心建家」的信念，堅持追求卓越，精益求精，是香港最具領導地位的發展商之一。集團用心發展優質項目，興建多項地標物業，彰顯香港國際大都會的地位；其中位於九龍站的環球貿易廣場，為全港最高的建築物，與對岸的中環國際金融中心二期組成宏偉壯麗的香港景觀標誌「維港門廊」。

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FEATURE

BEING MORE PRECISE ABOUT THE 'SMART' IN SMART CITIES

Modified from Timmy Kwong

Chris Webster¹, Alain Chiaradia¹, John Gallacher², Jianxiang Huang¹, Bin Jiang¹, Sarika Kumari¹, Scott Melbourne¹, Michael Yuxuan Ni³, Matthew Pryor¹, Chinmoy Sarkar¹, William C Sullivan⁴, Guibo Sun¹, Dorothy Tang¹, Xiaohu Zhang¹

¹ HKUrbanLab, The research arm of Faculty of Architecture, The University of Hong Kong, Hong Kong Special Administrative Region, China; ² Department of Psychiatry, Oxford University; ³ School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China; ⁴ Department of Landscape Architecture, University of Illinois at Urbana-Champaign, United States

1

What is a smart city?

From an urban planner's perspective, the Smart City may seem nothing more than a latest conceptual fad. It follows a long list of model city ideas such as model workers suburb, garden city, garden suburb, neighbourhood unit, new town, socialist city, company town, eco-city, low carbon

neighbourhood, zero-carbon neighbourhood, carbon-positive neighbourhood, gated community, private community, healthy city and others ideas that did not have quite so catchy labels and resonant rationale. As well as its famed New Towns, Hong Kong has its own Healthy Village (1966) and a Model Housing Estate (1954), both in North Point. We view this as a list of experimental

utopias. These are the ones that made it to some form of implementation. Others were merely radical propositions from political entrepreneurs. It is challenging and instructive to note that most were not invented by professional planners (noting that the idea of a professional planner has changed its meaning over the past 150 years or so during which these model towns have been imagined). One reason why they have made it into the lexicon of planning ideas is that they resonated with society at large. Successful ideas in any profession or knowledge domain are usually those that have been tested by other professions and disciplines and by producers and consumers of knowledge and products more widely. We note that utopias constructed on political ideals, such as Robert Owen's 'New Harmony Indiana' (1825) and Levitt Brothers' 'Levittown, PA.' (1929), have been amongst the least smart ideas, mainly because of their ideological naivety.

“...utopias constructed on political ideals...”

The concept of a smart city, we would suggest, is somewhat different from the rest. At its simplest, it means merely, a city enhanced by Information and Communications Technology (ICT). In itself, this is not utopian. It is technocratic and value-independent. A smart city, meaning a

wired-up and App-enhanced city, may be better or may be worse than a city that is less ICT-enabled. Whether 'smart' improves a city depends entirely on the use that is made of ICT. What makes the concept slip into the list of model-city concepts is the application of values, norms and goals. So equating smart with efficiency or with fairness or with innovativeness, give it a purpose and potentially renders the smart city a new kind of utopian statement. So let's unpack what that could mean.

2 Smart to what end and by what route?

ICT could be embraced to give a government more control over its people. In the extreme, a smart city could be dystopian, as in George Orwell's 1984 (2012) and Suzanne Collins' The Hunger Games (2008). The dominant rhetoric in today's smart city talk, is, thankfully, efficiency, not power and control. This is safe ground since few would dissent from the idea that a more efficient city is a better city since it implies less wastage of scarce resources, more wealth generation and greater financial ability to address equity, externalities and other distributional issues.

Having agreed on this, ICT may be applied to make the operations of urban government more efficient or it may be applied to make the operations of markets and other modes of private transactions more efficient. Imagine an urban government with limited

budget to invest in ICT. Should it invest in a new computer system to collect taxes, or to manage the regulations governing vehicular registration and annual safety checks or should it use it for a road pricing system? One ICT application enhances government administration, the other enhances individual resource decisions in the consumption of scarce urban resources (road space). Of course, the efficiency of a city can be enhanced through both kinds of public investment in smart technology. The discussion can go further in considering 'smart' in pursuit of 'efficiency' vs 'efficacy'.

Direct investment by government is not, of course, the only means by which its government can smarten up a city. A government might subsidise strategic ICT investments by private firms or households. It might regulate to require land and property developers to provide trunk ICT infrastructure. It might provide fiscal incentives or impose fiscal penalties on industrial or commercial firms to make their own operations more ICT-smart. It might create a smart city plan to coordinate individual private ICT investments, make it easier for software industries to cluster, or create a subsidized ICT platform for smart-city App development.

3 What capacity for smart in different sectors?

All sectors may benefit, but not equally. Different sectors will yield different marginal

private and social gains from ICT innovation. To imagine the possibilities and sketch out priorities, the easiest approach is to focus on the most pressing urban problems. Pressing urban problems indicate efficiency gaps in the way society currently orders its cities. These can be characterized as various forms of congestion, all of which have efficiency, equity and environmental consequences. Housing market congestion leads to affordability problems (Hong Kong). Transport market congestion leads to loss of economic value and environmental degradation (Beijing). Labour market congestion leads to persistently low wages (Southern Chinese cities over the past 30 years). Capital market congestion in supply (too many suppliers searching for too few buyers with productive uses for capital) leads to property and other investment bubbles (China housing market since late 1990s). Health sector demand-side congestion leads to rationing (UK), high prices (USA), unacceptable health inequalities and lower ends of the urban labour market unable to reproduce itself (Chinese migrant workers unable to cover the costs of health risk from urban wages). Education sector congestion leads to rationing (London, HK), low quality private education (Shenzhen), high price private education (HK), educationally propagated intergenerational social segregation (USA) and rural-urban differences in life-chances and the quality of labour (Mainland China).

So where would one start in discussing how

cities might begin to think about filling these efficiency gaps using ICT innovations? It would take ten HKIP P&D articles of this length to even commence this task – perhaps HKUrbanLab researchers could write a series of short blogs or op-eds for the journal on smart-city ideas for a selection of urban problems over the coming issues. For now, we focus on just one sector and hope that this triggers parallel thoughts for other areas.

4 Smart Healthy Cities

How might a city become healthier through the application of ICT to solving public domain issues? First, it could improve the efficiency of hospital and other health care administration through technological upgrading. Just as the US State Department admitted, earlier in June, that it continues to run its nuclear ‘red button’ system on a 1980s PC with floppy disks; in the same way, many front-line professional services in the UK’s National Health System lack even a single wired-up computer and many critical central systems still run on ancient platforms written in Cobol, Fortran and other programming languages from the 1970s. Second, the delivery of services can be enhanced through online diagnostic expert systems; telephone-line body-function sensing and recording systems; care-in-the-community ICT systems, for example a smart circuit that triggers a home visit when the pattern of electricity use in a elderly individual’s home changes in some

way. Third, the sophistication, accuracy and speed of technical support of medical services can be enhanced, for example, through surgical robotics, ever-more-smart genotyping chips and MRI scanning technology. Fourth, big urban health data analytics can lead to better understanding about how to optimize both the design and management of the built environment for various kinds of health outcomes.

In the remainder of the article, we present some of the projects currently underway at HKUrbanLab, the newly established research arm of HKU FoA. The projects represent the work of the Healthy High Density Cities research group, which is a partnership between the Faculty of Architecture and the Li Ka Shing Faculty of Medicine, led by the two Deans (Dean Chris Webster and Dean Gabriel Leung, a Public Health Professor) and currently comprising ten researchers.

What all of the projects have in common is the aim of improving the intelligence underlying healthy city interventions. So these are examples of innovations that we hope will make cities healthier through better knowledge, smarter analytics, fuller use of data, more sophisticated verification of evidence, finer specification of guidelines, regulations and design parameters and so on. This is clearly one role for the academy in partnership with health and urban planning agencies that use such knowledge, and industrial and capital market partners

who seek to turn innovative ideas into saleable inventions. All of the research projects summarized below involve massive data, technological innovations in 2D and 3D processing algorithms and high-powered computing.

5 Can we design urban layout and morphology to reduce traffic accidents? (Sarkar, Sarika, Webster)

The term smart in Smart Healthy Cities (SHC) also entails creation of cities with an intelligent design aiming to minimize mortality, injury and corresponding burdens of disability-adjusted-life-years and economic costs. Road traffic injuries (RTI) constitute one of the top ten leading causes of death and are predicted to ascend the ladder further by 2030 (WHO, 2009). The situation is dire in under-developed and fast developing economies. Even among OECD countries, increments in the number of motor vehicles imply that road traffic injuries will continue to remain a major urban public health risk. In Great Britain there has been an estimated 138,688 fatalities over the past 35 years with an average of 2,452 fatalities annually during 2004-2013, with an estimated £14.71 billion incurred in 2013 alone in direct and indirect casualty and accident-related costs (Department of Transport 2014). Furthermore, a higher probability of 'Killed and Seriously Injured' (KSI) among pedestrians and cyclists implies that RTIs indirectly deter active

travel behavior, impeding the development of more healthy cities.

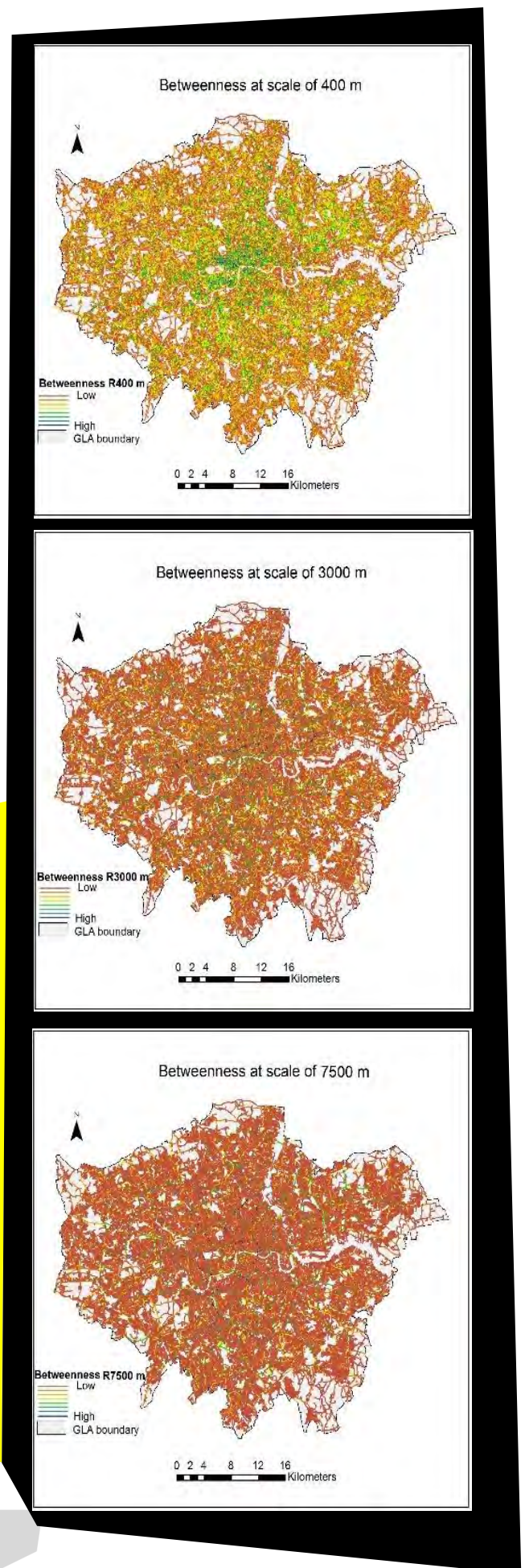
One of the primary challenges of SHC is to design and engineer new cities as well as optimize existing ones, at the micro-level in terms of underlying morphology and physical design of streets, adjacent land uses and communities these can sustain. Part of the planning and design optimization problem is to ensuring that traffic volume, speed and momentum remain well within the carrying capacity of the streets and that the interactions among vehicular traffic and between vehicles and active travelers do not result in KSIs incidents.

The links between street layout and incidence of traffic casualties have long been established; nonetheless, most studies thus far have been conducted at an aggregate level of census tract or traffic analysis zone, and explicit evidence about urban layout and configuration of street links cannot therefore be made. Evidence emerging from HKUrbanLab's large scale 5-year Greater London study comprising 143,299 crash incidences with 26,464 pedestrian casualties, points to the fact that objective measures of urban morphology and design (see Figure 5.1), physical features of streets, traffic volume and neighbourhood-level deprivation are all significantly associated with street accident severity and mortality. Another ongoing study of children aged 0-16 years in London found similar associations between urban

morphology, land use intensity and casualty counts.

'SHCs of tomorrow' should rely on current advances in network science and big data geo-computation technology to produce intelligent urban layouts supporting sustainable land use dynamics. They will help to ensure efficient traffic movement in terms of both speed and volume, create effective segregation of transport modes, thereby mitigating high-risk exposures and minimizing KSIs. Studies such as ours offer specific guidance on calibrating street design and associated land-use patterns in a way that can be proven statistically to reduce the odds of road traffic injury-related health-risks.

Figure 5.1 Street level urban morphological metrics of betweenness (through movement) measured at spatial scales of 400, 3000 and 7500 m. These metrics are used to develop finely tuned models that correlate street design with the probability of road traffic injuries and thereby help specify more healthy urban design.



6 Can smart urban design reduce the burdens of obesity, mental health and other chronic disease? (Sarkar, Webster, Gallacher)

Chronic disease constitutes the largest cause of mortality and disability-adjusted-life-years, being a considerable drain on the national GDP in both developed and developing economies (Yach et al., 2004, Abegunde et al., 2007). There is now unambiguous evidence that non-clinical environmental interventions in our cities in the form of health-specific planning and design of neighbourhoods and cities can accrue significant benefits both in terms of health sustaining lifestyles and wellbeing (Rydin et al., 2012; Sarkar, Webster & Gallacher, 2014) as well as economic incentives via reductions in health expenditures (Chokshi & Farley, 2012). Smart Healthy Cities (SHCs) should aim to create intelligent buildings, layouts and land use dynamics all designed and configured to promote healthy behaviour and lifestyle and hence lower economic and disease burdens.

Current technological advances in multiple healthy-city domains including the creation of national level environmental databases; high end geo-computation; new breeds of proficient algorithms for big data spatial and network modelling for objective assessment of urban environments; large-scale

collection of data on health outcomes; physiological biomarkers; 3D whole body scans for population cohorts; data anonymization; and linkage of multiple cohorts to create supportive virtual platforms for data acquisition. All these imply that we are on the cusp of a new science of creation of smart and healthy cities. Not only do these innovations enable access to big data for modelling and large scale evidence generation about how attributes of urban environments (density, design, configuration and urban lifestyles) influence specific health outcomes, but they also open doors to the creation of intelligent decision support systems to support future planning and resource allocation.

The UK Biobank Urban Morphometric Platform (UKBUMP) is a high resolution spatial database (see Figures 6.1a & 6.1b) of about 750 individual-level health-specific BE metrics being developed for half a million participants of the flagship UK Biobank study, a prospective cohort of 500,000 participants across 22 cities of UK (Sarkar, Webster & Gallacher, 2015). The UKBUMP study aims to provide large-scale evidence (that has thus far been lacking) for efficient interventions that will shape smart healthy cities of the 21st century. A series of studies are currently underway looking at associations of housing density and type, urban greenness, land use densities and physical street configurations upon physical activity, adiposity, social capital and wellbeing, depression, sleep, respiratory

health and other outcomes. Evidence from UKBUMP thus far, points to the non-beneficial independent effects of housing density upon adiposity in the suburbs while the beneficial effects begin to kick-in subsequently as housing density further increases in urbanized areas (Sarkar, Webster & Gallacher, 2016a). Another of our ongoing studies finds positive effects of urban green, retail density and street-level walkability and that PM2.5 is associated with lower adiposity (Sarkar, Webster &

Gallacher, 2016b).

Guided by well calibrated models of built environment-health associations, SHCs can configure and optimize urban designs so as to reap the maximum benefits in terms of healthy lifestyles including higher levels of physical activity, social capital, and wellbeing, thereby reducing prevalence of obesity, cardio-metabolic disease and mental disorders.

Figure 6.1 a) Spatial locations of 22 UK Biobank assessment centres with number of participants (reproduced from *Annals of GIS*, 21, 135-148).



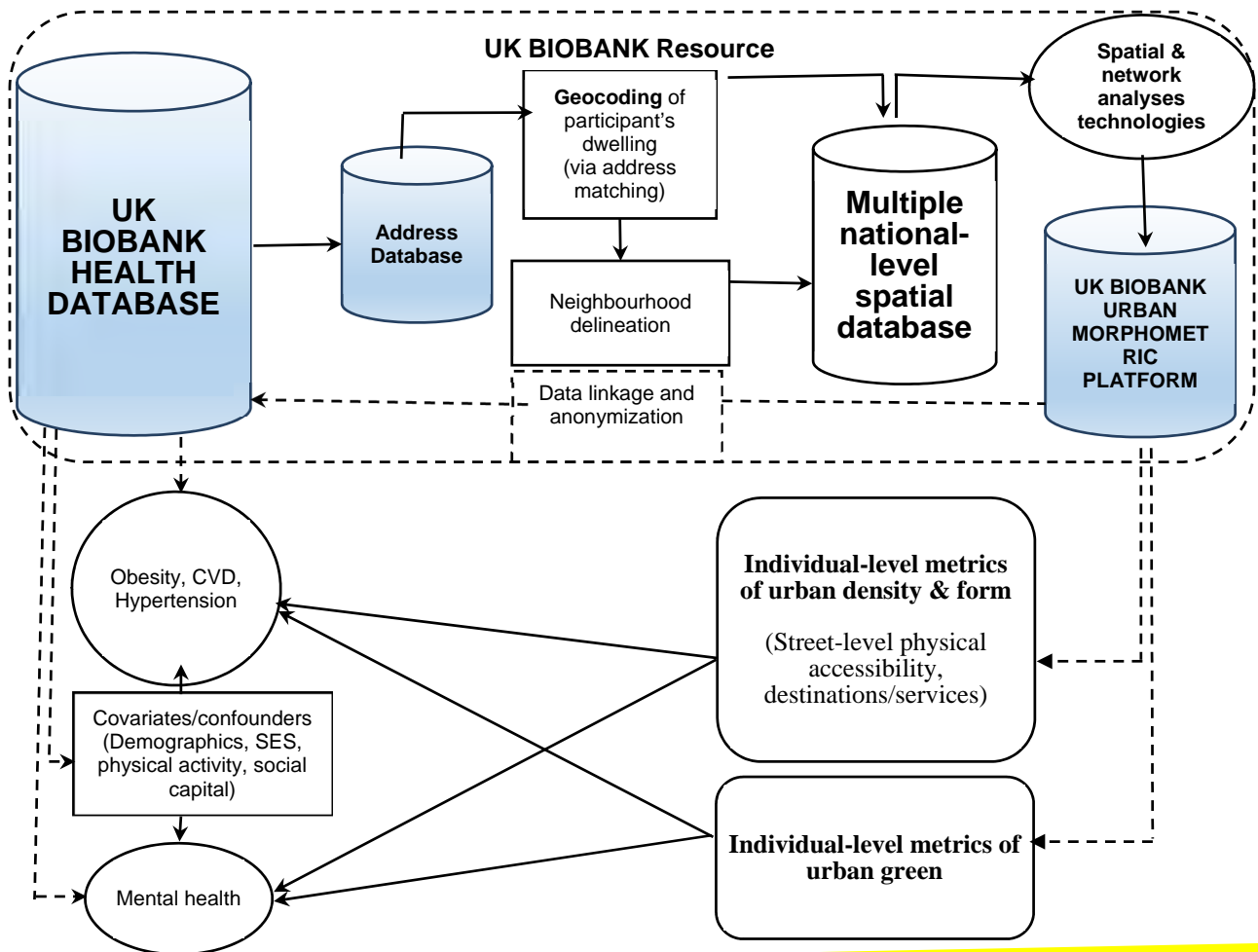


Figure 6.1 b) Illustration of potential applications of UKBUMP database in BE-Health studies towards evidence-base for SHC (reproduced from *Annals of GIS*, 21, 135-148).

7 How does urban noise affect mental health and how can we adjust planning and design in response? (Ni, Huang, Webster)

The nuisance of urban noise is not new. Rumbling chariots on cobblestone road troubled the Romans so that the traffic had to be banned at night. The acoustic environment of the industrial era was described in Jean Arp's writing as "Man ... invents machines and devices that increase

noise and distract humanity from the essence of life, contemplation, meditation..." (Arp, 1972) Modern cities are flooded with noises, and there appears to be no escape from the humming HVAC unit, the purring internal combustion engines, or the clunking roadwork site. Hong Kong is among the world's most densely populated cities and the noisiest ones. Over one million residents are affected daily by excessive traffic noise, according to statistics from Hong Kong's Environmental Protection Department. Noise exposure is known to cause

annoyance, sleep disturbance and mental health problems. Sleep disturbance can lead to impaired mental, social and physical performance and in the extreme, psychosis. Medical literature links noise exposure to hypertension, depression, and psychiatric disorder.

Researchers from the Faculty of Architecture and Li Ka Shing Faculty of Medicine are studying the impact of Hong Kong's traffic noise, to examine its impact on depressive symptoms and mental wellbeing. The study leverages the FAMILY cohort and "Children of 1997" birth cohort, two large population-representative cohorts in Hong Kong. The team is developing advanced numerical models to assess noise exposure of households at their home addresses, taking into account source profiles and the modifying effect of the local built environment, i.e. multiple noise reflections from building surfaces, attenuation by distance and structural insulation. Noise exposure data in the study are linked to health outcomes using a 3D geo-spatial database (see Figure 7.1), providing precise resolution much needed in a high-density city, where the complexity of soundscapes exceed lower density living environments.

If no actions are taken, urban noise and the risk to exposed populations will continue to grow. A smart city will manage its acoustic environment, minimizing hazards in pursuit of enhanced wellbeing for all. Practical

suggestions include:

- Urban acoustic environments should be assessed for complete attributes of loudness, pitch, and quality, not merely the sound pressure level (dB). A pleasing auditory environment does not equal quietness – think of the sound of waves on a beach, wind-swept trees, or birdsong in urban parks. The use of water features as sound masks can create enjoyable auditory experiences; famous examples including Green Acre Park in Manhattan and Japanese gardens.
- Noise should be a planning priority before an engineering one. Land use, infrastructure, landscape features, open spaces, and building designs matter. Further controls, such as noise barriers, low-noise road surface materials, and building sound proofing are due if planning measures fail.
- Vulnerabilities may vary in the population by age, gender or occupation. Subpopulations with higher exposure or sensitivity should receive interventions and empowerment, via acoustic insulation, enhanced resilience and family support.

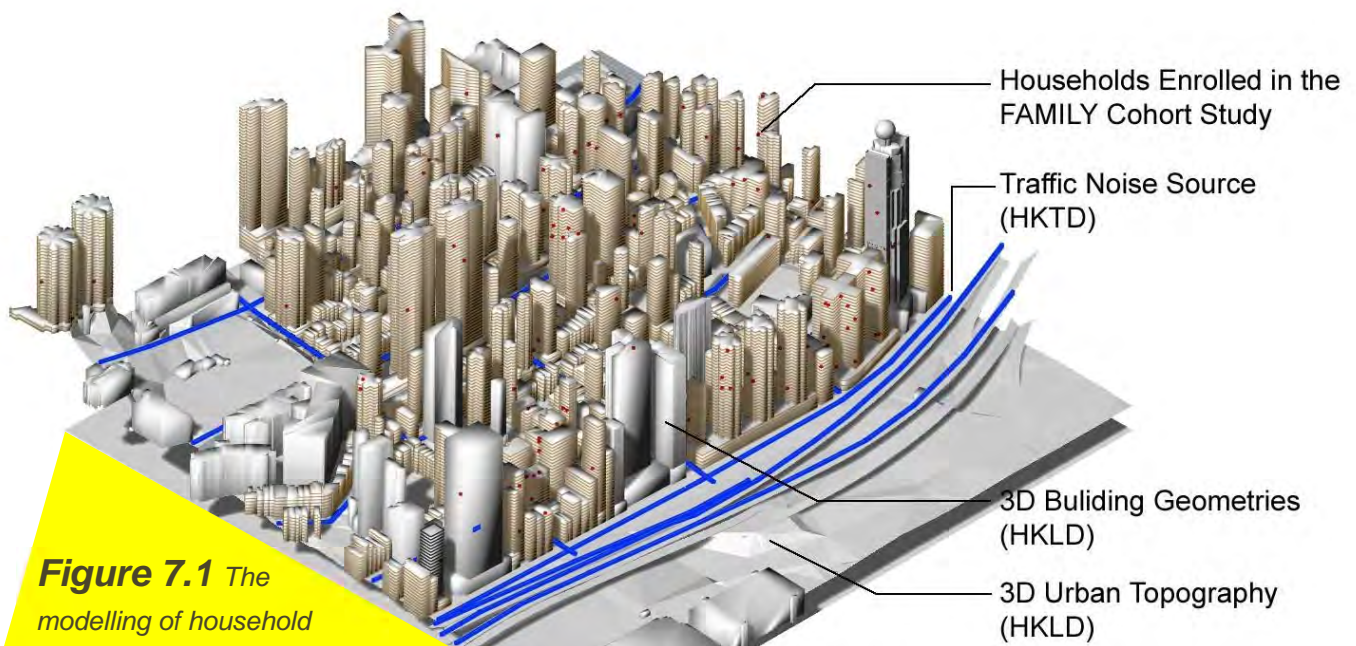


Figure 7.1 The modelling of household noise exposure in high-density cities

8 What is the optimal size and distribution of green spaces to increase walking probability for commute and for leisure? (Sarkar, Webster, Melbourne, Pryor, Tang, Zhang, Chiaradia)

The term smart in Smart Healthy Cities (SHCs) also implies optimized allocation, distribution and design of green infrastructure to create places promoting salutogenic exposures that encourage active travel, social capital and wellbeing. These in turn lead to positive externalities accrued in the form of minimized health burdens of sedentary lifestyles ; reduced

vehicle miles travelled, congestion, pollution and carbon footprints in cities.

A tranche of studies in the past decade have examined the beneficial effects of urban green upon physical activity, health and environment (Takano et al., 2002; Chiesura, 2004; Mitchell & Popham, 2008; Webster et al., 2015), consistently supporting the cause of green access. However, most of these studies have employed aggregated data and coarse measurements to examine direct relationships between exposure to urban green and health outcomes, rather than direct effects on mediators, especially activity behaviour such as walking. Consequently, they fail to address the core

challenge of making cities smarter and healthier. These pertain to the impending necessity to optimize urban green for healthy living apropos:

- allocation of green spaces in relation to existing and forecasted population densities
- distribution and connectivity in relation to underlying urban morphology and land use dynamics
- size and quality.

To address these, we conducted a series of data driven large scale studies employing objective and functionally coherent measures of urban green in Greater London comprising more than 15,000 individuals and 55,000 walk trips (Melbourne et al., 2016; Sarkar et al., 2015). They included observed measures of area under parks; natural green and sports facilities expressed as square Km per unit neighbourhood catchment area, to capture the activity promoting and recreational potential of green space; Normalized Difference Vegetation Index (NDVI) derived from very high resolution colour infrared data, acting as a proxy of salutogenic properties of urban green; and density of street trees within neighbourhood catchments, acting as a proxy of perceived green design and street environment (see Figure 8.1). We found that walking density within park catchments was negatively associated with

park size and residential density, while it was positively associated with degree of park clustering, street-level movement potential, density of retail and public transport (Figure 8.2 depicting the geographically weighted regression coefficients for various predictors). Evidence also pointed to the positive association of a participant's odds of walking with density of street trees, service destinations and street network configuration (movement potential), while actual distance walked was positively associated with both street tree density and NDVI greenness.

Studies such as this show that contemporary SHCs can be guided scientific evidence on much finer scale than was possible for other generations of 'model city'. Green design guidelines can be calibrated to specifically enhance the role of urban green on behaviour, lifestyle and environment. The distribution and design of green infrastructure can be treated not just as arbitrary islands of green, but configured to act as efficient and interconnected functional healing spaces for both its residents and the environment.



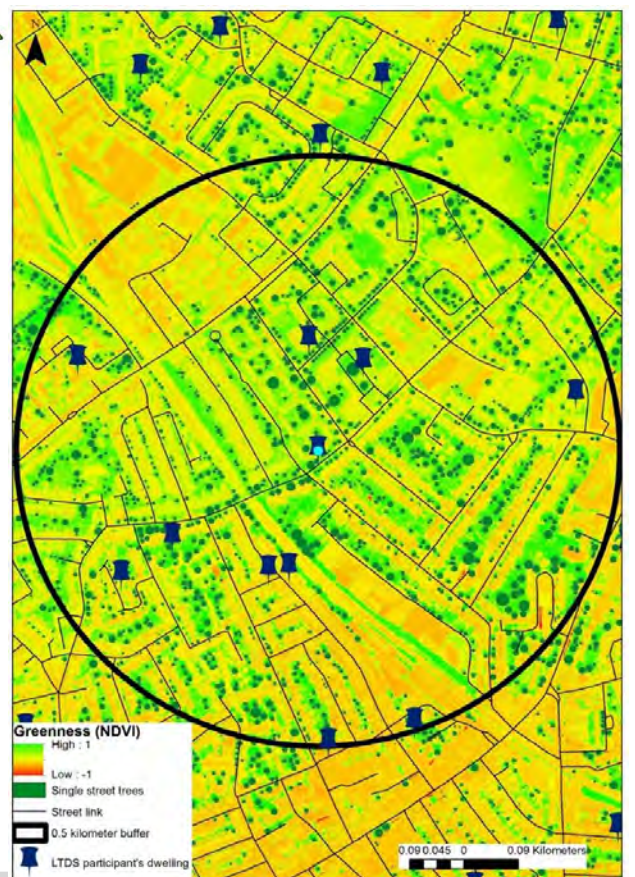
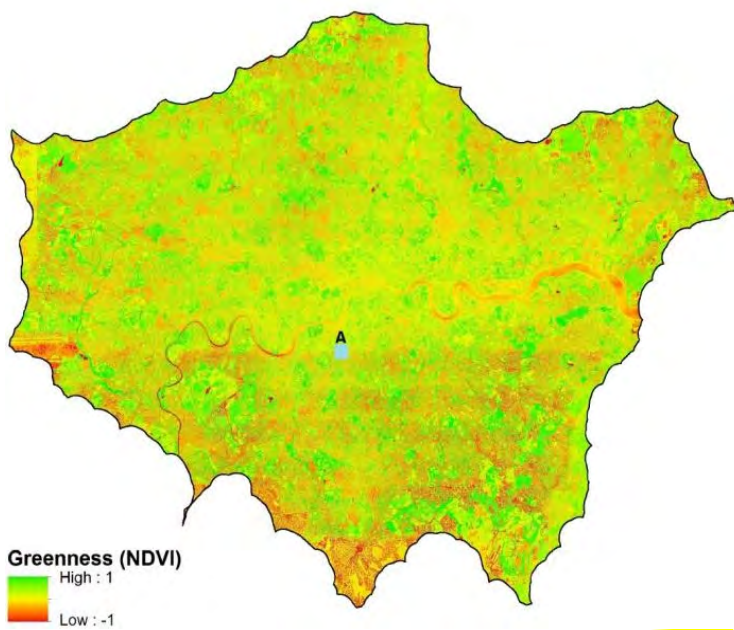
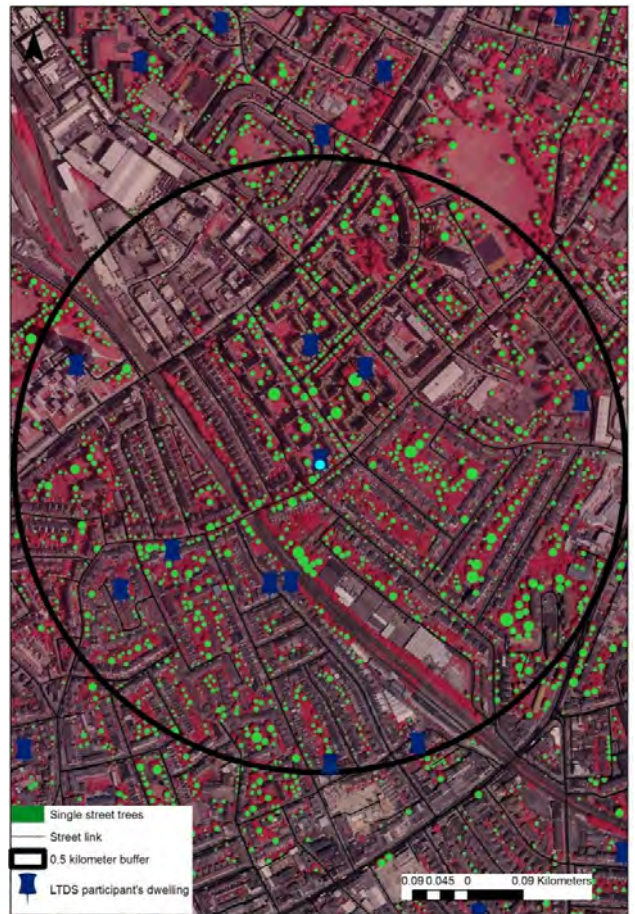
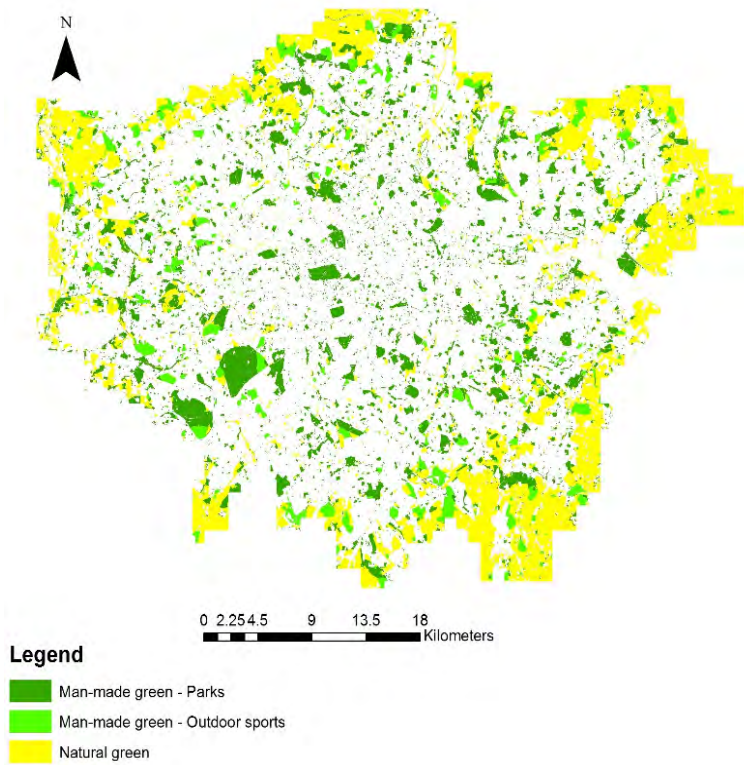


Figure 8.1 Extent of the Greater London study area (above), showing urban green spaces and 0.5 metre resolution index of greenery (as captured by NDVI modelled from colour infrared imagery). The two details on the right depict the urban green around a specific LTDS dwelling address 'A'. Detailed green measures from these databases were used to predict walking to work.

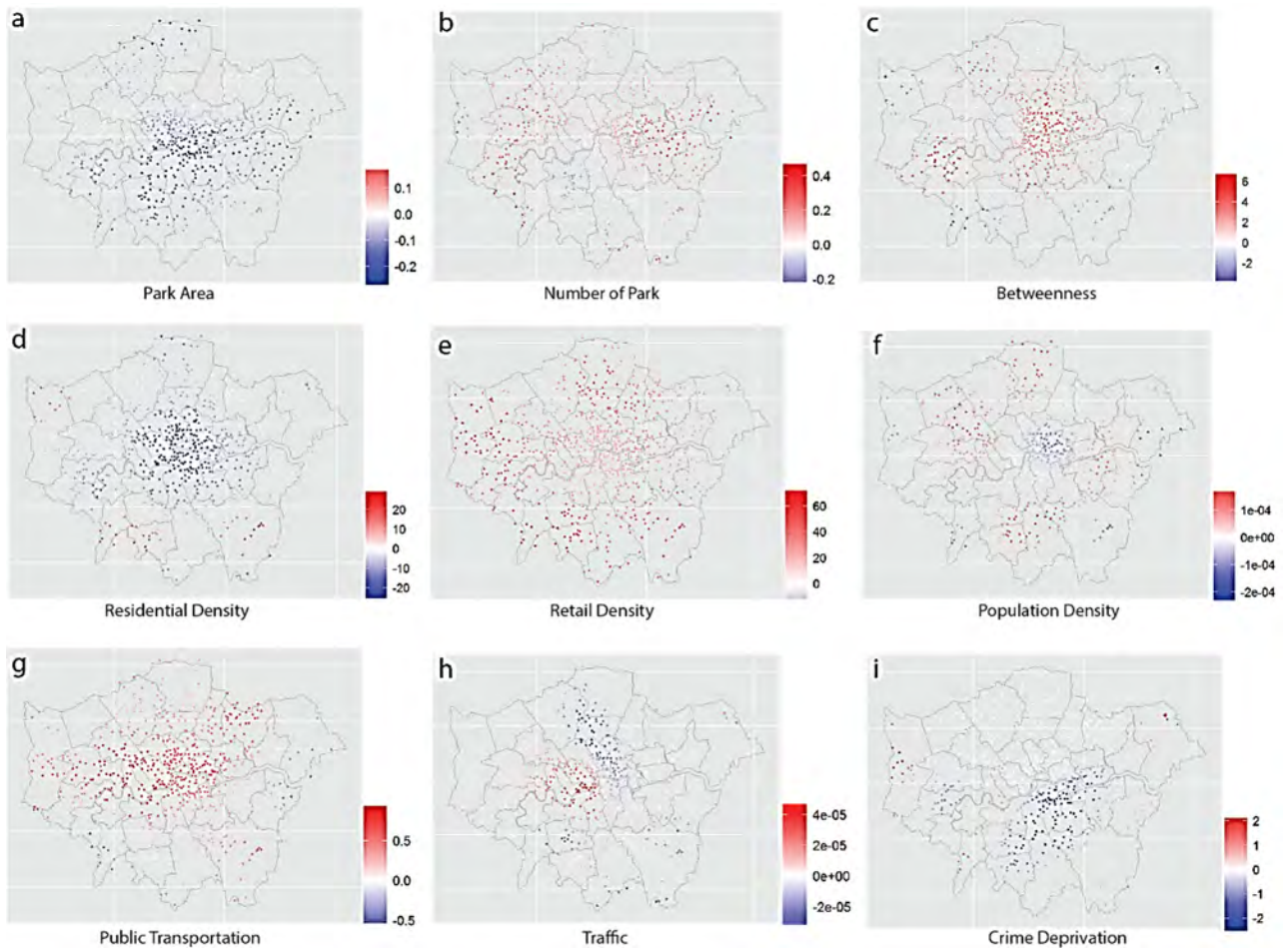


Figure 8.2 Spatial mapping of the coefficients by geographically-weighted regression (GWR). Red points indicate park centroids around which walking density is positively associated with a respective model predictor, while blue points depict negative associations.

9 What 'doses' of urban greenery optimize stress relief and physiological and psychological human responses? (Jiang, Pryor, Sullivan)

stress in daily life can trigger disorders such as cardiovascular disease, stroke, type 2 diabetes, and some types of cancer (Jiang, Zhang, & Sullivan, 2015). There is growing evidence that exposure to urban green landscape can foster faster and more complete recovery from mental stress.

Demands and pressures of contemporary urban life are precursors to many serious health problems. Accumulation of acute

While many previous studies provide convincing evidence that contact with green

landscape is considerably more beneficial for human health than artificial landscapes in the urban settings, the shape of the dose-response curve for the impact of green landscape on human health is little understood (Barton & Pretty, 2010; Jiang, Chang, & Sullivan, 2014), and researchers and professionals need know how much green is necessary or optimal. The Dose of Nature project, a group of scholars from Illinois and Hong Kong U, are looking to fill this significant knowledge gap.

These studies have examined participants' landscape preferences, changes of self-reported stress status, changes of physiologically measured stress status as each participant was randomly assigned to watch one of ten community street videos with different eye-level tree cover densities (ranging from 1.7% to 62.0%) after a stressful event (Trier Social Stress Test) (see Figure 9.1). We adopted the eye-level tree cover density as the measure of tree canopy coverage because it is a more accurate indicator of ordinary individual's visual perception on site than the top-down tree cover density (Jiang et al., 2017).

Several significant findings have been made, providing concrete and detailed information on the relationship between tree cover densities with two responses: stress recovery and landscape preference (Jiang, Chang, & Sullivan, 2014; Jiang, Larsen, Deal, & Sullivan, 2015; Jiang, Li, Larsen, & Sullivan, 2016). Dose-response curves for

the relationship between tree cover density and landscape preference (see Figure 9.2) indicated that participants preferred streets with greater tree cover density, with the curve following a power trend line equation. Participants also reported greater stress recovery with higher tree cover density, after self-reported and physiological measures were integrated as general stress recovery indicators (see Figure 9.3).

We know contact with green landscape is beneficial, which is consistent with findings from many previous studies. More importantly, we now have a better idea of how much greenness is needed to generate necessary or optimal mental health benefits. Dose-response curve research creates a bridge between landscape architecture, urban planning, public health, environmental psychology, and physiological psychology disciplines, and these findings should enable future urban researchers to examine dose of nature issues in a variety of urban environments.



Multiple measures

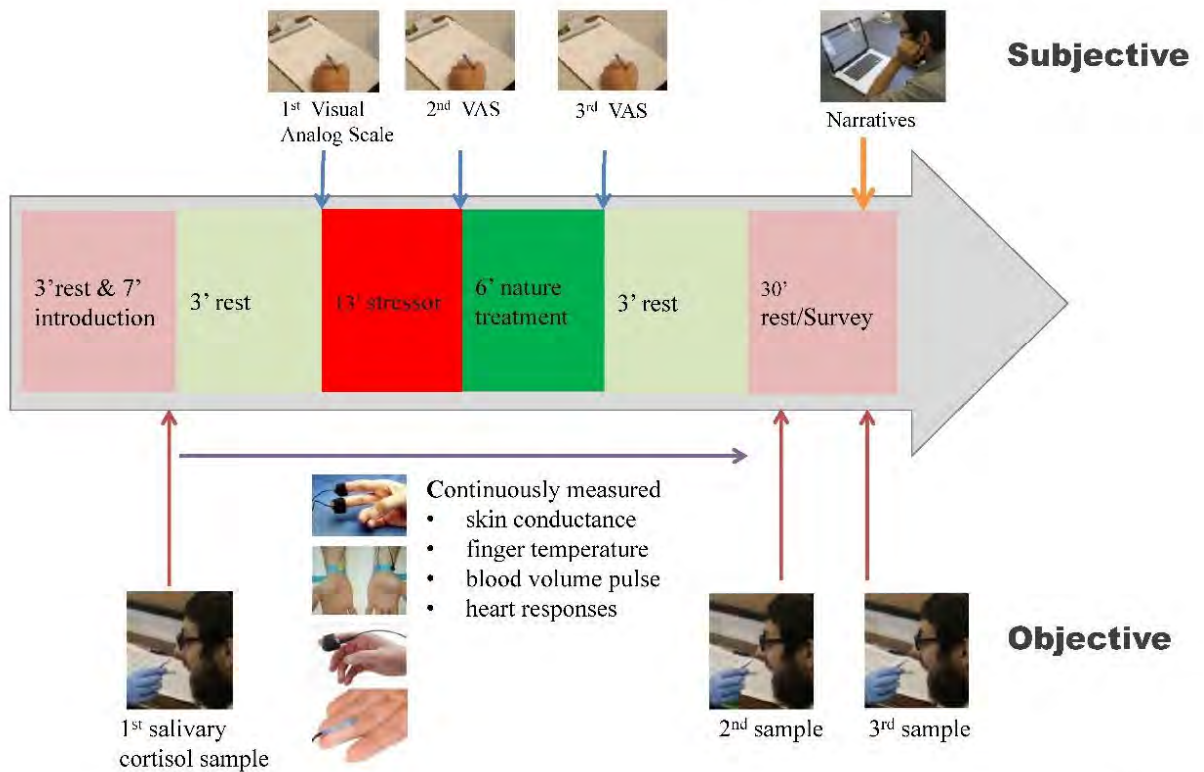


Figure 9.1 Dose of Nature project: procedure and multiple measures.

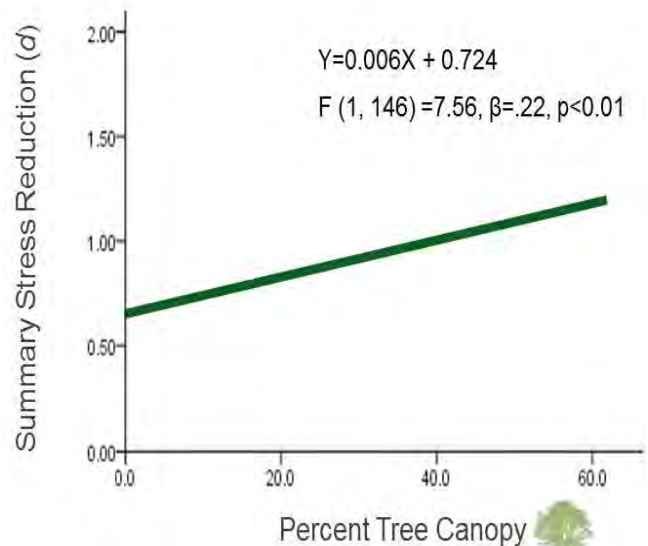
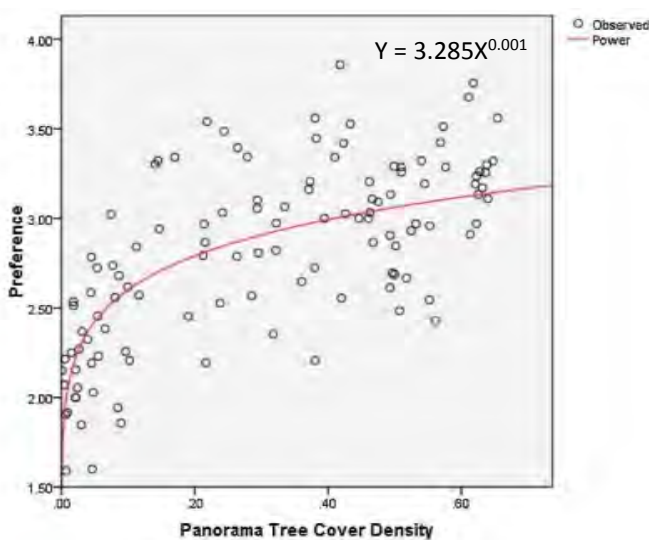


Figure 9.2 Dose-response curve between panoramic tree cover density (X axis) and landscape preference (Y axis). Equation: $Y = 3.285X^{0.101}$. Image source: Jiang, Larsen, Deal, & Sullivan, 2015.

Figure 9.3 The dose-response curve between tree cover density (X axis) and summary stress reduction (Y axis).

10

How can we improve the walkability of cities to induce healthier lifestyles? (Sun, Webster, Chiaradia and Zhang)

China is in a period of rapid urban rail system development, with an intention to transform urban structure to encourage walking, cycling and travels using public transit. These are deemed to be environmental interventions consistent with the reduction in risk of major non-communicable diseases such as coronary heart disease, type 2 diabetes, and breast and colon cancers. However, active travel may also shorten life expectancy, since physical inactivity in car-oriented urban environments with exposure to heavy air pollution is rapidly becomes a major risk factor in China.

Twenty-five Chinese cities have been building 87 urban rail lines at a cost of 150.2 billion USD between 2009 and 2015, with additional lines planned. A key component of urban rail projects is pedestrian access between the train station and the immediately surrounding area. The problem is acute in China because of the lack of integration of rail route planning and urban planning. Figure 10.1 illustrates the problem: A new transit line in Nanchang has been constructed along a highway for ease of construction, which is largely separated from most of the walkable communities planned to serve. Poor siting of stations in

relation to patterns of walking can seriously inhibit (or delay) transit ridership. Few investigations have been carried out to address this problem. We need to better understand the configuration and quality of train-station approaching streets in Chinese cities, and to assess the complex interactions among these enormous investment, government-led land use decisions, and active travel.

“

...raise transit ridership via urban design interventions.

”

In this cohort study, we used a ‘natural experiment’ in urban rail infrastructure with longitudinal data to provide insight into the causal relationship between urban rail infrastructure, land use revitalization of stations’ immediately surrounding areas and active travel behavior. The study provides evidence for urban planning, health interventions, and public policy for risk reductions of non-communicable disease in pursuit of more healthy cities. In particular, the studies are exploring the urban design features necessary to induce more walking around stations and thus increase the integration of the new rail networks with exiting urban centres and thereby raise transit ridership via urban design interventions.

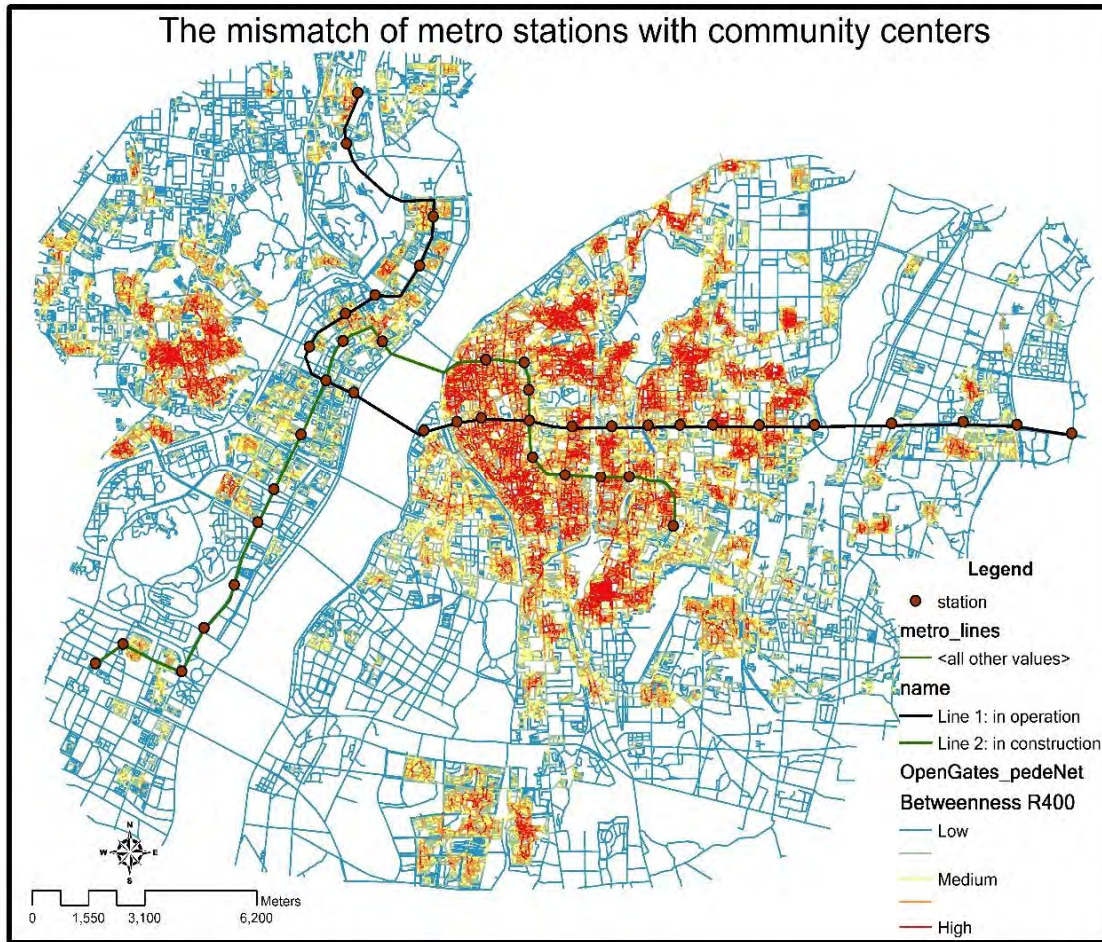


Figure 10.1 An illustration of lack of integration of rail route planning and urban planning in China. Smart city analysis can be used to identify the ‘disconnects’; implement experimental urban designs to encourage better connections; and measure the consequent results in terms of changed walking patterns and, using smart health sensors, changes in individual health.

11 Discussion

With ICT-enabled research methodologies such as described in these projects, HKUrbanLab’s Health High Density Cities group offers new insights to urban planners and public health professionals in pursuit of more healthy cities. Our work will extend to

compiling a comprehensive urban GIS database of sufficient spatial resolution and data-richness to link to HKU Faculty of Medicine’s FAMILY cohort. The work described and cited represents a new phase of scientific evidence in urban planning, drawing on data, sensing and computational technologies unimaginable when the British

spatial statistician John Snow produced his famous map of cholera cases and water-pump locations in the Soho district of London in the 19th century, thereby initiating the Victorians' venture into the science of healthy cities. Our studies have employed data captured by a variety of smart sensors including a colour infrared airborne-sensor; road traffic sensors; stress, brain, heart-rate and blood-pressure sensors worn by human subjects; traditional questionnaire survey instruments; accelerometers worn by human subjects; body scanners; sensors on earth-observation satellites; and more. Data have been captured for individual people; individual links in road networks; individual trees; patches of land across entire cities with a 50cmx50cm resolution; individual bus stops; and many more objects that help us model the healthy city. These technologies make the analysis 'smart', as do the computational algorithms that we have used in commercial analytical software and the computational code we have written ourselves for data organization, conversion, linking and verification and for statistical analysis and visualization.

The results of our analysis and visualization make it possible to target many kinds of urban planning and management intervention with new precision; for example, designing bespoke green space standards for different age groups; optimizing road network design and the design of open spaces to increase transit ridership; advising on density standards for new cities

and new neighbourhoods; and so on.

“

...capacity of the technology has run ahead of the capacity to use the informational products it is capable of producing.....

”

This is just one part of what a 'smart city' entails. Similar stories can be told of other dimensions of urban life: smart transport, smart environmental services; smart retail systems; and so on. For this reason, smart cities should be viewed not so much as just another 'model city' fad in urban planning and architecture but the result of applying the virtually limitless capacity now available to collect, store and analyze urban performance data. As will be apparent from some of the work reported, it is now true to say that the capacity of the technology has run ahead of the capacity to use the informational products it is capable of producing. Enter the new field of urban science. We predict that urban planning in the 21st century will be increasingly informed by the new urban science – a coming together of information science in environmental, health, land use, economics, transport, housing and other domains – and less by social science, though there will always be a role for good social science. Public health scientists' demands are high

when they come to ask urban planners 'how can we design cities to lower obesity or mental health problems or to keep elderly people healthy for a longer time?' The answers require a shift in mindset and investigative and theoretical paradigms among urban planning researchers. One that takes us back to the origins of the modern urban planning profession in empirical research that effortlessly crossed the boundaries between architecture, engineering, environmental science, public health and epidemiology. This presents a challenge to urban planning practitioners as well as academic teachers and researchers: they need to handle their toolkits of policies and other interventions with greater sophistication and precision, understanding better the likely impacts of interventions on the multiple outcomes they seek to affect. Smarter cities will require better evidence. That has a knock-on effect to the training required for urban planners and managers.

HKUrbanLab at the University Hong Kong is our attempt to gear up for this challenge. We welcome partners from industry and government as well as our growing number of corporate technology and data partners and academic partners in Faculties of Medicine, Health, Science and Business and Economics in HKU and beyond. Smart cities means we have to think bigger and in a more interdisciplinary fashion. Coming alongside other disciplines to solve unanswered research questions about city performance, forces us to understand the

contributions of our own disciplines better. In time, smart city technology, research and policy analysis and practice will force the long-needed shift in professional and disciplinary boundaries that so often have hindered rather than helped society grow healthy, wealthy, happy and environmentally efficient and prudent cities.

Acknowledgements

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FEATURE

ENABLING A SMARTER HONG KONG WITH GEOGRAPHIC INFORMATION SYSTEMS

Modified from Timmy Kwong

Dr. Winnie Tang, JP

Founder and Chairman of Steering Committee

Smart City Consortium

According to the United Nations¹, the global urban population is expected to grow by 63 percent to 6.3 billion between 2014 and 2050, compared to an overall global population growth of 32 percent during the same period. There will be 41 megacities, which with over 20 million inhabitants, by 2030. In China alone, more than 250 million rural inhabitants will move to urban areas over the next 12 years². The population of Hong Kong will also grow to the peak of 8.22 million in 2043 as well³.

The accelerating pace of urbanization is intensifying the worldwide problems of

resource shortage, pollution, traffic congestion and deteriorating public safety. Cities in different countries are embracing the idea of Smart City in the hope that it can successfully tackle the urbanization problems, enhance the quality of life of its inhabitants, foster knowledge economy, and create a vibrant eco-system.

In Hong Kong, the SAR Government has shown its ambition to build our home into a world class Smart City. The Policy Addresses and Budgets in recent years have substantial mention of policies related to Smart Cities including the pilot study in

Kowloon East, Water Intelligent Network Project, the development of robots, intelligent home care and continuous promotion of Fintech development.

The Government has also caught people's attention by recognizing the technology of Geographic Information Systems (GIS) as a foundation for city planning and management in the future. In the 2016 Budget Speech the Financial Secretary announced, "We shall refine the existing geographic information systems (GIS) and explore ways to align and integrate the spatial data in Hong Kong, including the location and relevant information of facilities that are above, on and under ground level"⁴. The announcement has raised the expectation of many on the role of GIS in Hong Kong's upcoming development process of Smart City.

“ In fact, Hong Kong has started its journey of Smart City quite early... ”

In fact, Hong Kong has started its journey of Smart City quite early by the implementation of a number of smart technologies like Smart Identity Card, Octopus smart card, the RFID baggage handling system of Hong Kong International Airport. Based on these successes, the city has been ranked the 9th Smartest Cities in the world in 2011 by the

renowned researcher Dr. Boyd Cohen⁵.

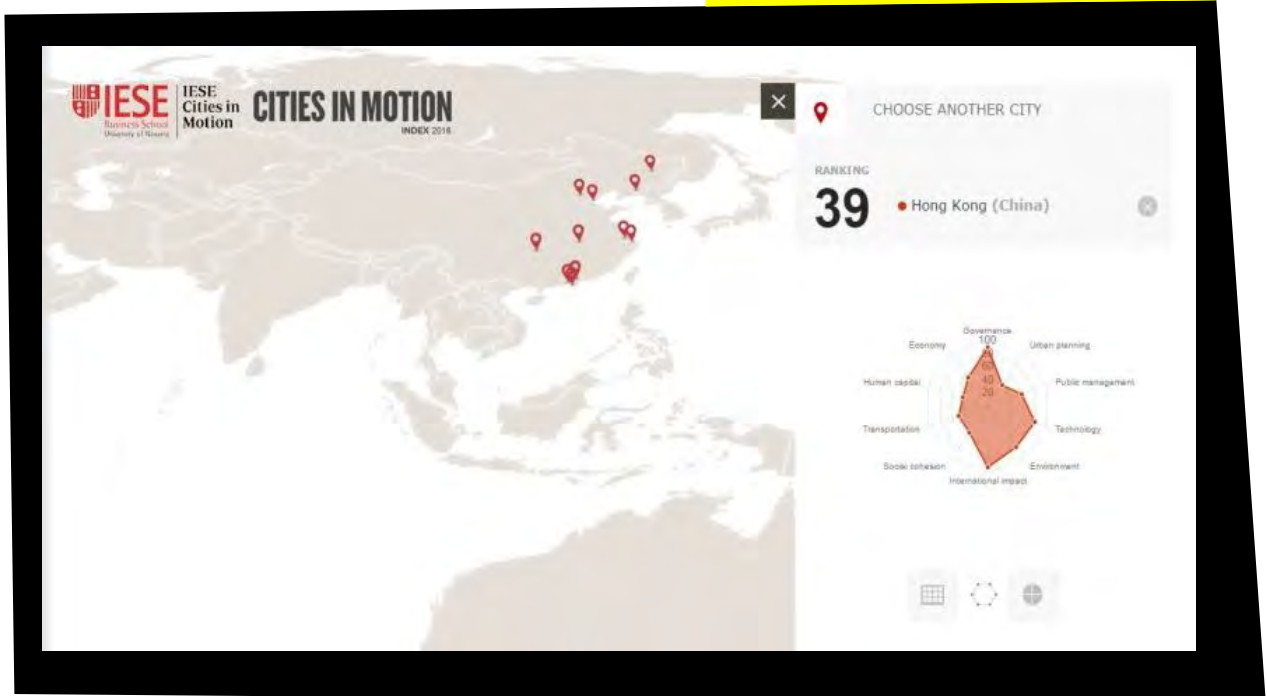
Hong Kong citizens are also heavy users of technology products and telecommunication services. Today, 99% of people in Hong Kong aged 15 to 64 are using Octopus card to travel, shop or dine⁶. The data of the Census and Statistics Department of the HKSAR Government in 2016⁷ shows that there are 16.77 million public mobile subscribers in 2015 and the number of public mobile subscribers per 100 population was 229, making Hong Kong one of the places with the highest ratio in the world. The use of Internet with mobile broadband connection has also proliferated as the mobile broadband subscribers per 100 population increased from 74.5 in 2010 to 193.1 in 2015. In the same year, the international Internet bandwidth per person has reached 4,198 Kilobits per second, an enviable number to most places around the world.

All the facts above indicate that Hong Kong has a solid infrastructure, a tech-savvy population and a mature ecosystem to further its Smart City development. On the contrary, the image of Hong Kong being a world-leading Smart City has been fading in recent years because little development has been made since then.

In IESE Cities in Motion Index 2016⁸, which presents the current ranking of "the world's smartest cities", Hong Kong has been ranked 39th among 181 cities around the

globe and 4th in Asia Pacific region respectively. In the 10 dimensions that constituted the Index, Hong Kong was ranked 3rd on International Outreach, 10th on Technology, 13th on Governance, 20th on Human Capital, 22nd on Economy, 62nd on Environment, 71st on Public Management, 92nd on Mobility and Transportation, 131st in Social Cohesion and 153rd in Urban Planning.

Figure 1 The IESE Cities in Motion Index 2016 shows that International Outreach and Technology are the advantages of Hong Kong, while Social Cohesion and Urban Planning are two of the dimensions that the city needs improvement. (Source of Picture: <http://citiesinmotion.iese.edu/indiceci>)



TOP 5 ASIA-PACIFIC

CITY	REGIONAL POSITION	GLOBAL POSITION 2013	GLOBAL POSITION 2014	GLOBAL POSITION 2015
Seoul, South Korea	1	9	9	8
Tokyo, Japan	2	8	8	12
Singapore, Singapore	3	25	21	22
Hong Kong, China	4	31	32	39
Osaka, Japan	5	50	52	56

Figure 2 Hong Kong is trailing behind Seoul, Tokyo and Singapore among Asia Pacific cities in the ranking of IESE Cities in Motion Index 2016. (Source of Picture: IESE Cities in Motion Index 2016 Report)

Another index about Smart Cities, the Smart City Development Index 2016 compiled by market intelligence firm IDC, has awarded Asia Pacific cities including Beijing, Incheon, Shanghai, Singapore and Taipei for their achievements in different aspects of a Smart City such as Administration, Healthcare, Education, Transportation, Land Use & Environmental Management, and Economic Development. This year Hong Kong failed to repeat the glory after the city won the award of Smart Buildings by Hong Kong Science Park in 2015.

the world and compiled a report⁹. The criteria of the program could also be viewed as a measurement of the progress towards creating a Smart City.

“...scored the lowest in
 "making full use of data to
 improve services and
 promote innovation...”



In 2015, the international assessment program "City Initiatives for Technology, Innovation and Entrepreneurship" (CITIE) reviewed the progress in adopting technological innovation in 40 cities around

Figure 3 Hong Kong was not among the names of the 2016 Winners of IDC Smart City Development Index. (Source of Picture: <http://www.idc.asia/micro/sites/smartcity/awards.html#awardsWinners>)

The assessment divided the progress of city development into 4 stages: "Front Runners", "Challengers", "Builders" and "Experimenters". Among the Asian cities reviewed, Singapore is the only one ranked a "Front Runner". Hong Kong is ranked in the third stage of "Builders", along with Tokyo and Sydney. Among the nine assessment criteria, Hong Kong scored the lowest in "making full use of data to improve services and promote innovation".

its citizens' quality of lives and enabling sustainable development. Therefore, we have to step up our efforts of Smart City Development with a holistic approach. In this regard, the aforementioned Geographic Information Systems (GIS), a technology designed to capture, store, manipulate analyze, manage and present all types of spatial data, can bring a new dimension towards the mission.

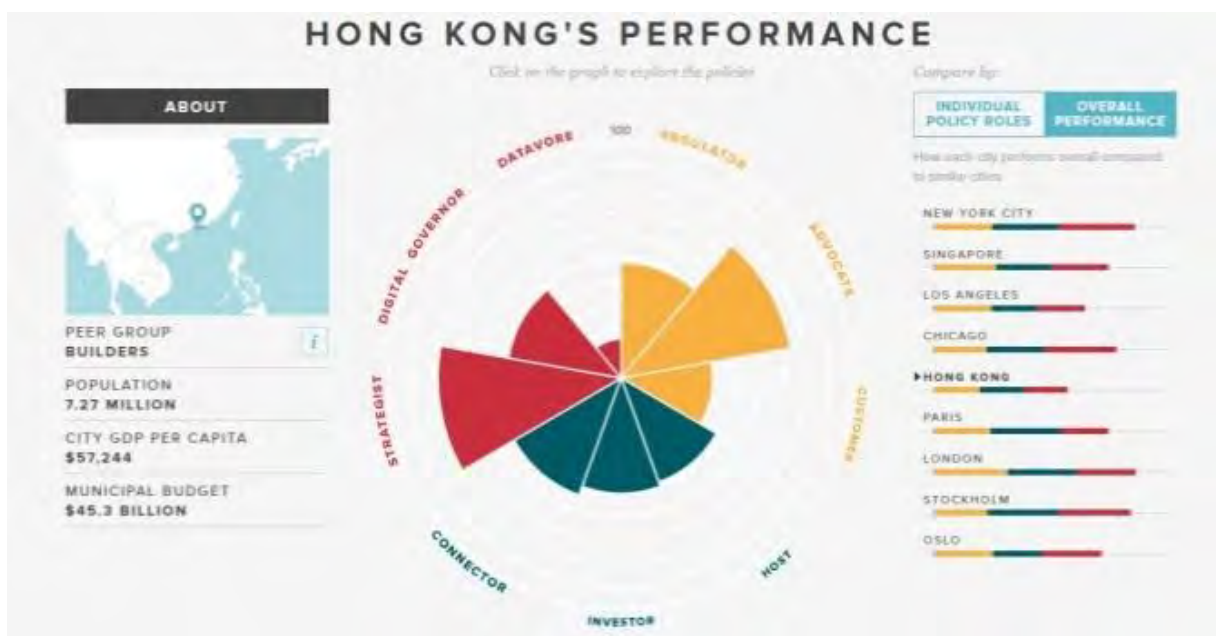


Figure 4 Hong Kong needs to make better use of data to improve city services and promote innovation according to CITIE's assessment. (Source of Picture: <http://www.citie.org>)

Although different assessments and rankings have different criteria, and there may be subjective elements in the assessments, the findings are worth using as a reference. Various rankings and researches have pointed out that although Hong Kong is an advanced city in terms of technology consumption, there have not been significant values created for uplifting

A dominant characteristic of a Smart City is that it creates hubs of innovation which connect people with information and technologies to make better decisions. GIS interacts with technologies like Cloud Computing, Big Data and Internet of Things (IoT), and serves as the core platform to plan, build, manage and maintain Smart Cities by fusing people and processes

together. GIS and mapping are becoming a kind of fundamental language which is providing all the rich content and also context of the things happening in cities. This language facilitates people to have a better understanding of the events happening in Smart Cities and also able to manage them.

**“ Smart City ... connect
people with information
and technologies to make
better decisions... ”**

The geospatial information processed by GIS is vital to understand citizens' needs, collaboration of departments and people, and make timely informed decisions by decision makers. For example, at the planning stage, GIS allows the Government to analyze the population and its demographics based on their geographical distribution. Such analysis enables optimized development of public facilities such as transport, schools and hospitals. The information is also an important foundation for planning the introduction and management of emblematic smart city services like e-health, e-learning and electric vehicles.

Across the world, there are a number of examples that Hong Kong can take as references to make the best use of GIS. The governments of those cities are using GIS to enable safe, livable, prosperous,

healthy and well-run communities. Overall speaking, GIS facilitates the development of Smart Cities mainly in 5 ways:

1. To stimulate Collaboration: GIS connects people with open data – including big data and real time data – across departments and organizations;
2. To raise Awareness: GIS fuses advanced analytics and live data to allocate limited resources and optimize performance;
3. To improve Analytics: GIS uncovers patterns, diagnose problems, and predict behaviors to make data-driven decisions;
4. To enhance Mobility: GIS empowers field staffs with the ability to map, collect, and analyze with data from their mobile devices;
5. To empowers Engagement: GIS shares critical information and open data to inform citizens and build confidence in government leaders.

Seattle - Real Time Crime Center

In the city of Seattle, the Seattle Police Department (SPD)'s real time crime center is an excellent example which utilizes GIS to enable a safe community. The center, which began operating in July 2015, serves as the information hub for the department's "Agile Policing" strategy. Its function is to help officers, investigators and analysts solve crimes more efficiently and effectively.

The center features a massive mounted wall display that shows real time information about active 911 calls separated by priority level, the location of available patrol cars, and more visual data on maps. There is also a piece of business intelligence software installed in the background which pulls historical data from SPD to help detect unusual spikes or anomalies in real-time. Analysts will monitor incoming data and report relevant spikes and trends to commanders, who will ultimately use the information to decide how to best deploy resources and aid officers on the ground the different incidents in real time.

gone off. The department believes the center take them to crime fighting 2.0 which helps them to respond to the community more efficiently and also be more responsive to the needs of police officers.

Auburn - GIS-based Citizen Engagement

The case of Auburn in Alabama¹⁰, a small but fast-growing city of United States, is also worthwhile for us to take a closer look. Growth and development are big concerns for the city of 62,000 residents at the moment as it has been attracting a number of investors including auto manufacturers



Figure 5 Seattle Real Time Crime Center utilizes GIS to solve crimes based on real time data. (Source of Photo: www.esri.com)

With the capabilities of real time crime center, SPD's operational commanders can make quick decisions such as redeploying resources as they see fit if an anomaly in real time has been detected or a flag has

and its population grew 16 percent for the last 4 or 5 years. A new downtown development plan aims to encourage enhancements in the downtown urban core while preserving some rural tracts along the

city's perimeter is underway.

GIS applications have been used both in the development of the city and in the communication process with citizens. The government of the city presents the data of policies and plans in the format of maps so that city residents could easily digest and imagine the effects on their community. For example, they can be assured with visual evidence that their individual properties are not being singled out for restrictions. Realtors, builders, developers and ordinary citizens now can turn to digital maps and find zoning ordinances, future land regulations, school districts and other relevant information. In addition, the open data of traffic, sidewalks, streetlights, parking, sewer lines, and dozens of other city functions released can stimulate the creation of hundreds of story maps and applications to answer questions raised by citizens so that it becomes unnecessary to make calls to city departments in many cases.

Therefore, Auburn's investments in GIS ensure that the Government of the city is engaging its citizens about the best future for their city in an all-around manner. According to an annual citizen survey of the city, 86 percent of respondents say they are satisfied or very satisfied with the overall quality of city services, and 76 percent say they are satisfied or very satisfied with the overall value received for city taxes or fees.

Auckland Spatial Plan

Another example is Auckland of New Zealand. Auckland Council¹¹, a single governing body for managing the largest and fastest growing city of New Zealand, has applied GIS to meet the challenges associated with continued growth and constrained geography, and bring the vision of creating the world's most livable city to life. It has drafted an overall strategy called Auckland Spatial Plan, and have been carrying it out in a number of steps.

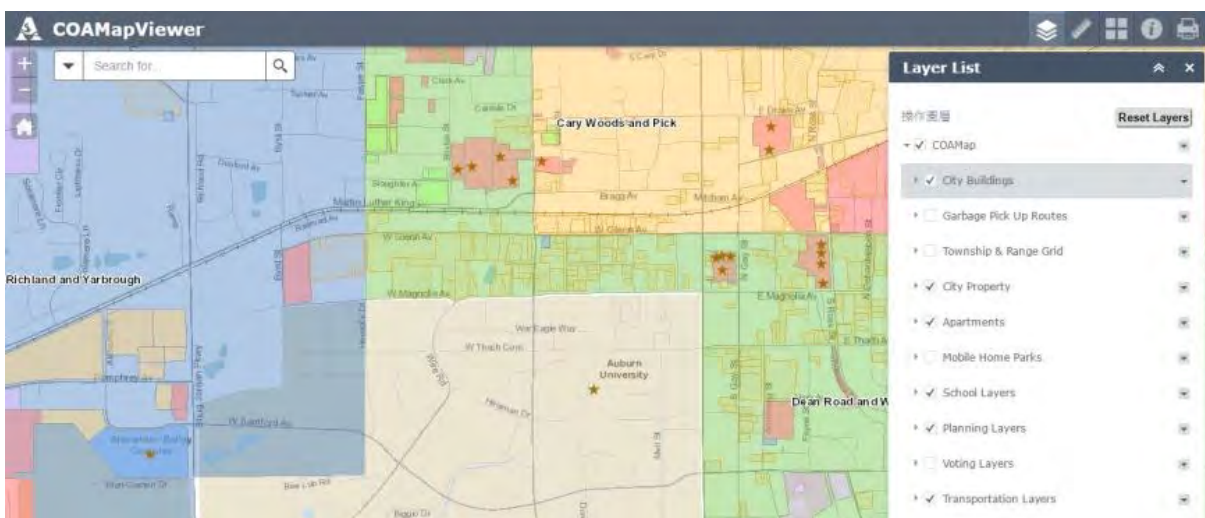


Figure 6 The City of Auburn Map contains the GIS data of the city as well as a number of useful mapping tools. (Source of Picture: <http://webgis.auburnalabama.org/coamapviewer/>)

Firstly, the agency has deployed web-based GIS systems to all of its offices and staff. Then it established various integrated and authoritative systems of record for its engineers and professionals. Those systems were followed by configurable apps which can deliver the information easily, effectively and accurately to the staff of the Council and citizens. Next, the Council began to improve its operation efficiency by maximizing the power of GIS-based apps. Assignments were sent to the mobile devices of responsible workforces and field crews so that blown light bulbs, water pipe leakage, power lines failure can all be fixed in an efficient manner and the city is safer for Auckland citizens.

The final step involves communicating the progress of Auckland Council to its users. It uses Story Maps, which are GIS-powered maps that tell stories, to educate and inform citizens about the renewals and improvements to the public utilities of the city. Under the strategy, Auckland Council is not only targeting to improve the efficiency of the Government and the communication with the public, but also to tackle those long-existing problems such as housing affordability and traffic congestion. The city is well on the way to transform itself into a city which is safe, well-connected, green, resilient, and with many opportunities for its citizens.

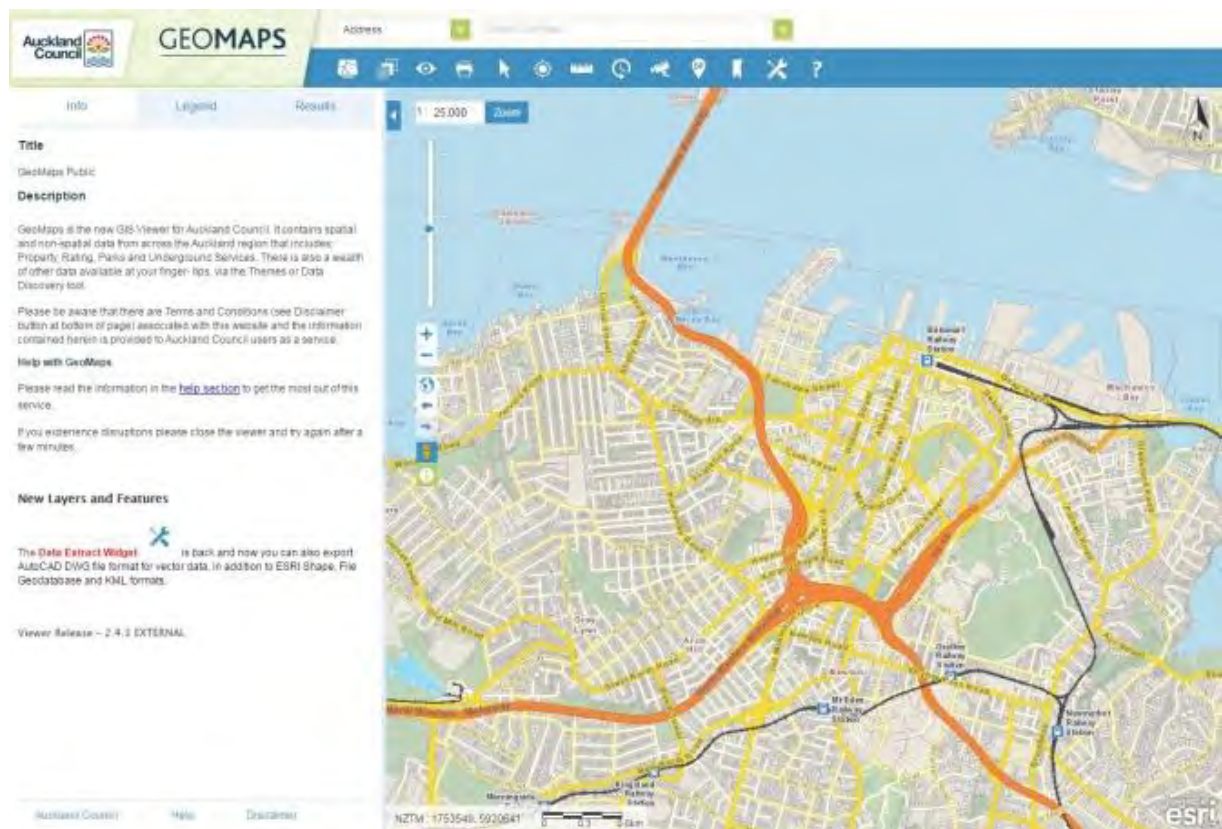


Figure 7 GeoMaps (GIS viewer) shows property information based on Auckland Council's open GIS data. (Source of Picture: <https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>)

Spatial Data Infrastructure

The centralized and open approach the cities like Auburn and Auckland take towards utilizing GIS data can lead to the establishment of a Spatial Data Infrastructure (SDI). The term SDI was firstly used in 1993 by the U.S. National Research Council to denote “a framework of technologies, policies and institutional arrangements that together facilitate the creation, exchange, and use of geospatial data and related information resources across an information-sharing community” (Esri, 2010¹²).

In other words, SDI extends a GIS by ensuring geospatial data and standards are used to create authoritative datasets and policies that support it. It can be implemented narrowly within an organization or more broadly for use at a national, regional, or at global level to enable the sharing of geospatial information. One of the key components within this framework is the open-standard-based Application Programming Interface (API) which provides a standardized and relatively simple way for people to integrate geospatial data to build apps for a Smart City.

Many countries have recognized SDI as an important digital foundation in Smart City development. The United States started its development of a national SDI in 2003. After years of development and enrichment, different geographic information has been

integrated through the GeoPlatform.gov website with APIs available for the general public. Europe and Singapore have also built their own SDIs, called Infrastructure for Spatial Information in European Community (INSPIRE) and the Singapore Geospatial Collaborative Environment (SG-SPACE) respectively.

INSPIRE is a European Union (EU) spatial data infrastructure for the purposes of EU environmental policies and policies or activities which may have an impact on the environment. By adopting common implementing rules, it ensures the geographic datasets and services are understood, compatible and usable across European countries. Therefore the effective access and sharing of environmental spatial information among public sector organizations and the public through the INSPIRE Geoportal ¹³ is possible. A wealth of spatial datasets and services such as transport networks, species distribution, farming and mineral resources can be found on the portal.



Figure 8 INSPIRE Geoportal allows access and sharing of spatial data across Europe. (Source of Picture: <http://inspire-geoportal.ec.europa.eu/discovery/>)

In Singapore, SG-SPACE provides a data-sharing platform which can facilitate better policy, decision-making, governance and day-to-day operation by government agencies. It is also targeted to be extended to private sectors for value and knowledge creation. One of the most well-known initiatives under SG-SPACE is the OneMap portal¹⁴, which allows

government departments, businesses and individuals to create services and apps by mashing up public geospatial information via APIs to create services and apps for their specific needs. Up to now, hundreds layers of spatial data have been contributed by public agencies and a number of private projects that aim at creating new business opportunities and improving workforce productivity have been implemented.



Figure 9 Query of property prices is one of the services provided by the OneMap portal. (Source of Picture: www.onemap.sg)

Los Angeles GeoHub

In January 2016, the Los Angeles (LA) Government launched a city level SDI called GeoHub¹⁵. It is a web portal which contains more than 500 kinds of public geographic information provided by various city departments and many apps utilizing the information. It aims to improve public awareness of community issues, and also enhance government departments' efficiency and cooperation. GeoHub currently also collects information like public road works and traffic black spots from public and private sectors.

future. By making the data available to residents, the GeoHub helps the citizens to better understand their communities, and City departments to better coordinate construction, road paving and public safety efforts.

There are 3 “flagship” apps that can show the power and range of the hub. “Streetwize” shows all of the permitted activities on the City’s public roads; “The Road to 2400” tracks the Bureau of Street Services’ progress on paving about 2,400 lane miles per year; and “Vision Zero High

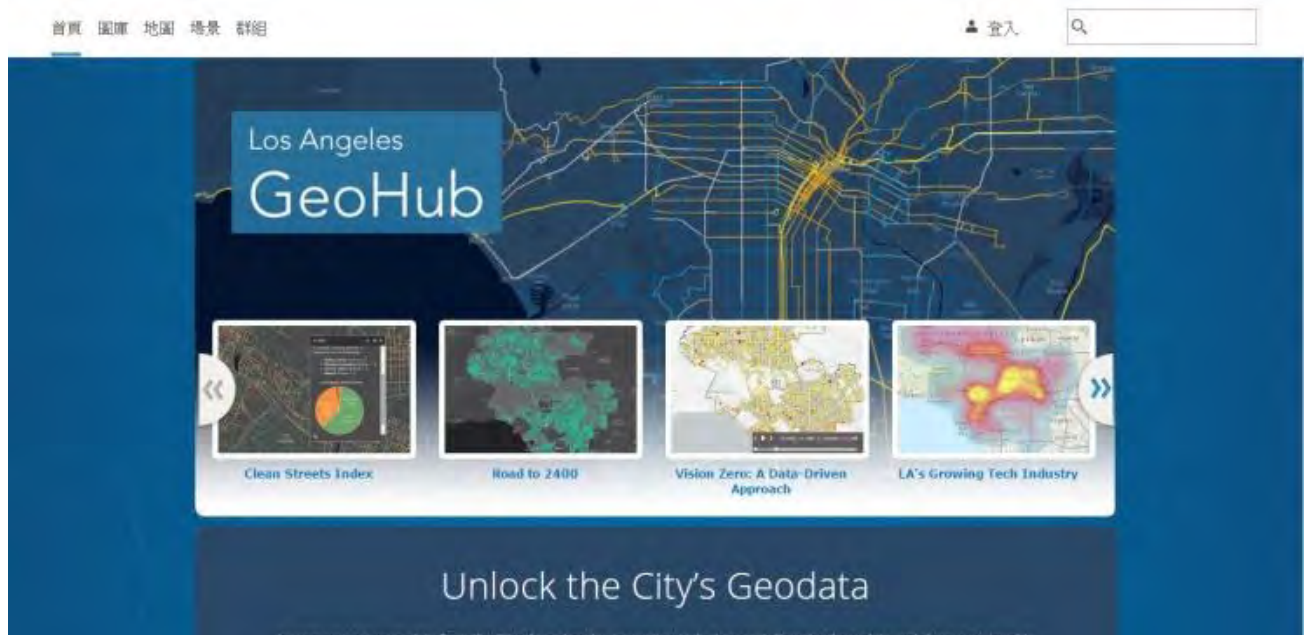


Figure 10 Anyone can use the open GIS data from the Los Angeles GeoHub to share insights with citizens or build new applications that serve specific users at no cost.

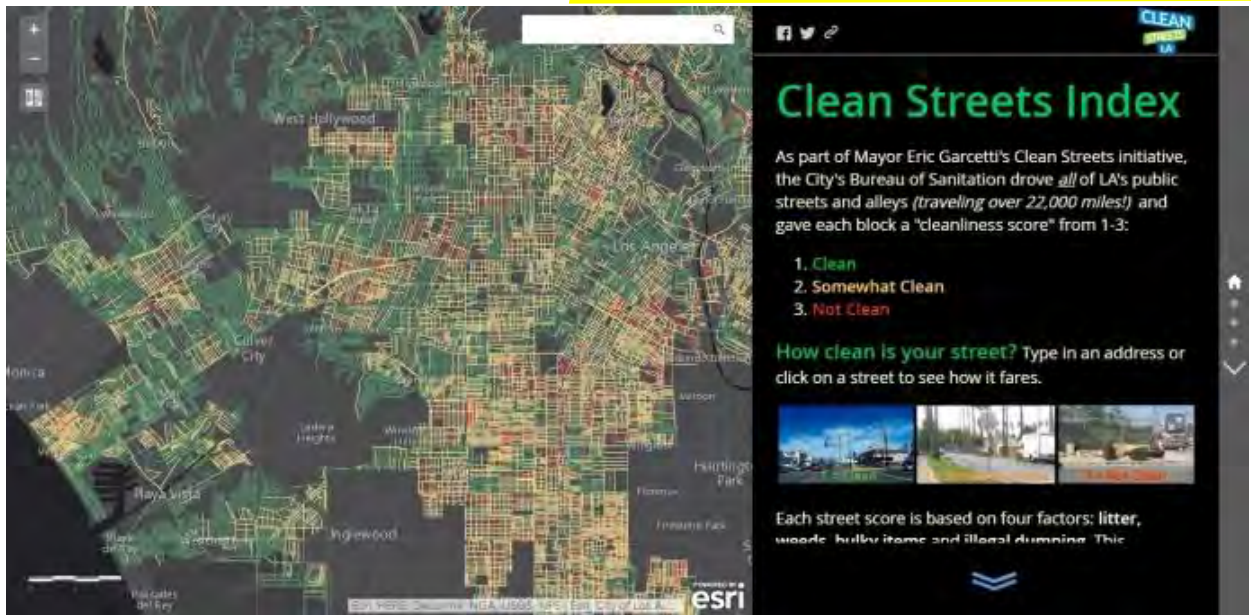
(Source of Picture: <http://geohub.lacity.org/>)

The GeoHub is in a central part of the foundation that will make Los Angeles smarter and more responsive for the coming

Injury Network” helps to improve pedestrian safety by providing users with key information including where school and high

speed streets intersect. Other applications include “Clean Streets Index”, which shows the “cleanliness scores” of streets and alleys in LA, and “LA’s Growing Tech Industry”, which shows what types of tech businesses have registered and where they are distributed in LA area.

Figure 11 Clean Streets Index aims at enhancing public awareness of the importance of keeping the streets of LA clean and hygienic. (Source of Picture: <http://lahub.maps.arcgis.com/apps/MapJournal/index.html?appid=7279dc87ea9e416d9f90bf844505a54a>)



SDIs similar to INSPIRE, SG-SPACE and Los Angeles GeoHub promote technology education, creativity, innovation and entrepreneurship. Through sharing the APIs, the private sector or individuals that are familiar with programming can utilize the geographic information, like real-time traffic condition, road works, building inspections, business statistics from a SDI to create their own innovative apps or services for betterment of the society. Furthermore, the digital economy of a city can be boosted if a significant number of young entrepreneurs can start their businesses of smart apps and more jobs are created.

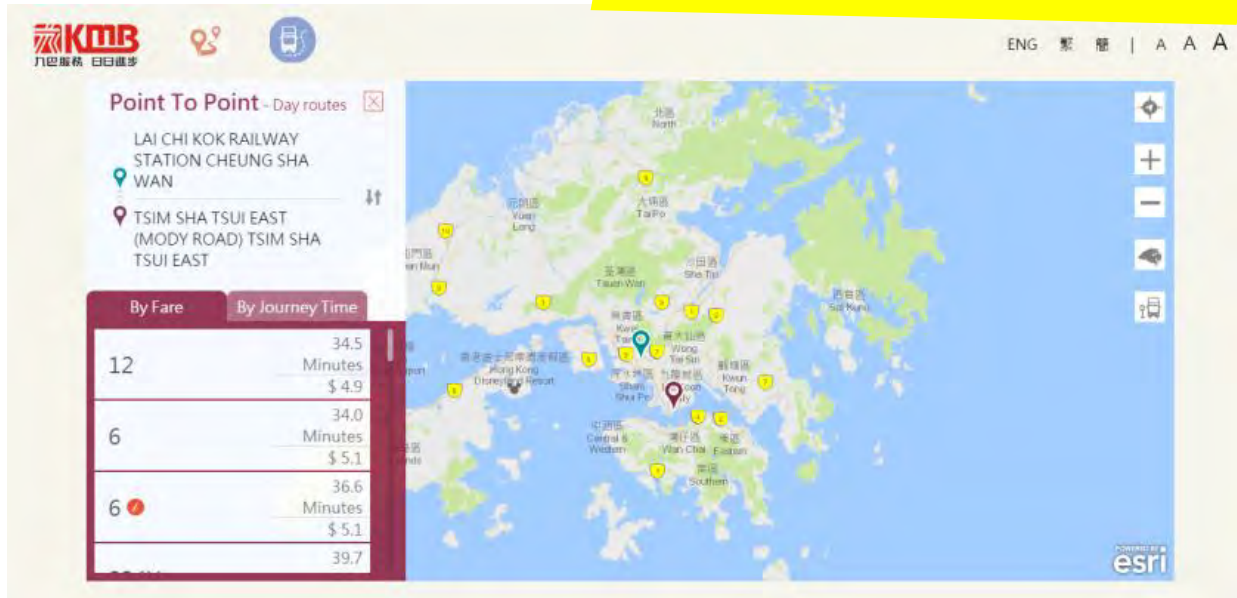
SDI for Hong Kong

Although many Hong Kong government departments have well-developed GIS, they are limited for internal use and not available to the public. In other words, Hong Kong does not have a SDI right now.

Different government departments like Lands Department, Highways Department, Civil Engineering and Development Department have their dedicated GIS. But there is not much data sharing among them, nor significant amount of these kinds of information have been released to the public. In addition, sharing of real time geospatial

data from organizations and companies in private sectors is also uncommon because of business consideration and other related reasons.

Figure 12 It would be encouraging for more companies from private sectors like public transportation to share real time geospatial data through API for establishing Hong Kong's SDI. (Source of Picture: <http://search.kmb.hk/KMBWebSite/index.aspx?lang=en>)



Fortunately there are still some good examples of the Government departments working together to offer geographic information for public use. Currently, the GeoInfo Map, which is developed by the Lands Department, contains over 180 kinds of spatial data provided by 26 government departments. The main shortcoming of it is that it does not provide APIs. It can be further developed into a SDI by offering its geospatial data through the public sector information portal of the Government (<https://data.gov.hk>) with APIs, and collaborating with various government departments and the private sectors, so that IT startups and even ordinary citizens can take advantage and integrate the data in innovative apps. There are also some

voluntary efforts from private sectors to convert public data into API-ready format such as the Open-Source Geo-Spatial Data Portal¹⁶ which can be a valuable resource for apps development.



Figure 13 GeoInfo Map is a good source to obtain geographic information of Hong Kong although it is not a SDI. (Source of Picture: <http://www.map.gov.hk>)

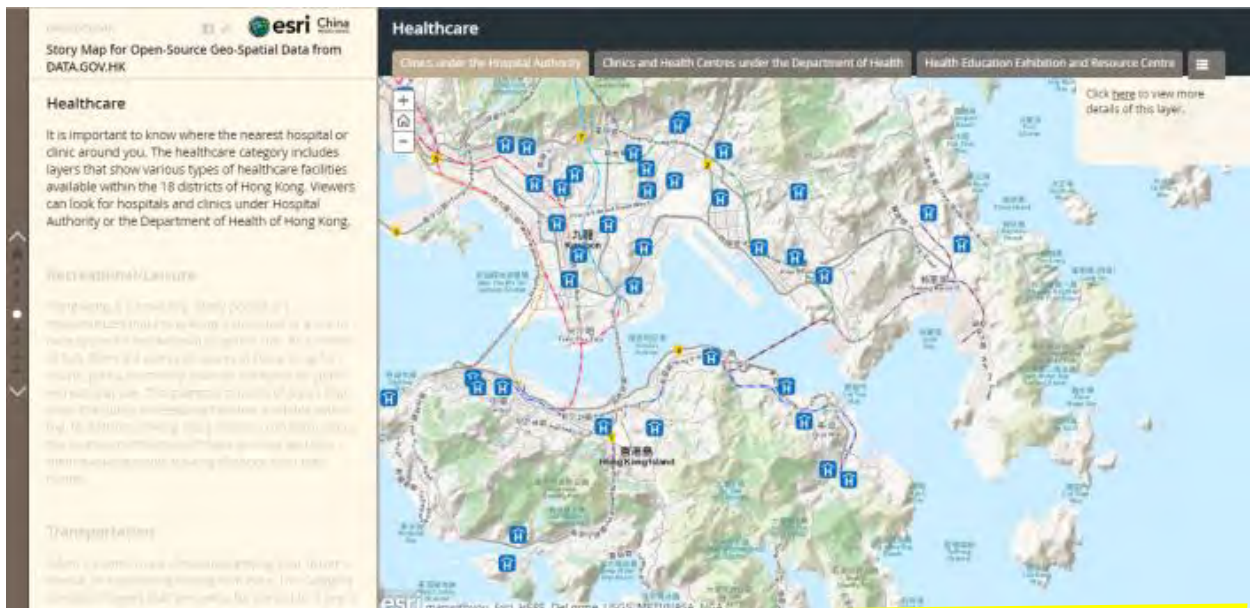


Figure An Open Geo-Spatial Data Portal of Hong Kong which has utilized the data of data.gov.hk and created different types of layers and webmaps. (Source of Picture: <https://esrihk.maps.arcgis.com/apps/MapJournal/index.html?appid=c4cf5eafc03740c8b8c67a59c0e0777e>)

A well-developed SDI of Hong Kong can be used to exploit the possibilities for the city to improve and transform in its economic,

environmental and social aspects. The SDI can also serve as the foundation for the city to move into a citizen-driven Smart City,

or Smart City 3.0 as defined by Dr. Boyd Cohen¹⁷. According to him, there seems to be three distinct phases of how cities have embraced technology and development, moving from technology-driven, to city-Government driven, and finally to citizen-driven.

Therefore in a Smart City 3.0, citizens are actively working together with businesses, public and private organizations and government agencies to realize the vision of Smart City. Maps, web sites and applications can be developed based on the SDI for information sharing, discussion and collaboration, so that everybody will be in the same page on the journey. It can also help to alleviate the aspects of the city that need improvement such as social cohesion, urban planning, data-driven innovation as pointed out by the aforementioned IESE Cities in Motion Index 2016 and other studies of Smart City.

Recommendations to establish a SDI for Hong Kong

A well-developed SDI could only be possible with the support of a sound legal institutional and technological framework to facilitate its functions. According to Masser et al (2008), there are three major strategic factors for the development of an efficient and effective SDI:

- i) Inclusive implementation approach – involving a large

number of stakeholders from all levels of Government, private sector (including the NGOs and the public at large), and universities and other research institutes;

- ii) Emphasis on data sharing between different kinds of organizations – to gain easy data access and to minimize efforts in collecting and maintaining data; and
- iii) Development of effective GIS platforms to facilitate easy and convenient access to information (both spatial and textual data) and related services – taking advantage of SDI as an infrastructure for linking data users and data providers through data sharing.

Therefore the Hong Kong Government plays an important role as both the initiator and the facilitator in the planning and implementation of SDI. It is the key that the Government should take the lead – by collaborating with various departments, and across to the private sectors to define the level of service and clearly articulate the roadmap.

“ ... high-level Government body should be set up to coordinate the major tasks...”

A high-level Government body should be set up to coordinate the major tasks, including standardization of data and the setting up of a framework to develop guidelines for the definition, collection and processing of data. Open data and availability of APIs should be the basic standard in information services provided by the authority and all Government services should be “digital by default”. It is also important to consider developing a classification of major components of SDI, including access network, policies and standards. This classification is analogous to a big data dictionary for all SDI-based applications and services in the city.

In addition, the Government should identify and review the relevant laws and regulations for the development of technologies, usage of data, particularly protection of privacy and personal information. The prevailing and proposed ordinances should be flexible enough to accommodate the technological changes and overcome potential risks. To achieve good results, policy-makers should implement the development processes in a holistic manner.

Conclusion

In summary, Hong Kong must continue its journey of Smart City development because of limited resources and the demand on quality of lives from citizens.

By embracing the highly efficient management and innovative services brought by GIS and SDI, a Smart City will absolutely enrich our lives. The initiative will have a direct impact in tackling urbanization problems, and an indirect impact by freeing up manpower and resource to develop further ways for improving our city. Although we may face economic and logistical challenges along the way, the development of a smart city can mean a brighter future is ready for all of us.

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world-leading Smart City has been fading in recent years because little development has been made since then.

In IESE Cities in Motion Index 2016¹⁸, which presents the current ranking of “the world’s smartest cities”, Hong Kong has been ranked 39th among 181 cities around the globe and 4th in Asia Pacific region respectively. In the 10 dimensions that constituted the Index, Hong Kong was ranked 3rd on International Outreach, 10th on Technology, 13th on Governance, 20th on

Human Capital, 22nd on Economy, 62nd on Environment, 71st on Public Management, 92nd on Mobility and Transportation, 131st in Social Cohesion and 153rd in Urban Planning.

1 <http://esa.un.org/unpd/wup/highlights/WUP2014-Highlights.pdf>

2 <http://www.nytimes.com/2013/06/16/world/asia/chinas-great-uprooting-moving-250-million-into-cities.html?pagewanted=all&r=0>

3 http://www.censtatd.gov.hk/press_release/pressReleaseDetail.jsp?pressRID=3799&charsetID=1

4 <http://www.budget.gov.hk/2016/eng/budget10.html>

5 <https://www.fastcoexist.com/1679127/the-top-10-smart-cities-on-the-planet>

6 <http://www.octopus.com.hk/about-us/corporate-profile/services-in-hong-kong/en/index.html>

7 <http://www.statistics.gov.hk/pub/B11100062016AN16B0100.pdf>

8 <http://www.ieseinsight.com/fichaMaterial.aspx?pk=129948&idi=2&origen=3&ar=15>

9 http://citie.org/assets/uploads/2015/04/CITIE_Report_2015.pdf

10 <https://www.auburnalabama.org>

11 <http://www.aucklandcouncil.govt.nz/>

12 <http://www.esri.com/library/brochures/pdfs/spatial-data-infrastructure.pdf>

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14 <http://www.onemap.sg>

15 <http://geohub.lacity.org/>

16 <https://esrihk.maps.arcgis.com/apps/MapJournal/index.html?appid=c4cf5eafc03740c8b8c67a59c0e0777e>

17 <https://www.fastcoexist.com/3047795/the-3-generations-of-smart-cities>

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FEATURE

VISION OF ITS TO ENABLE SMARTER HONG KONG



Modified from Timmy Kwong

Ir. Sam Pang

In the article, the author wishes to highlight the importance of ITS in meeting the transport needs of Hong Kong, and on a wider perspective the role of ITS in sustaining Hong Kong's status as an international city and competitiveness. This article focuses on road transport as rail transit has already been given quite some emphasis in the Government's Comprehensive Transport Study.

What is ITS?

Intelligent Transportation Systems (ITS) refers to the application of advanced information and communication technologies (ICT) in transportation systems to enhance safety and increase efficiency of the transport systems and improve environment. ITS can increase the throughput of the transport systems without expanding the corresponding infrastructures. In other words, ITS can optimize the utilization of the existing transport infrastructures.

A Brief Overview of ITS in Hong Kong

The development and deployment of ITS in Hong Kong is mainly led by the Government. There are however private-sector operators and service providers providing ITS related services such as electronic toll collection, fleet management, mobile applications, etc.

The Government's approach to delivery of ITS in Hong Kong is based on a partnership between the Government, industry and academia / professionals. The Government aims to provide safe, reliable,

and sustainable integrated transport systems and services. The Government's ITS framework is illustrated in **Figure 1** and briefly described in the following paragraphs.

motorists to make route choice. The Speed Map Panel System installed on strategic routes from the New Territories to Kowloon performs similar function by displaying traffic conditions in form of graphical maps.

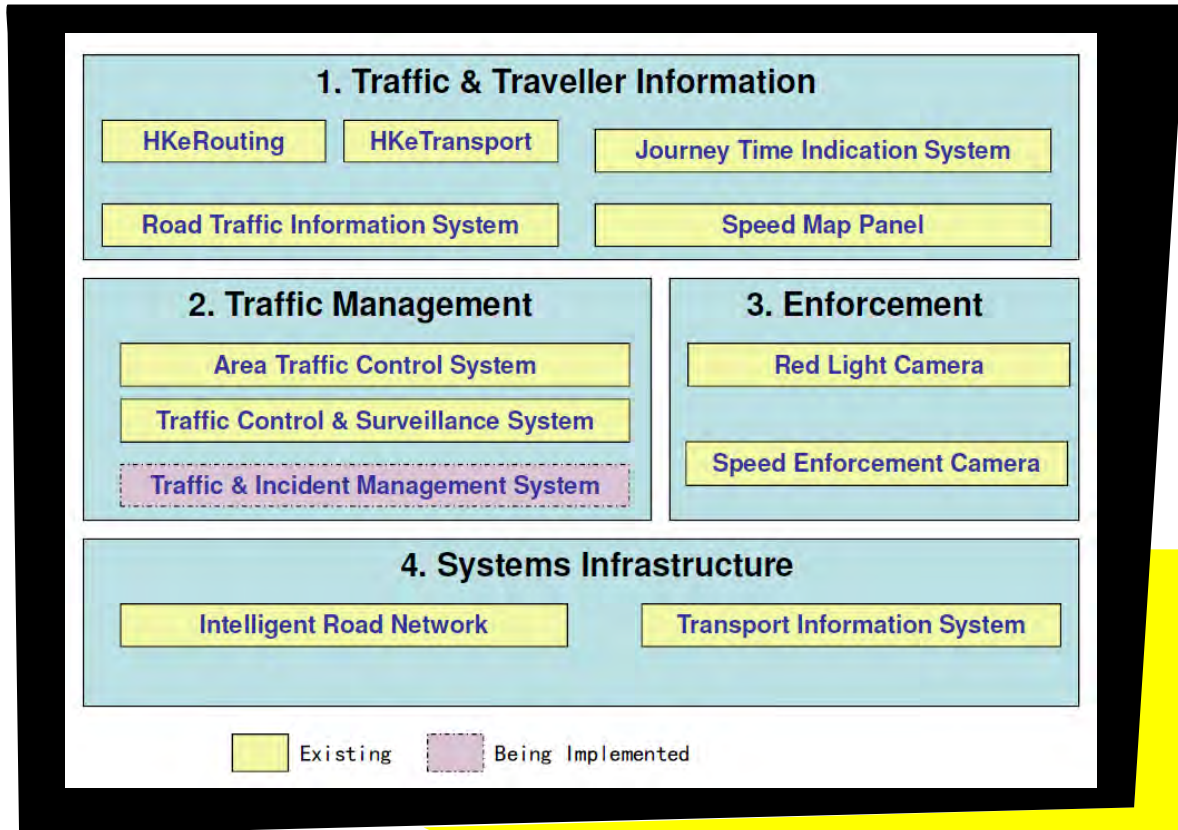


Figure 1 Government's ITS Deployment Framework

Traffic and Traveller Information

- Motorists and commuters can find driving route or mode and route of public transport to their intended designations with the aid of the HKeRouting and HKeTransport web sites or mobile applications; and static and dynamic message signs provided on the roads.

The Journey Time Indication System displays the estimated journey times on approaches to the three cross harbor tunnels for crossing the harbour to assist

Traffic Management - Area Traffic Control

(ATC) Systems (traffic signals), installed at road junctions, determine and coordinate timing of traffic signals according to the current traffic conditions to reduce journey time and stopping.

Computerized Traffic Control and Surveillance Systems (TCSS) are installed at major road tunnels and control areas. With the employment of state-of-the-art technologies, TCSS monitors the traffic conditions; detect incidents and

automatically initiate response plans to enable speedy recovery of normal traffic conditions.

Enforcement - Red light cameras and speed enforcement cameras are in operation to improve compliance status and deter non-compliance with traffic regulations.

System Infrastructure - Operations of the above systems are supported by the following backend systems:

- Intelligent Road Network (IRN) is a Geographic Information System (GIS)-based system providing information on traffic directions, turning movements at road junctions, stopping restrictions, etc.
- Transport Information System (TIS) is a consolidated database of transport and traffic data and information.

ITS projects being implemented by the Government include:

- **Traffic and Incident Management System (TIMS)**, which automatically detects traffic incidents across Hong Kong; generates holistic traffic diversion / incident response plans with the aid of an expert system; and disseminates related information to stakeholders.
- **Traffic Detector Installation** – addition of about 400 traffic detectors of various types on the strategic routes

to provide more real-time traffic information to TIMS; the public through various media; and build up Big Data for transport in Hong Kong.

- **Citywide Traffic Control Centre**, which provides a platform for citywide traffic management at a single location.
- **TCSS** of tunnels and highways under construction and planning
- **Pilot project of parking meter upgrade** – The parking meter system on trial accepts payment by multiple contactless credit cards and the Octopus card.
- **Districtwide parking information system**, which provides information on locations of carparks and remaining number of parking space available in each carpark.
- Those smart mobility initiatives being on trial under the Energizing Kowloon East Project such as Smart Carpark, Smart EV Charging Facility and Collision Avoidance System.



ITS projects initiated by the private sectors include:

- **Bus arrival time information system**
– Mobile applications and bus arrival time display boards at selected bus stops implemented by the bus operators.
- **Real-time journey time estimation algorithm** developed by academia that takes into account of traffic network uncertainty and the on-time arrival probability of a traveler at a destination.
- **Mobile applications** – Traffic information, taxi calling, etc. developed by various ITS service providers.

The above projects will augment the existing ITS and further improve the efficiency of the existing transport systems.

“
...ITS has brought much
convenience...comparable
to mobile phone.... ”

Is ITS Optional or Essential?

ITS is not just something good to have. Apart from achieving enhanced safety, increased efficiency and improved environment that were the three fundamental objectives when the concept of ITS was first evolved in 1980's, ITS has brought much convenience to commuters in a manner comparable to that of mobile

phone. Commuters have been habitually enjoying the convenience brought by ITS without even paying particular attention to their existence. One can imagine how chaotic it would be nowadays a day without traffic signals and message signs on the roads, journey time indication, bus arrival time information or GPS route guidance. ITS has indeed become an essential part of our daily life. Apart from service objectives, ITS is a key in smart city development which is a world trend that we cannot simply ignore anymore.

World Trends and Their Impacts to Hong Kong

Technological advancements and applications in ITS have been evolving very rapidly. There are new ITS technologies, products and services launched every year. A recent award-winning technology combines the beauty of renewable energy with smart traffic sign. The sign is made of the same low power consumption illuminating foil used in mobile phone screens with a transparent layer of photovoltaic cells so its surface doubles as solar panels making it self-powering.

The author considers that some of these technologies or emerging technologies would impact Hong Kong.

Autonomous Vehicles and Cooperative Vehicles –

Autonomous vehicles refer to self-driving vehicles whereas connected vehicles refer to vehicles in constant communication with

nearby vehicles and the roads. Many of the world brands of carmakers manufacture autonomous and cooperative vehicles to various degrees of autonomy. They have been test running such types of vehicle on public roads for years. Besides, some non-carmaking conglomerates have invested in the research and development of autonomous vehicles and trial running them.

Under a research partnership scheme of the Land Transport Authority of Singapore, self-driving taxi service is being on trial run in Singapore with an ultimate goal of having a fully self-driving taxi fleet in Singapore by 2018. Each car is fitted with six sets of Lidar, a detection system that uses lasers to operate like radar, including one that constantly spins on the roof. There are also two cameras on the dashboard to scan for obstacles and detect changes in traffic lights. The taxi operator, an autonomous vehicle software startup formed by two Massachusetts Institute of Technology researchers, expects autonomous taxis could ultimately reduce the number of cars on Singapore's roads from 900,000 to 300,000.

Behind supporting autonomous vehicle research, the Singapore Government's vision is to take advantage of self-driving technology to overcome the constraints in land and manpower in Singapore, and to look for non-traditional ways to grow its economy.

Moreover, there are also self-driving shuttle bus and self-driving taxi service being on

trial run respectively in Leon of France and Pittsburgh of USA.

When these vehicles or related services are to be imported to Hong Kong, relevant laws and road infrastructures should have been in place to support the development. For Hong Kong as an international city, it would be too late to propose amendments to the relevant laws and construction or modification of road infrastructures after carmakers and service providers knock our door. This should be planned ahead.

Big Data Analytics of Transport and Traffic Data

– Big Data is a broad term for large or complex datasets which after analysis using advanced techniques, can reveal much more useful information than that can be obtained by traditional datasets. Huge volumes of probe data are collected through navigation systems, roadside vehicle detectors and mobile communication devices. With such 'big data', new services for personal mobility and business operations as well as public applications for policy performance measures and emergency operations are



rapidly emerging. Leaders from both the private and public sectors in many parts of the world have taken part in vigorous discussions on the potential and implications of big data. Big Data Analytics should be accomplished with a holistic data framework in place to ensure the platform is robust, future-proof and will not require major retrofits when additional datasets are to be imported to the system.

Electric Vehicles (EV) by nature are pollution-free on roads. There is an ever increasing use of EVs in Hong Kong. However, it is expected that the growth would experience bottleneck when the corresponding increase in charging stations cannot cope with it. Recently two local utility companies join force to launch charging services for private and corporate / company customers. However, it is anticipated that the service would still be constrained by the availability of charging infrastructures and local electricity supply network capacity.

To cope with the growth, more charging stations are required, either implemented by way of Government-led programme or charging service projects initiated by the private sector with supporting Government policy. In the long term, the subject of EV charging solutions should be addressed right from the planning stage as part of city infrastructure planning.

Innovations and technologies advance rapidly nowadays. The above technologies that would impact Hong Kong

are by no means exhaustive and more would continue to evolve. Moving forward, to sustain Hong Kong's competitiveness and its status as an international city, it is imperative that our transport and planning policies should adequately address these trends at policy level and with action plans. Timing is one of key success factors as technological advancement and smart city development are also happening in many other cities around the world. The action plans should aim to keep Hong Kong at the forefront of these cities. In the longer-term, a governmental task force that can effectively work with various related government departments to execute the plans should be established.

“
...our neighbouring cities
have done better than Hong
Kong in smart city
development.....”

End or Beginning?

Hong Kong used to be ranked high in a number of city development indexes. However, in 2016, International Data Corporation (IDC) published a report titled Smart City Development Index 2016 Review indicates that our neighbouring cities like Taipei, Incheon, Singapore, Shanghai and Beijing have done better than Hong Kong one way or the other in smart city

development. In terms of transportation, Hong Kong is lagging behind Taipei and Singapore in 2016 and 2015 respectively. Although different indexes have different attributes and may lead to different ranking, the outcome of IDC's report deserves our deep reflection.

Is there a genuine need or drive for Hong Kong to excel further on ITS to make its smarter? Different comments on this subject were noted by the author. Some people question if the stakeholders' quest for ITS initiatives from the Government are mainly their own wish triggered by their experience in some impressive ITS in other countries and may not be founded on genuine needs of Hong Kong. Some comment that mass transit systems have been identified as the main mode of transport in Hong Kong which would

suggest that the need for development of ITS is less critical. However, if this subject is approached from the perspectives of livability, economic growth, environmental friendliness and competitiveness, there are strong reasons for Hong Kong to excel further in ITS in a world of smart cities. ITS reduces congestion as one of its fundamental objectives and thus improve environment. Besides, ITS also opens wider choice and offers smart means of transportation to allow different life styles. With the support of policy, ITS can become an area of economic growth, which is being pursued in some of our neighbouring cities. These benefits together will increase Hong Kong's competitiveness. In this regard, the author believes a key and the first step towards success is to have a broad vision.





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COLUMNS

JUMPING ON THE BANDWAGON OF SMART CITY



Photo Credits: Mr. Nelson Yung

Jimmy C.F. LEUNG

Jimmy C.F. Leung is currently an Adjunct Professor, Department of Geography and Resource Management, the Chinese University of Hong Kong and Honorary Professor, Department of Urban Planning and Design, the University of Hong Kong. Views expressed are his own and do not represent those of the organisations he is associated with.

Concept and Definition of Smart City

“Smart City” seems to have become hype in Hong Kong after it was successively mentioned in the 2015 and 2016 Policy Addresses. People inevitably ask if smart city is just another buzzword that will become outdated after a while. There are many such examples in the past when

different labels were given to cities like garden city, green city, eco city, just city, sustainable city, creative city, digital city and resilient city, each with a theme which is probably reflecting the main concerns of a particular period of time. They are important concepts contributing to the long-term sustainability of cities and will therefore continue to be relevant to city

development, albeit the terms may become out of fashion.

What then is a smart city? While the concept of smart city has been around for more than 20 years, there is difficulty in coming up with a commonly agreed definition. The government has the term defined as,

*“A smart city is the leverage of ICT to address challenges and optimise resources to create a sustainable living environment for citizens. The main benefit of smart city is enhancement of quality of life of its citizens. Smart city also enables efficient resources allocation through optimisation and personalisation. It results in sustainable economic development and creates a sustainable environment, which lessens carbon dioxide emission and increases the efforts on energy conservation.”*¹

Another definition has aptly explained the concept and put it in the context of urban challenges communities face today,

“A Smart City or community is one, which successfully harnesses the most powerful tool of our age – digital technology – to create opportunities for its citizens; to

1

http://www.ogcio.gov.hk/en/news_and_publications/speeches/2015/04/sp_20150416_3.htm

*address the most severe acute challenges the human race has ever faced, arising from global urbanisation and population growth and man-made climate change; and to address the persistent challenge of social and economic inequality. The policies and investments needed to do this demand the highest level of political leadership at a local level where regional challenges and resources are best understood, and particularly in cities where they are most concentrated. Those policies and investments will only be successful if they are enabling, not directing; if they result from the actions of leaders who are listening and responding to the people and communities they serve; and if they shape an urban environment and digital economy in which individual citizens, businesses and communities have the skills, opportunities and resources to recreate their own success on their own terms.”*²

In a nutshell, the pursuit of smart city should aim at addressing challenges faced by individual cities and should be grounded within the context of achieving sustainable development. As cities are at different stages of development with variations in context, there is no one-size-fits-all smart city solution.

² <https://theurbantechnologist.com>

Hong Kong's "Smart City" Initiatives in the past

Is Hong Kong a smart city? The answer is both yes and no. Hong Kong has strong ICT infrastructure, a foundation for smart city. It obtained high positions in global standings for IT infrastructure in the Global Innovation Index 2015, the Cloud Readiness Index 2014 and the World Economic Forum's Global Information Technology Report. On the other hand, there is still a long way to go in terms of achieving smart economy, smart environment, smart governance, smart living, smart mobility and smart people. This becomes apparent after examining Hong Kong's past efforts in this regard.

After Hong Kong's reunification with China, the then Chief Executive articulated a vision "to make Hong Kong a leader, not a follower in the information world of tomorrow" in his 1997 Policy Address.³ The vision kick-started systematic efforts to develop information technology by the government.

The vision was closely followed by the release of the 1998 Digital 21 IT Strategy which aimed to "enhance and promote Hong Kong's information infrastructure and services so as to make Hong Kong a leading digital city in the globally connected world of the 21st century."⁴

³ Policy Address, 1997, available at <http://www.policyaddress.gov.hk/pa97/english/patext.htm>

⁴ 1998 Digital 21 IT Strategy, available at <http://www.digital21.gov.hk/eng/strategy/1998/index.htm>

The Strategy was later reviewed in the 2001 Digital 21 Strategy which aimed at: "[C]onnecting the World is to develop Hong Kong into a leading digital city in the globally connected world." and "capitalising on Hong Kong's early success in establishing a world class environment for the information economy. Its focus is on promoting further developments in the information economy to improve overall wealth, economic and social prosperity of Hong Kong."⁵

It is acknowledged in the 2004 "Digital 21 Strategy Sustainability and Opportunities" that "government leadership and commitment is vital in realizing our goal of building Hong Kong as a leading digital city in the region" and that "the Government should be an effective facilitator to enhance the innovative capability of both industry and the community, promote the development of industry and enterprises, and in this process encourage investment and innovation in IT."⁶

The 2008 Digital 21 Strategy contains five key action areas:

- "Facilitating a digital economy;
- Promoting advanced technology and innovation;

⁵ 2001 Digital 21 IT Strategy, available at <http://www.digital21.gov.hk/eng/strategy/2001/index.htm>

⁶ 2004 Digital 21 Strategy, available at <http://www.digital21.gov.hk/eng/strategy/2004/31.htm>

- Developing Hong Kong as a hub for technological cooperation and trade;
- Enabling the next generation of public services; and
- Building an inclusive, knowledge-based society”⁷

It is in the 2014 “Digital 21 Strategy Smarter Hong Kong, Smarter Living” that the term “smarter city” first appeared replacing “digital city” in the previous strategies. It is stated that “[W]e envision Hong Kong as a world-renowned smarter city where technology helps improve quality of life by enabling:

- Citizens and visitors to be more engaged with, and understood by, businesses and government agencies through intelligent and interconnected touchpoints;
- Businesses to be more innovative in anticipating changing customer needs, and growing and expanding beyond Hong Kong borders both physically and digitally;
- Hong Kong's ICT industry to continue to be successful and reach new heights by exploiting both the technology

⁷ 2008 Digital 21 Strategy, available at <http://www.digital21.gov.hk/eng/strategy/2008/forword.htm>

possibilities and the opportunities in the Mainland;

- The city to be more sustainable through smarter, interconnected infrastructure;
- The community to be more inclusive and prosperous through an open and collaborative digital ecosystem; and
- Hong Kong society to be more knowledge-based, with real-time access to knowledge and information anytime, anywhere.

Technology can facilitate better communication and great collaboration between and among Hong Kong's citizens, businesses and government departments and should be a means of support and assistance to disadvantaged groups in our society.”⁸

In his 2015 Policy Address, the Chief Executive announced that “we intend to use Kowloon East as a pilot area to explore the feasibility of developing a smart city”⁹ and further elaborated in his 2016 Policy Address that,

“the ITB will, in collaboration with research institutions and public and

⁸ Consultancy Services for the Digital 21 Strategy Review for the Office of the Government Chief Information Officer Strategy Report, available at http://www.digital21.gov.hk/eng/relatedDoc/download/IBM-ConsultancyStudyReport_eng.pdf

⁹ 2015 Policy Address available at <http://www.policyaddress.gov.hk/2015/eng/pdf/PA2015.pdf>

private organisations, study the development of a “smart city”, which includes providing free Wi-Fi services at bus stops and shopping arcades, opening up more public data to facilitate development of user-friendly mobile applications (apps) for the public, and developing intelligent homes. The ITB will formulate a digital framework and standards for the development of a “smart city”.¹⁰

No doubt a clear vision to develop a digital city has been articulated and refined in the various versions of the Digital 21 Strategy. Tremendous efforts have also been made in terms of building ICT infrastructure by implementation of programmes embedded in various strategies. The emphasis is primarily on providing e-government services and developing the economy taking advantage of information technology. There is a gap to be bridged between building up ICT capacity on one hand and leveraging technology to address social and environment challenges on the other.

In the 2014 Digital 21 Strategy Review, the scope was somewhat broadened from the previous strategies with technology as a means of support and assistance to disadvantaged groups in society. The social aspects have not been a focus and the environmental aspects

have largely been ignored in the series of strategies.

The 2016 policy address only mentioned a few smart city initiatives. It will be useful to build on what has been done in pursuit of digital city vision in the past for developing Hong Kong as a smart city in the future.

A framework for developing Smart Hong Kong in the future

A smart city should be people-centric. Technology, while an important component, is only a means to an end. The objectives should target at improving the quality of life, enhancing efficiency of public service provision, addressing climate change and use of limited natural resources, tackling growing disparities in society and enhancing efficiency in business operations by leveraging on technology. One can add ageing population, shrinking workforce and the lack of space in the local context where technology can help. As the government is embarking on a new round of strategic planning, “Hong Kong 2030+: Towards a Planning Vision and Strategy transcending 2030”, it is not clear how the strategic plan interfaces with the smart city initiatives. It is highly essential to consider better interfacing or even merging the two exercises to achieve economies of scope. A broad framework comprising political leadership and commitment, capacity building, engendering public support and fostering public/private co-creation is suggested below.

¹⁰ 2016 Policy Address available at <http://www.policyaddress.gov.hk/2016/eng/>

Political leadership and Commitment

Under this broad framework of smart city and knowing the position of technology in developing smart city, the government has a very vital role to play in ensuring political leadership and commitment. In this connection, an appropriate institutional set-up with expertise in city development and technology is vital to articulate a clear vision and to formulate strategies and programme of actions. More importantly an updated legal and regulatory framework is needed to embrace new technologies and actions to help mitigate adverse impacts of technologies on existing businesses. The government also has to step up protection of privacy by tightening up security of data against leaking and hacking of sensitive information. With various government funding schemes, some research funds should be steered to support projects that meet social and environmental objectives. For example, social media is a powerful tool that has been used to encourage sharing of resources and help the needy in the community.

There are many such examples around the world, which can serve as good references for Hong Kong. The government can also encourage smart solution and nurture local entrepreneur through procurement of goods and services.

Capacity Building

While a lot has been done to enhance ICT infrastructure, the government should invest smartly in entrepreneurship programme. The Science Park, the Cyberport, the Hong Kong Productivity Council, the Hong Kong Trade Development Council and Invest Hong Kong have played very important role in nurturing and promoting start-up companies. To help build a start-up ecosystem, attracting students to pursue education on science, technology, engineering and mathematics (STEM), facilitating overseas talent staying in Hong Kong and providing mentorship and training programmes are all essential. However, creative ideas are the fundamental ingredient in innovation and technology industries. This is why entrepreneurship is not just restricted to those possessing STEM qualifications but people with different education background and working experience. This is particularly true for innovation in domains like finance, law, accounting, education, design etc. where experiences in these fields are needed. Hong Kong has long been criticised for not providing sufficient R&D. The government should increase funding and encourage the private sector to do so through various means.

As indicated in 2008 and 2014 Digital 21



Strategy, the government has a vital role to address digital divide by building an inclusive, knowledge-based economy, “the community to be more inclusive and prosperous through an open and collaborative digital ecosystem”¹¹ and “technology ... should be a means of support and assistance to disadvantaged groups in our society”¹². In this connection, projects funding the younger generations to help the growing elderly population and socially disadvantaged groups to become computer literate so that they would not be left out of the digital world are worthwhile projects to be supported by the government. This type of projects will have an added advantage of fostering inter-generation contact and understanding.

Engendering public support

Engendering public support should not be overlooked. First and foremost is to promote the concept of smart city within the government and in the community. Not everyone understands what a smart city is. The benefits of new technologies to the community at large and possible adverse impacts on certain economic sectors should be acknowledged, discussed and

¹¹ 2008 Digital 21 Strategy, available at

<http://www.digital21.gov.hk/eng/strategy/2008/forword.htm>

¹² Consultancy Services for the Digital 21 Strategy Review for the Office of the Government Chief Information Officer Strategy Report, available at

http://www.digital21.gov.hk/eng/relatedDoc/download/IBM-ConsultancyStudyReport_eng.pdf

mitigated as appropriate. The government should encourage the community to embrace technology. Launching a few quick win projects will certainly enable the community to appreciate the benefits of smart city initiatives. Needless to say, more public support on the use of technology will facilitate funding approval for projects from the Legislative Council.

Fostering Public/Private Co-creation

At a higher level of achieving community empowerment through public/private co-creation, more needs to be done. The most important step to facilitate co-creation is perhaps to set up a spatial data infrastructure and open up data for use of the community. This will provide tremendous opportunities for research and business development.

Concluding Remarks

In the pursuit of smart city initiatives, it is important to focus on people and not just technology. Building on past initiatives in IT infrastructure development, new initiatives should address the present and future challenges that Hong Kong faces. There is merit of linking up the Hong Kong 2030+ and the smart city initiative in some ways to achieve the economies of scope.

The government should step up in investments in the technology research, training of skilled workers, and nurturing/mentoring entrepreneur and encouraging the private sector to increase funding on research and development. Uber-type autonomous vehicles have proven a

success in reducing car ownership, the demand for parking spaces and traffic flows in some cities. Examples like applications in health care delivery system and 3-D printing for construction of buildings have reduced costs, and at the same time enhanced efficiency. All these will be very relevant for Hong Kong in view of its ageing population and labour shortage.

However, with limited resources, government has to prioritise investments in smart city initiatives. The community, the technology industry and the different economic sectors will benefit or be affected by such investments. The government has to ensure that decisions are made with adequate public engagement and transparency bearing in mind that the interests of different stakeholders are unlikely to be identical.



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COLUMNS

THE CHALLENGE OF GETTING 'SMART'



Photo Credits: Mr. Nelson Yung

Mr. Andrew LAM

Mr. Andrew Lam is a veteran town planner involved deeply in professional researches and education in parallel with his practice. He has dedicated most of his time on community services. He was appointed to serve on numerous advisory and statutory bodies. He is currently Board Member of the West Kowloon Cultural District Authority, and Chairman of the Antiquities Advisory Board.

Technological advancement has always been a key driver in changing our way of life through history. Hong Kong may not have the best soil for invention but its unique urban environment plus its accumulated wealth could be ideal for innovations. Its compactness demands

superb operation efficiency at city scale and should in theory more ready to accommodate any ideas or applications that can facilitate better interaction at all dimensions especially those which can reduce costs in economic, social and environmental terms.

Yet, even for implementing vintage 'smart' city management concept like electronic road management system, we are still stuck at endless consultation after the first one launched in 1982. While related technologies have made significant progress at light speed, it seems that our mind set prefers idea chiselled in stone tablet! Why?

Putting aside concerns on personal contribution or costs in any respect associated with the use of different applications, availability and access to data has always been controversial. Privacy is a sacred word. And the government, in particular, should not be allowed any chance to abuse it.

This might well be true back in the 80s before we granted permissions to numerous service providers for tapping into our personal information including real time location, contacts, faces of friends and relatives, health condition, interests, hobbies and preferences on daily intake of spiritual as well as life-supporting material... through our smart gadgets. But now? Many of us put our life story with fine details on 'cloud' without raising much query.

Should we trust the commercial service providers more than the government who are providing us with the needed public goods and services? Wise man may say personal choice is different from collective choice, especially when it involves compulsory action. In addition, an average person will expect the government to provide the necessary protection for their individual choice against abuse in use of personal information and not the least, their safety and general well-being.

In the creative world, success does not come easy or cheap. One must have a good appetite for risky attempts and endeavours before entering. Return is the mirror face of risk, venture capital with a bigger-than-average appetite can always share the load if the market is big enough for offering a potentially attractive upside. Knowing that mistakes could kill but could also take one to another level if one did learn and is determined, it is beyond doubt that innovation and its application is an adventure - an adventure that the government has hesitation in leading but a tendency to regulate with great caution.



The biggest hurdle facing innovation is always over regulate due to over cautious. There are enough examples showing how conservative we are even comparing with what is happening in our motherland. Yet, even looking at successful business cases like AirBnB or Uber, not to mention challenges from those with vested interests, issues related to customer safety, protection and rights are not something facing Hong Kong in isolation.

Apart from blaming the government, we simply have to ask whether Hong Kong has a culture for accommodating mistakes, or at least, giving a reasonable level of allowance for failure at the trail-run stage. In fact, there are enough proven technologies that only require customisation in application. The process of customisation in delivering smart public services is not entirely a matter of thorough testing in the laboratory but an interactive operation exercise that involves all users.

Public transport problem in South Lantau may be a good example for illustrating the issue. How to enhance accessibility in a control-zone without compromising environmental quality and use right of locals especially at peak periods?

Imagine one can use a smart phone to track the arrival time of the next bus and make sure there is room, and local residence and workers, disabled and elderly can be given priority through booking and payment in advance. On the other hand, bus companies can effectively schedule its fleet to address the mid-way demand and minimise empty load. Taxi can easily grasp the niche demand.

The challenge, however, is how to address the need of those who do not use smart phone for whatever reasons. Moreover, there will be different queues for those accorded with priority but some people may not choose to respect the arrangement. No matter how advance technology is, it works on the basis of logic which human does not necessarily follow!

Same idea can be applied to setting cordon point, and provision of car parking space and park-and-ride facilities for green transport within the control zone. There is no need for policeman to be physically presence to cordon off vehicles without a permit when automatic automobile recognition programme and equipments are readily available. Trespassing, illegally-parking and abused use of green vehicles will be subject to penalties once tracked, and additional penalties can be applied automatically according to time of stay or repeat offences. Yet, there will still be criticism on the system that it bias towards those who can afford to pay.

There are bound to be errors and problems even for matured technologies. When realisation of 'smart city' goes beyond the smooth operation of a single machine, we should not expect perfect performance at the very beginning as none of us were born to run and think like an adult. We just have to give everything, including ourselves, a chance to learn to be smart. To achieve that, it is not just about more smart talk. Instead, it is time for us to learn again on how to 'Respect', 'Trust' and 'Embrace' , without which 'Creativity' can hardly thrive!

COLUMNS

IS SMART CITY SMART?



Photo Credits: Mr. Nelson Yung

Ms. Betty S.F. HO

Ms. Betty S.F. Ho is the Director of PlanArch Consultants Ltd. and a part-time Assistant Professor in the Department of Urban Planning and Design in HKU. She is currently the Director of The Conservancy Association and a member of the Sustainable Development Council.



I like 'smart city'. Who can resist such a beautiful term? In fact, it has become a 'fashion' in town planning, development and infrastructure. But what exactly is smart city about?

The concept of Smart City began in 1990s when the focus is on how the application of new ICT (information and communications technologies)

can enhance quality and performance of the city. Subsequently, there were criticisms that the idea of smart cities was too technically oriented and then, it expanded and tried to encompass the social dimension. Today, a common definition of Smart City comes from Giffinger and Gudrun, who identified six main components in Smart City including smart economy, smart mobility,

smart environment, smart people, smart living, and smart governance. The concept has become very popular and every city is chasing after it, trying to become one of the smart ones. Smart city is a proactive response to ICT advancement and embrace various tools and models in planning for various arenas in city development, like traffic and transport, noise, air quality, ventilation, drainage and sewerage as well as smart household living, etc. Indeed, applications of these tools make our city more efficient and our lives more convenient and comfortable. They facilitate design of buildings and infrastructures which can better respond to the physical environment and urban climate. One do not need to go out and yet can get what is needed from the internet, the automation of various appliances make daily life easier and faster, and navigation around the city is also made more convenient with greater comfort.

However, does smart city equal to smart growth? Does it contribute to sustainable development, building communities and neighbourhood? Or is this just another fashionable terminology after green city, zero carbon city....? What are we really looking for?

I have worries about Smart City. There is a danger of being too obsessed with the use of smart city technologies, but neglecting the cumulative impacts to the social and natural environment. It is often seen that cities will introduce different ICT in the construction of infrastructure, but pay only some regard to environmental issues with little attention to social aspect. What is more dangerous is ICT upset the balance of sustainable development. For

example, in planning for an area, the ceiling of the development capacity is often capped by the availability of transport / traffic capacity. With Smart City concept and the available technological advancement, the traffic and infrastructural capacity can be increased and thereby allow for more development and population intake. This is often (mis)taken as increasing the carrying capacity. However, these technologies do not have the ability to increase social, environmental and ecological capacity, and thus, they may cause imbalance development and ignite conflicts in social and environmental arenas.

Is smart city the solution to our future development? How can the smart tools help building our community and contribute to sustainable development? Smart city to me is a planning tool; it is a means to an end. We may have different visions and priorities, and facing different challenges in achieving the objectives at different times. No matter what we do, we should always remember the ultimate objective is sustainable development, which "is development that meets the need of the present without compromising the ability of future generations to meet their own needs". (Brundtland Report) Can we bridge smart city to sustainable development? Smart City can be a powerful tool, it is about "internet of things" and big data mining and analysis. It is important that smart policy initiatives should investigate the cross-sectional implications and social related aspects in the application of ICT in planning, and then promote an integrated development of different aspects. The emphasis on business-led cost-effective urban development should be

considered as only one of the many dimensions of city development. There are intangible treasures that need our keeping to make our city lively. Special consideration should be given to environmental and ecological attributes, with the natural environment as a strategic component for the future. It is also important to facilitate social inclusion and build up social capital in our urban development, and enhance social interaction, integration and solidarity. The fundamental issues of carrying capacity and sustainable development, especially in the social and environmental arena, involve a lot of value judgments. With collective data gathering and deliberations, it can facilitate evidence-based discussions and expose socio-spatial inequity, which may help build a more just and sustainable society.

A real smart city is value-driven. It is only with a new mindset of putting people and nature first that our smart city can become really smart.

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電話(Tel): (852) 2566 9988 傳真(Fax): (852) 2566 9978

電郵 E-mail : vision@visionplanning.com.hk
網址 Homepage : <http://www.visionplanning.com.hk>



STUDENT CORNER

SMART CITY DEVELOPMENT IN HONG KONG



Photo Credits: Mr. Kevin Jaako

HO Nga Sum Clarice, LAU Sin Yee Jessie, LEUNG Cheuk Nam Jeff, LI Jiu Zhen Beko, TING Yick Nam Edison, KU Yiu Chung Felix, ZHU Yi

The University of Hong Kong

PART I Introduction

Technology is now everywhere - in every sector, every organization and every household. While this issue might once be concerned by only a

few computer lovers, technology is now pertinent to policy makers across the globe for its potential benefits to city management. Smart City, a concept first emerging in the early 2000s, is said to be a response to address the wicked urban problems brought about by rapid urbanization

Part II Background of study

(URENIO, 2015). By 2017, it is estimated that at least 20 of the world's largest countries will have developed national-level Smart City policies (URENIO, 2015). While there is no general consensus on what is meant by a Smart City, the discussion on Smart City in this paper premises on the belief that "people", instead of "technology" should be the essence of Smart City and that Smart City should be a means to achieve the ends instead of being an end itself. Based on such belief, relevant literature and the Smart City Wheel suggested by Cohen (2012), a tailor-made working definition of Smart City has been provided for this project:

" Smart City encourages knowledge exchange and innovations through advanced Information and Communication Technologies (ICTs), contributing to a society in terms of developing a talent-based economy, reducing ecological footprint and improving the quality of life of citizens."

This paper is organized into six sections, subsequent to the introduction of the paper, section 2 introduces the background of the study, including the study process and methodology; section 3 is a synopsis of Smart City Development in Hong Kong; section 4 gives an overview on international practices on Smart City development; section 5 outlines the recommendation on future Smart City development in Hong Kong and a conclusion is given in section 6.

This paper is a summary of the final report generated by students from the Master of Science in Urban Planning at the University of Hong Kong on "Smart City Project" (hereafter the project) for the course entitled "Regional and Territorial Planning Studio" from January to May 2016. The project comprises three stages which consists of an inception report, working paper and a final report. Various methodologies have been employed throughout the study process, including literature review, desktop research, interviews with legislators and professionals, site visit and case studies. Detailed description of the methodologies are illustrated as below. (Illustration 1).

As highlighted in the HK2030, an analytical framework has been established for this study with reference to the five key future development trends facing Hong Kong. They are: 1) Economic Transformation Towards an Innovative and Sharing Economy; 2) Rising Expectation on Quality of Life; 3) Greater Emphasis on Environmental Stewardship; 4) Higher Efficiency and Transparency in Governance;; and 5) Increasing Collaboration with mainland China. In this paper, formulation of Smart City development strategies in Hong Kong in later section centres on these five key issues.

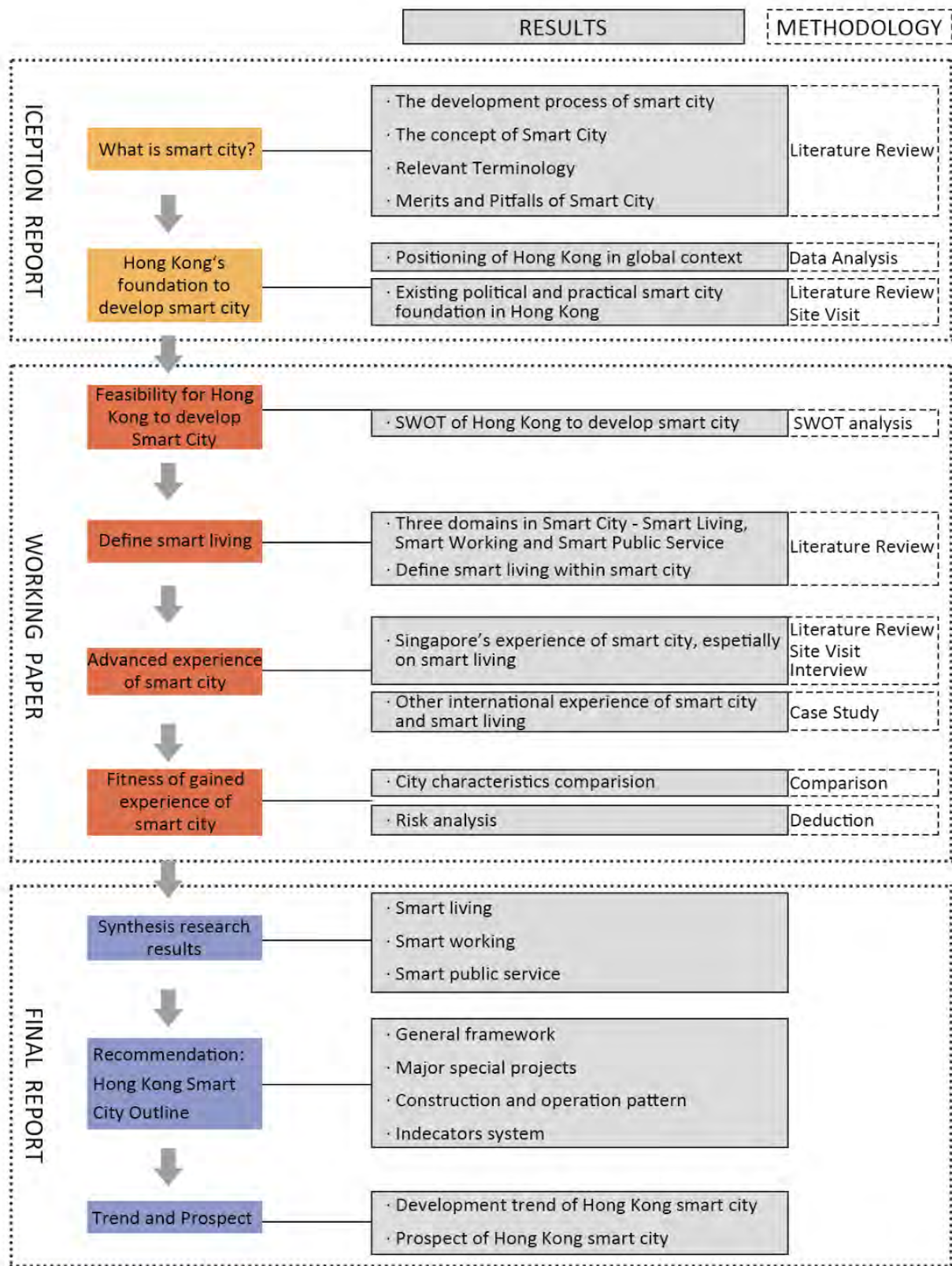


Illustration 1:

Methodology applied in the Smart City Project

PART III Smart City Development in Hong Kong

Positioning as Asia's world city, Hong Kong goes in tune with the global trend and aspires to evolve itself into a Smart City. Hong Kong's attempts of Smart City can be identified in various policies and measures such as in 2014's Digital 21 Strategy - Smarter Hong Kong, Smarter Living, Policy Address 2015 and 2016 (CEDB, 2013; HKSAR Government, 2015; HKSAR Government, 2016). After studying Smart City strategies, the performance of Hong Kong in developing into a Smart City has been reviewed.

Generally, Hong Kong has advantages in infrastructure, affordable ICT services and having a sound business environment. Wide internet coverage, high connection speeds and a wide range of ICT services available at low prices have contributed to a pro-ICT business environment and formulated the bedrock for Smart City development in Hong Kong.

Weaknesses

Despite existing advantages in hardware of a city, Hong Kong continues to lag behind in terms of software which facilitate Smart City development. Having an agreed vision of Smart City development is a prerequisite for success, according to Smart City framework – 'Guide to Establishing Strategies for Smart Cities and Communities' issued by the British Standards Institution. However, Hong Kong falls short as there are inadequate comprehensive policies

supporting ICT development and long-term vision on Smart City development. It seems that Government over the past decades lacked effort in strategic determination in promoting Smart City development.

In developing a Smart City, a bureau should be "tasked to take the lead in formulating overall strategies and plans, coordinating inter-bureaux or department responsibilities, and strengthening the Government's facilitating role in support of the development of Smart City technologies and services driven by the community and the business sector", as pointed out in CPU report on Smart City (CPU, 2015). Unfortunately, such high-level framework cannot be seen in Hong Kong Government at this stage, which hampers the effectiveness in implementing Smart City strategies.

Matters concerning Smart City development are "under the purview of different bureaux and departments," (CPU, 2015) while a steering committee or organization overseeing and directing overall Smart City development of higher position is absent. Different government departments adopt different operation modes and data sets, resulting in fragmentation and incompatibility in the use of data. Government organizations such as Lands Department, Highways Department, Development Bureau, Planning Department, Civil Engineering and Development Department all have their own Geographical Information System (GIS) application system. The lack of centralized data collection system in the Hong Kong Government constitutes one of the major obstacles of Smart City development in Hong Kong.

Data transparency and availability is fundamental for Smart City. Despite recent efforts invested in providing spatial data through online tools such as GeoInfo Map¹ and statutory planning portal², these open data is still dispersed. Application Programming Interfaces (APIs), which provide consistent data and allow users to export data for their own uses, are not available at present. Such defect undermines the optimization of information analysis and usage in Hong Kong. Given that much data is only for internal circulation in the Government, it is difficult and expensive for the public to gain access to those data.

Open sources of data is also important for Smart City Development which requires the supports from innovative ideas and talents cultivation. However, similar to Government departments, data in private companies are primarily circulated and used internally. Technological innovations and improvements could mainly rely on private companies' own initiatives. Smart City development also relies on the flexibility in regulatory regime and citizen readiness towards new innovation. A lack of free readily available data would hinder idea generation process as well as the development of Smart City. Hence, more free readily available data and funding should be provided to support research and development activities and talents cultivation.

Strengths

ICT talents are human resources which are of

¹ See: <http://www2.map.gov.hk/gih3/index.jsp>

² See: <http://www2.ozp.tpb.gov.hk/gos/default.aspx?>

great importance on the road to Smart City. Entering Information Age, the population of digital native is expected to rise and Hong Kong is no exception. Digital native is a term used to “characterize (young) people born during the digital age and growing up using ICTs.”(Hanson, 2015) Rise of digital native will be conducive to the development of Smart City, on the grounds that digital natives, with solid ICT experiences, know how to manipulate ICT as a powerful tool, shaping and driving Smart City.

Opportunities

Synergy between Hong Kong and the Mainland is an indispensable prerequisite for Smart City development in Hong Kong given its role of being a gateway to China. One possible opportunity is to strengthen ties with the Pearl River Delta, especially Shenzhen, to drive Hong Kong's applied research particularly in technology. Cooperation between universities in Hong Kong and technology companies in Shenzhen in research and development activities is one example. The emergence of Shenzhen as a high-tech cluster in China provides opportunities for technology collaboration that are currently under explored. Through collaboration and knowledge exchange with the Mainland, Hong Kong will be benefited on its road towards Smart City.

Threats

Aside from optimizing the opportunities of Smart City Development in Hong Kong, Government should be mindful of the potential threats brought from social aspects, such as citizens' concern on privacy and security issues, ageing population, digital divide and employment

restructuring. Hence, the challenge of Smart City Development is not only about how to put forward the notion, but also about how to make the notion feasible without worsening the current situation.

because of similar socio-economic situation and their international reputation in innovation and technology development. As for mainland China, the focus will be more on regional collaboration.

PART IV International Review

In order to gain insights for recommendation for Smart City development in Hong Kong, overseas experience in Smart City planning and development will be reviewed, together with key applications to the five key issues Hong Kong is facing. The three cases to be scrutinized are Singapore, Barcelona and the Pearl River Delta (PRD). Singapore and Barcelona are chosen

Strategic direction for Smart City Development

In terms of strategic planning, each case has its own focus regarding long-term vision for Smart City development. For Singapore, the focus is on resources pooling from different stakeholders; for Barcelona, apart from productivity and connectedness, the emphasis is on developing a low carbon green environment; for the PRD, the focus is on regional integration.

Case	Strategic Direction
Singapore	To become “a Smart Nation where people live meaningful and fulfilled lives, enabled seamlessly by technology, offering exciting opportunities for all” (PMO Singapore, 2014)
Barcelona	To transform the city into “a self-sufficient city, made of productive neighborhoods at human speed, inside hyper connected metropolis, of high speed and zero emissions inside a high-speed interconnected Metropolitan Area” (BCN Smart City, 2014)
The PRD	“To push forward regional integration in terms of broadband information and communication network, digitization of public services and infocomm infrastructure to make the region a world-class smart city cluster “(Government of Guangdong, 2014)

Table 1: Smart City development vision in different cases.

Governance Structure for Smart City Development

In terms of Smart City planning, all cases adopt a top-down approach. However, Barcelona is relatively more open and encourages citizen participation. Regarding the formulation of the 4-year Municipal Action Plan for Smart City development in Barcelona, more than 70,000 contributions have been made to the City Council (EU-China Policy Dialogues Support Facility II, 2015).

Both Singapore and Barcelona have integrated, cross-governmental management which allows synergies among projects and ensures all efforts are aligned with the long-term development vision. For example, in Singapore, the iN2015 Steering Committee comprises representatives from different government departments for overall management and implementation of Smart City masterplans. While in Barcelona, Urban Habitat, a new organization drawn manpower from different departments of city development issues was formed (Smart City Summit, 2012).

One highlight among the three cases is a multi-stakeholder approach in implementation. Indeed, the core essence of Smart City concept is that governments cannot single-handedly take on everything to transform the whole city. Public-Private Partnership (PPP) is commonly adopted by Singapore in the delivery of Smart City projects. The Total Energy Solution in Punggol Eco-Town is one example. (Smart City Summit, 2012) Barcelona stresses highly on blending industry, academia and research

sectors together to work on Smart City projects (CPU, 2015). Even though Smart City development in the PRD is a government-led process to a large extent, particular stakeholders have been involved in implementation and consulting. For example, telecommunications companies have been invited in the provision of broadband network infrastructure while the Department of Transportation puts efforts in developing an integrated transportation network (EU-China Policy Dialogues Support Facility II, 2015).

Supporting Services for Smart City Development

Smart City is one which provides enough supporting services to create a pro-business and pro-consumer environment for innovation. In other words, provision of a flexible regulatory framework and formulation of policies with an aim to address cyber privacy, security and digital divide are important to allow innovation to flourish and to make ICT accessible for all.

The current wave of start-ups presents a challenge to existing legal framework as to questions like whether companies other than regulated taxi companies should be operating taxis and whether non-banks should be running like banks to collect deposits (ISOC, 2014). In the PRD, car-sharing service providers like Didi is supported by the government given that service providers jointly draft safety regulations for car-sharing services. As for the Singapore government, it begins to see its role as a promoter of innovative businesses other than a regulator as exemplified by The Third-Party Taxi

Booking Service Provider Act which acknowledges third-party booking apps as a legitimate service (LTA, 2015).

Regarding cyber privacy, security and digital divide, Singapore Computer Emergency Response Team (SingCERT) has been established in Singapore to respond to cyber security incidents and data privacy. With regard to programs to bridge digital divide, a range of measures have been implemented targeting the

elderly, the needy students and the physically challenged (iN2015, 2006).

Key Applications in Five Key Issues of Hong Kong

In this section, a summary of overseas policies and initiatives with reference to the five key issues in Hong Kong will be presented as follows.

Key Issues	Policies and Initiatives
<p>Economic Transformation towards an Innovative & Sharing Economy</p>	<p><u>1. Cultivate ICT Manpower</u></p> <p>In Singapore, programs and initiatives have been launched to prepare students for the future infocomm workforce. For example, Infocomm Clubs Programme is a co-curricular activity targets at primary, secondary and junior college students in Singapore with the purpose of cultivating entrepreneurship capabilities and helping them to equip with the latest infocomm skills (iN2015, 2006).</p> <p><u>2. Facilitate Use of Integrated and Secure E-payment Platform to Promote E-commerce</u></p> <p>E-commerce has gained its popularity worldwide and to promote its adaptation for households and companies, sufficient data privacy protection and a high level of convenience are necessary. For instance, both Public Key Infrastructure (PKI) Forum Singapore and Alipay in China are successful examples of promoting e-commerce.</p> <p><u>3. Promote Innovative Shared Mode of Transport</u></p> <p>To ride on the trend of sharing economy, for instance, Singapore government has taken the role as a promoter and supporter of sharing cars.</p> <p><u>4. Promote New Mode of Working</u></p> <p>Singaporean government has partnered with Regus to provide Smart Work Centers (SWC) as another support to new working mode and increasing work mobility.</p> <p><u>5. Drive Innovation and Entrepreneurship</u></p> <p>As for boosting research and development (R&D), three cases have demonstrated efforts to support the development of Smart City. For instance, a national R&D framework is outlined in one of the supporting documents of iN2015 in Singapore with an aim to transform Singapore economy into a research-driven knowledge-based economy (iDA, 2016).</p>

<p>Rising Expectation on Quality of Life</p>	<p><u>1. Distance Healthcare Support</u></p> <p>With the advance in technology and the widespread use of the Internet of Things (IoT), traditional healthcare services can be carried out outside hospitals. An example would be the Radars Project in Barcelona enabling the elderly aged over 75 years old to live at home while enjoying regular health consultation (BCN Smart City, 2014).</p> <p><u>2. E-platforms for Entertainment Experience Enrichment</u></p> <p>The application of technology in leisure stimulates tourism and entertainment through enhancing entertainment experience. In Barcelona, BCN Contactless is a mobile application which offers people information and position of their surrounding facilities, services and current activities at a precise location and time.</p> <p><u>3. Intelligent Transport System</u></p> <p>Singapore has implemented a range of Intelligent Transport Systems (ITS) infrastructure to provide innovative and efficient solutions and services for travellers. The heart of ITS is the ITS Centre which collects data from ITS infrastructures and allows transmission of real-time traffic information through (Land Transport Authority) LTA data portal and electronic message signs.</p> <p><u>4. High Quality Transport Information Delivery and Dynamic Processing of Big Data</u></p> <p>As for traffic and transportation information management, in terms of parking information management, LTA in Singapore has set up Parking Guidance System (PGS) in 2008 to provide real-time parking lots availability information for drivers, so that they can make informed choices regarding parking locations (LTA, 2015).</p>
<p>Greater Emphasis on Environmental Stewardship</p>	<p><u>1. Experimental Blocks to Promote Sustainable Living Environment</u></p> <p>Both Singapore and Barcelona have experimental blocks dedicated as a pilot for researches and further implementation of smart city technologies in a bid to create a sustainable living environment.</p> <p><u>2. Interconnected Sensor System for Energy and Water Management</u></p> <p>Barcelona has adopted Smart Grid, making use of digital and remote sensing technology to connect power plant, renewable energy facilities, power grid and users, so that users' electricity consumption can be monitored, maintained and adjusted automatically (BCN Smart City, 2014).</p> <p><u>3. Promote Green Mobility</u></p> <p>Travel Smart Program is a measure used in Singapore, to encourage the use of sustainable transportation alternatives such as cycling and walking.</p>

<p>Demand on Higher Efficiency & Transparency of Governance</p>	<p><u>1. Citizen Participation E-platform</u></p> <p>All cases have capitalized on the use of technology to encourage citizen participation in municipal issues to co-create greater social and economic values. For example, BUIITS Plan in Barcelona, (Urban Spaces with Territorial and Social Involvement) encourages suggestions for making temporary use of idled urban sites (BCN Smart City, 2014).</p> <p><u>2. Data Standardization and Open Data</u></p> <p>For Smart City development, openness and standardization of data is important as it can promote information sharing among government departments to enhance government capacity and synergy, opening up government information to public for greater value creation. For instance, the Singapore government has also developed a government platform (data.gov.sg) to provide easy data mining and access to government datasets (iDA, 2016).</p> <p><u>3. Establishment of Centralized Spatial Data Infrastructure (SDI) for Urban Planning</u></p> <p>A comprehensive and centralized SDI builds up government’s capability to coordinate spatial and temporal conflicts of various types of planning and facilitates scientific decision making in planning. In addition, it empowers planning as a public activity by sharing data. In Singapore, a Smart Integrated Planning Approach has been adopted to incorporate different spatial analytical tools to process and analyze data across five steps, namely, Data, Visualization, Collaboration, Make Sense and Test Options (SLA, 2011).</p>
<p>Increasing Collaboration with Mainland China</p>	<p><u>1. Collaboration and networking</u></p> <p>Collaboration and networking with other cities or countries are important for Smart City development due to pooling of resources, expertise and knowledge exchange. In PRD, Qianhai Administration has entrusted Jiansu Posts & Telecommunications Planning and Designing Institute and China Academy of Telecommunication Research of MIIT to cooperate in formulating the feasibility report and implementation proposal for the joint construction and sharing of infrastructure for smart Qianhai (EU-China Policy Dialogues Support Facility II, 2015).</p>

PART V Recommendations

Recommendations function as stepping stones for Hong Kong to reach Smart City. Five strategies, ‘CYBER’, have been formulated for the sake of realising Smart City development in Hong Kong.

*C*ommit to Efficient Urban Management via Data Consolidation and Dissemination

This strategy, concerning the Government, is to optimize the use of spatial data, so as to raise the quality of government services.

1. Establish a One-stop Cross-departmental

Data Sharing Platform for Government Management

To prevent information silo³ among government bureau and departments, a data sharing platform should be established to achieve better urban management. One example will be on planning. Having a communal data platform, Planning Department can easily get access to relevant data when preparing planning works while other departments can also contribute to city planning.

2. Promulgate a Collaborative Platform for Citizen Participation

Leveraging on certain Smart tools, public opinions can be collected and analysed more effectively through a collaborative platform. GeoPlanner⁴ is an example to illustrate that citizen co-creation can cultivate constructive solutions to urban challenges. By using mobile devices, participants can get access to visualisation of plans and compare planning alternatives from anywhere.

3. Advocate an Agile Transport System through a Traffic Control Centre Platform

Capitalising on traffic information collection devices or infrastructure such as sensors and traffic monitoring system, a traffic control centre platform provides real-time traffic information to

³ An organization or business group that fails to communicate effectively with other groups

⁴ A supporting application for ArcGIS to perform planning simulation and design. See: <https://doc.arcgis.com/en/geoplanner/>

help define problems and make decisions. For instance, defects in roads can be detected by measuring the vibrations made by vehicles with sensors. Meanwhile, smart facilities, such as LED variable message signs, can help deliver information to drivers in time.

***Yield a Digital Inclusive and Liveable Society**

This strategy, regarding the social aspect, is to respond to possible social needs arising in Smart City development, strengthening the accessibility of public services.

1. Provide Education to Bridge Digital Divide

Promoting ICT education for all is of paramount importance as digital divide is a major obstacle in achieving a digital inclusive society. Special education programmes and support for ICT learning should be provided in formal or informal learning space to citizens, especially to those who are not confident about their ICT skills or about to learn new things.

2. Enhance Community Vitality and Inclusion

Promoting an active lifestyle at community level is conducive to people's everyday life. To improve community vitality, one suggestion is locating point of interests (POI) by crowdsourced mapping, as this encourages positive usage of urban facilities for recreation. An initiative on All-in-one Community Services can also be launched to foster community inclusion. For example, community events such as item exchange can be promoted through the mobile application.

3. Promote Shared Modes of Transport to Provide More Options to the Citizens

In the hope of lifting up quality of life, shared modes of transport can be promoted. Uber is one example. Without sufficient supporting facilities and policies to facilitate the development of shared mode of transport, the rise of Uber may lead to increase in illegal parking and drop-offs on street and bus stations. Smart technology can be applied to step up the enforcement to combat such illegal road occupation.

4. Achieve Active and Healthy Ageing

In line with healthy ageing advocated by the Government, mandatory remote health sensing system installation in newly-built public housing can be implemented to encourage telehealth caring or rehabilitation. Besides, barrier-free website design can be widely adopted to facilitate browsing and using online information and services, enabling the elderly to lead a fulfilling life.

****B*ridge Stakeholders for Regional Collaboration and Cooperation***

This strategy, relating to regional collaboration, is to ride the waves of opportunities brought about by the opening up of China and increasing cooperation with the mainland.

1. Capitalize on Market Opportunities in Mainland China

Guangdong-Hong Kong-Macau Big Bay Area revealed under One-Belt-One-Road Initiative brings Hong Kong the opportunity in terms of

forging closer ties and cooperation with the mainland. By introducing high-end services into mainland market, more room can be provided for ICT talents and a bigger market for innovative products allows the fruit of innovation to continue to grow.

2. Optimize Cross-border Travel Experience

To strengthen travel experience for cross-border travellers between the Mainland and Hong Kong, smart technology can be deployed to optimize convenience and efficiency. A travel app containing traffic information related to cross-border buses and subways can be launched so that travellers can make better time arrangement when crossing the border. Another recommendation will be to provide a dual-currency Octopus card in order to bring about a more convenient shopping experience for cross-border consumers.

3. Emphasize Exchange of Know-how with Mainland China

Knowledge exchange performs as a catalyst in technological advancement and breakthroughs. To facilitate knowledge exchange, more efforts should be inputted into infrastructure construction such as convention centres required for aforementioned events, galleries for showcasing technology or innovation-related exhibitions.

****E*stablish an Innovative Economy to Sustain Economic Vitality***

This strategy, considering the economic aspect, is to promote a pro-innovation ecosystem which

in turns drive diversification in the economy.

1. Drive Innovation and Entrepreneurship

Expanding tech talent pool and raising R&D capabilities is indispensable in developing innovative industry. Talents cultivation can be achieved through promoting Science, Technology, Engineering and Mathematics education, providing ICT general education, and implementing enrichment programmes. Meanwhile, the Government should finance R&D projects and encourage private sectors to contribute financial resources to facilitate Smart City development.

2. Expedite Growth in E-commerce

It is imperative to ride the rise of e-commerce to expedite the diversification of Hong Kong's finance industry. The Government should lay more emphasis on information protection to tackle security and privacy issues in e-payment. Furthermore, the scope of incubation scheme should also be widened to cater for new clusters for financial technology and e-commerce. Besides, demand for logistic land uses and facilities are anticipated to meet the demand for import and disassembling goods.

3. Foster Location-free Work Culture

New ways of doing business arise because of the advancement of information technology. To encourage a new "work-live" relationship, advanced technology can be used to facilitate certain change in work culture. Through e-commerce and telecommuting, workplace can

be no longer confined to a particular physical space.

****R* ecognize Environmental Issues and Endeavour towards a Green City***

This strategy, in regard to the environment, is to capitalize on advanced ICT for resource allocation so as to address environmental protection.

1. Popularise Green Mobility in forms of Electric Cars, Cycling, and Walking

The use of green mobility is vital in Smart City development. To make the use of electric car more convenient, a unified platform should be constructed to share the locations of car-charging points and related information. To promote public transport, more park-and-ride facilities should be stepped up. To encourage cycling, cycling tracks and parking sites can be built in new towns. Besides, walking environment can be improved by using smart technology. For instance, placing sensors on street lights not only can improve energy efficiency, but also enhance safety and comfortability of streets.

2. Facilitate Effective Water Management and Waste Recycling

With the help of smart devices such as real-time water quality and distribution monitoring system, water usage can be managed in a more efficient way. As for newly-built housing estates, sensor-network-based infrastructure can be installed to identify water leakage. Managing waste efficiently is also of prime concern. Newly

built housing estates in new towns can leverage smart bins which are connected to the same underground channel through respective valves. Computers will then help classify items for further recycling process (Envac AB, 2016).

3. Implement Ecosystem Management

With a view to creating a better environment, the Government should continuously strive for conserving natural resources. Through the use of web-based and remote monitoring technologies, planners can fully understand and analyse the distribution of public spaces, grasslands and green belts with a view to promoting a green environment. For example data captured by Unmanned Aircraft System(UAS) can be compared at different time phases to identify changes or abnormal activities at a particular site.

PART VI Conclusion

Whether it's the concept of "Sustainable City" in the 1980s , "Low Carbon City" in the 1990s or the "Smart City" concept in the 2000s, they all share a common vision in urban development - enhance the living environment of citizens. The completion of this report with highlights on the recommended strategies is only the first milestone to transform Hong Kong into a Smart City, provided that the report only provides a broad direction and concepts for Smart City development of Hong Kong. Further studies and researches are needed to translate these recommendations into concrete strategic and district plans as well as planning guidelines of

Hong Kong. A constant and open dialogue will help policy makers to understand community needs and aspirations so that Smart City planning and development is truly catering to people's needs under ever-changing circumstances.

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STUDENT CORNER

A LAND SUPPLY FRAMEWORK FOR HONG KONG

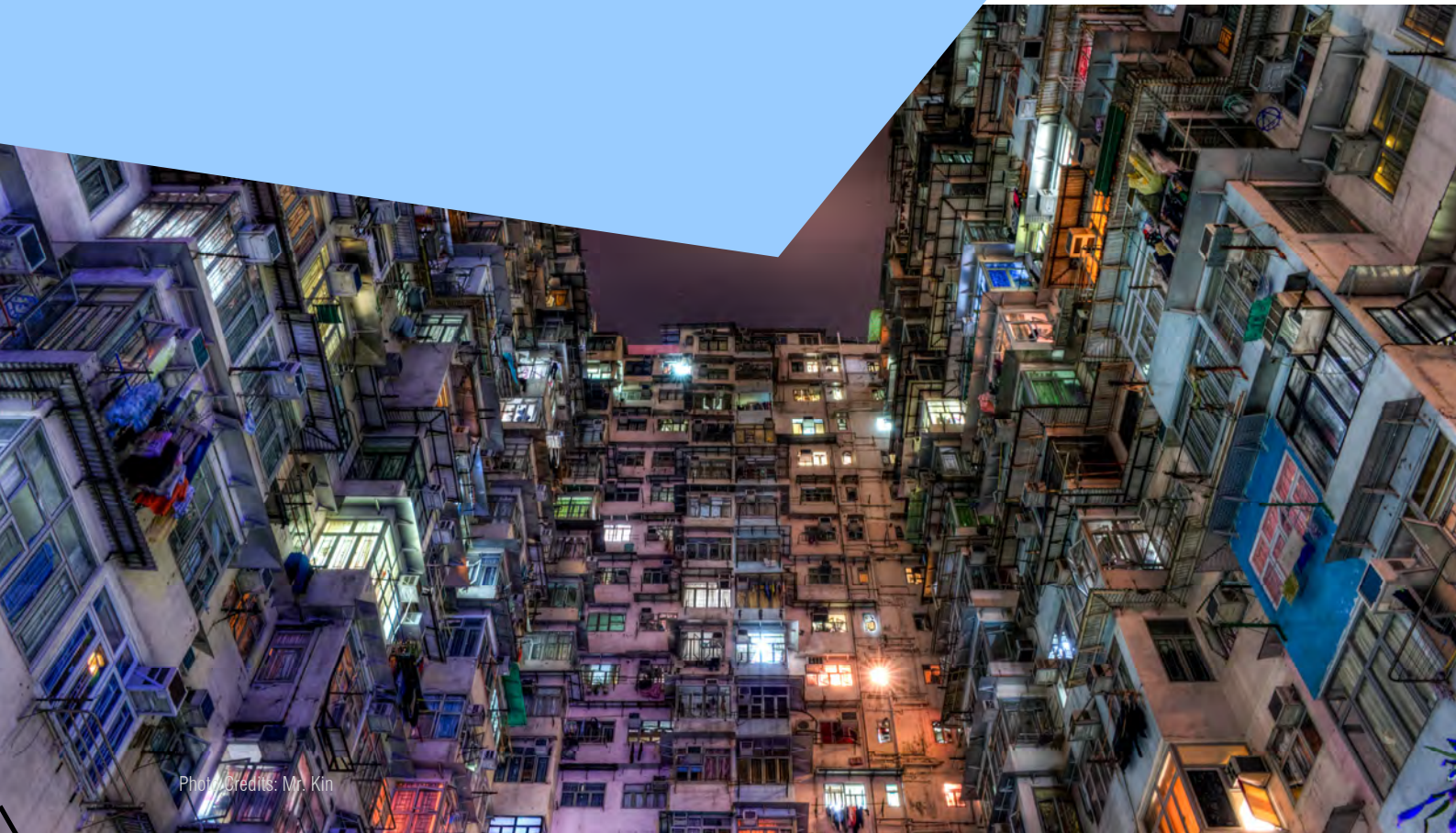


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***CHAN Kei Yee, CHAN Pui Yin, CHAN Shuk Han, CHIU Sing Yee, CHUNG Mei Han, LAU Hiu Ying,
LAW Hiu Ching***

The Chinese University of Hong Kong

1. Introduction

1.1 Objective

With the aim to establish a land supply framework to satisfy current and future land demand in Hong Kong, this study strives to:

- Evaluate different possible sources of land supply, with reference to various parameters, such as timely availability, size and scale, costs, environmental impacts, public objections, flexibility and robustness, land ownership, opportunities to tackle other issues and technical considerations

- Develop a holistic land supply framework to facilitate rational and informed public debates

1.2 Background

Land, usually perceived as scarce and precious natural resources, have to satisfy the continuous demand for development. In Hong Kong, tight land supply in fulfilling housing demand and socio-economic development has been a controversial issue. It is believed that the long-term land demand of Hong Kong could hardly be satisfied with the current approaches in land supply (CEDD, 2015).

As mentioned in the 2016 Policy Address, “what Hong Kong lacks is not land, but land that is developable” (OCE, 2016:27). The head of Civil Engineering Office once forecasted that by 2039, additional 4,500 hectares of land is needed to support future housing and socio-economic development (Li, 2012). In addition, according to *Our Hong Kong Foundation (2015)*, it is forecasted that by 2044, an extra 9,350 hectares of land should be produced¹. The forecast was made based on the assumption that population will grow as the Census and Statistic Department projects, i.e. population will reach 8.1 million by 2034. These undoubtedly hinted the pressing need for extra land supply.

In order to fulfill both current and future demand for land, there is an urgent need for a holistic land supply framework. While balancing social, economic and environment interests remains a major challenge for Hong Kong, particularly in land development, sustainability has been identified as the overreaching goal in HK2030 Study. Hence, it is imperative to consider sustainability in land supply strategy in order to consider social, economic and environmental aspects of development in a comprehensive manner.

2. Source of Land Supply

2.1 Introduction

To establish an integrated land supply framework for the territory, ten potential sources of land supply strategies are identified for further evaluation. Table 1 summarizes the definition and scale of possible land supply sources.

¹ A significant difference between CEDD and Our Hong Kong Foundation’s land demand forecast is shown. It is because the latter assumed that even if Hong Kong's population does not grow in the future, when the average developed land area per person is hoped to be raised by 40%, an extra 5,800 hectares of land supply is required. Furthermore, as Hong Kong's population is projected to reach 8.22million in 30 years, over 9,000 hectares of land demand is needed.

Sources of Land Supply	Definitions	Scale / Area Involved
1. Urban Redevelopment	Buildings under urban redevelopment will be re-planned and rebuilt to achieve better and full land utilization. In total there are three types of redevelopment, namely URA initiated, demand-led (URA) and private redevelopment.	70% URA-initiated project has an area of 2,000m ² ; and all demand-led project has site area smaller than 2,000m ² ²
2. Infill Development	Infill development refers to development that occurs in underutilized parcels in already developed urbanized areas (McCornell and Wiley, 2010), usually involving the rezoning of G/IC sites. Merely G/IC redevelopment would be included in infill redevelopment in the following discussion.	36 and 21 G/IC sites were rezoned to release for 27 and 34 hectares of land respectively in 2013 and 2014, making a total of 61 ha ³ ; 31 G/IC sites were proposed for rezoning in 2015 ⁴
3.Greenbelt Rezoning	Due to differences in terms of location, size of greenbelts and geological conditions of greenbelts, two types of greenbelt which are regarded as owning higher potential for rezoning would be urban pockets and urban-rural continuum.	Total size: 13,875.85 ha ⁵ (not all could be developed due to site constraints); 70 greenbelt sites with a total area of 150 ha among 150 potential sites ⁶
4.Brownfield	Brownfield refers to former agricultural land in New Territories, which have been occupied and converted for industrial uses, including open storage, port-backup facilities, wastes and recycling yards, and open vehicle parks. Being incompatible with the surrounding land uses, these uses may contaminate the environment (K.Y. Chan et al., 2016).	Total size: 1,192 ha ⁷
5.Abandoned Farmland	Farmland includes fallow farmland, accredited farm, local vegetable farm from Voluntary Registration Scheme,	Total size: 3781 ha ⁸

² URA, 2014

³ LegCo, 2014a

⁴ PlanD, 2014

⁵ Tang, Wong, & Lee, 2007

⁶ Development Bureau, 2016

⁷ Liber Research Community, 2016

⁸ AFCD, 2015

	and Organic Farming Support Service. Abandoned farmland refers to those parcels of land, which are left fallow and without any active agricultural activities.	
6.Small House Redevelopment	Small houses were introduced under the New Territories Small House Policy in 1972 to provide permissions for each indigenous male villager aged 18 or above to build a small house. They are found in 'Village Environs' or "Village Type Development" zone. Land could be released from small house redevelopment by increasing building intensity, including plot ratio and building height.	Approximately 4,960 ha of Village and Village Environ zones ⁹ ; 932.9 ha regarded as suitable for development (excluding sites with development constraints) ¹⁰
7.Reclamation	Reclamation uses the methods of mechanical and hydraulic dredging to obtain a piece of created land from the sea.	Total size: 1,490 ha reclamation in Siu Ho Wan, Sunny Bay, Lung Kwu Tan, Ma Liu Shui, South West Tsing Yi and Artificial Island between Hong Kong Island and Lantau Island ¹¹
8.Rock Cavern	A rock cavern is the manipulation of a large portion of space in rocks. Rock cavern development mainly serves supporting facilities, such as G/IC facilities or obnoxious uses.	Total size: 3,500 ha ¹² (not all could be developed) Total size: 34 ha identified in 2015 ¹³ ; among which, 400 hectares of government facilities were found to be suitable for relocation ¹⁴
9.Ex-quarry Site	An abandoned quarry site which dimension stone, rock, construction aggregate, riprap, sand, gravel, or slate have been excavated from the ground.	Total size: 60 ha (40 hectares of land platform from Anderson Road quarry and 20 ha from Ex-Lamma quarry sites) ¹⁵
10.Country Park	Country park aims at conserving the	Total size: 44,240 ha ¹⁶

⁹ ISD, 2012b

¹⁰ Secretary for Development, 2012

¹¹ ARUP, 2014a; Cheung, 2013

¹² Ng, Roberts, & Ho, 2013

¹³ Development Bureau, 2016

¹⁴ Ng et al., 2013

¹⁵ Development Bureau, 2016; ARUP & PlanD, 2014

¹⁶ AFCD, 2015

natural landscapes and habitats like woodlands, natural coastlines, reservoirs and scenic hills so as to maintain and enhance its biodiversity. They also serve as recreational ground for public to enjoy nature at the countryside environment.

Table 1: Potential sources of land supply

3. Framework for Evaluation on Possible Sources of Land Supply

3.1 Definition of Evaluation Criteria

To establish a holistic framework for rationalizing planning decisions, a set of evaluation criteria has been selected,

namely timely availability, size and scale, cost, environmental impact, public opinion, flexibility and robustness, land ownership, opportunities to tackle other issues, and technical considerations. Table 2 defines the definition and evaluation principle of the framework. Figure 1 illustrates the conceptual framework for evaluating possible land sources for development.

Criteria	Definition	Evaluation Principle
Timely Availability	Time required for land to be ready and available for use	Short term measures allow swift response to land demand
Size and Scale	Physical size and scale of land source	Large, clustered land parcel is preferred
Cost	Cost of forming land for development	Lower cost is preferred
Environmental Impact	The adverse impacts on the environment, namely 'human health and survival' and 'ecosystem functions and structure'	Less adverse environment impacts is preferred
Public Opinion	Public objections are mainly from the affected groups and are often more prominent when the land supply strategy caused adverse impacts towards environment and neglect of social benefits	Less public objection is preferred
Flexibility and Robustness	Effective functioning to cope with uncertainties and fluctuations in demand	High flexibility and robustness in responding to variation in demand is preferred
Land Ownership	Land under multiple ownership requires a more lengthy process of resumption because more stakeholders are involved.	Less complicated land ownership is preferred

Opportunity to Tackle Other Issue	Other issues are defined as other kinds of social and environmental issues apart from increasing housing supply.	When forming land, opportunities to tackle other issues are provided
Technical Consideration	Technical concerns during land development include opening up of land, existing land pollution and carrying capacity problem.	Less technical complication is preferred

Table 2: Definition and evaluation principle of evaluation criteria

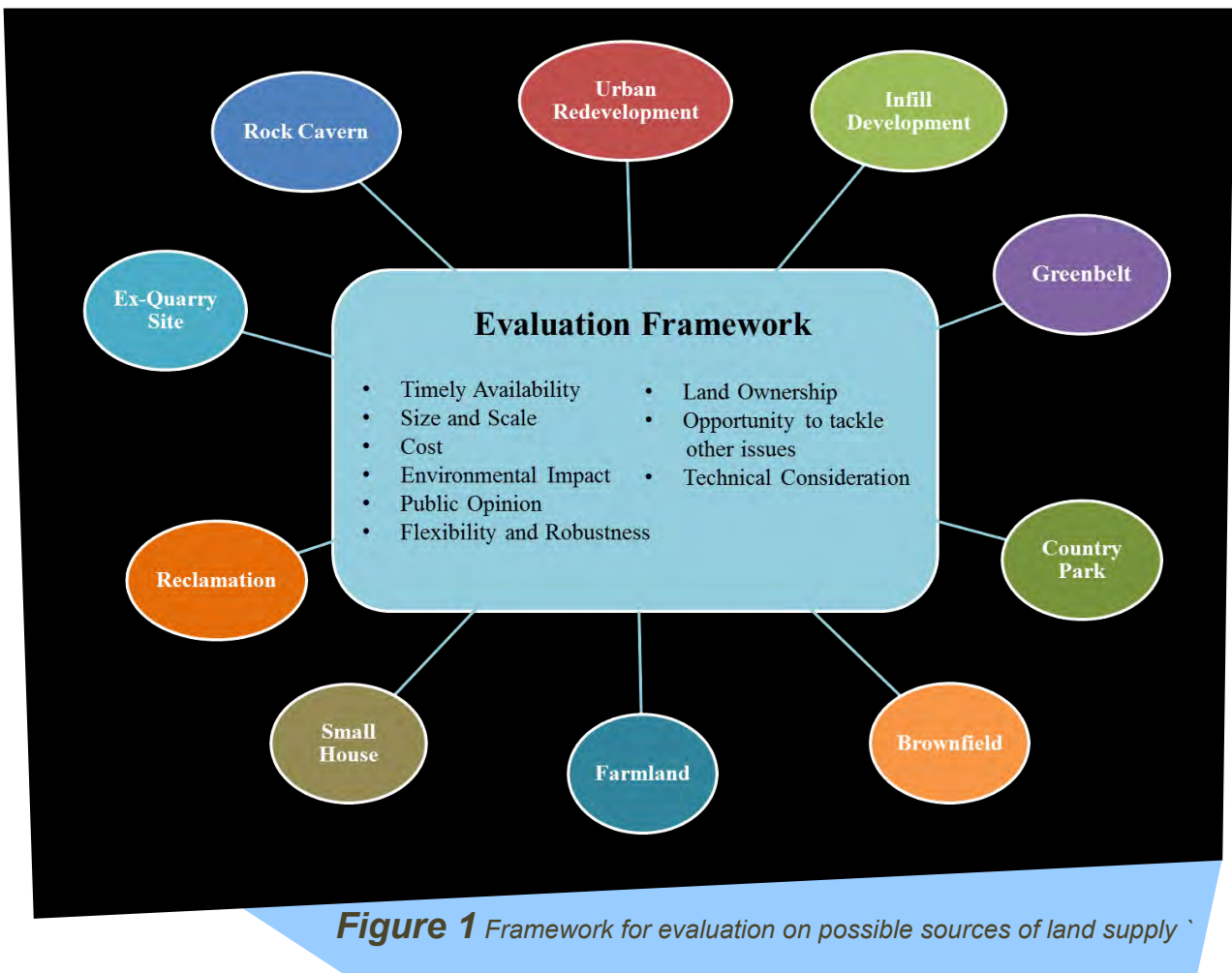


Figure 1 Framework for evaluation on possible sources of land supply

3.2 Evaluation on land supply sources

Based on the framework developed for evaluating different sources of land supply, Table

3 summarizes the evaluation on 10 possible sources of land supply, with reference to the evaluation criteria and Hong Kong's planning context.

Sources of Land Supply	Evaluation Criteria	Timely Availability	Size & Scale	Cost	Environmental Impact	Public Opinion	Flexibility & Robustness	Land Ownership	Opportunity to tackle other issue	Technical Consideration
1. Urban Redevelopment		One of the quickest land supply options; a minimum of 5 years is required for negotiation with landowners, land acquisition, relocation and clearance	Sites are relatively small and scattered	High land acquisition cost and rising construction cost	Redevelopment impacts are relatively localized with little impact to the natural habitat	Objections mainly from the involved and nearby residents concerning compensation and relocation arrangements and impact on traffic, air ventilation, G/C provisions respectively	Mainly serve residential purposes, subject to site characteristics and location	Complicated and fragmented land ownership hinders redevelopment process	Mainly tackle local issues due to limited scale	Unlikely to have technical complications
2. Infill Development		Available within a relatively short period of time in response to demand; involve rezoning applications/amendments to statutory plans, which usually takes 3 to 15 months	Sites are relatively small and scattered	Low / no cost of land acquisition, land owned by the government; readily available infrastructure	Localized impacts with little effects at territorial level	Concerns from nearby residents on traffic, air ventilation and G/C provisions, etc.	Available within short period of time in response to demand	Simple land ownership as the Government is the key landowner	Limited by its scale, redevelopment may not bring huge improvement to the community	Unlikely to have technical complications

Evaluation Criteria		Timely Availability	Size & Scale	Cost	Environmental Impact	Public Opinion	Flexibility & Robustness	Land Ownership	Opportunity to tackle other issue	Technical Consideration
Sources of Land Supply	3.Greenbelt	Involve rezoning applications/amendments to statutory plans, which usually takes 3 to 15 months for the entire planning process	Small to medium sized sites	Low cost of land acquisition and construction, depending on site topography, may require additional provision of infrastructure	Potential damages to natural habitat and landscape	May face strong objections from environmentalists and green groups	Very unlikely to be converted back to Greenbelt	Mostly government owned but some under private ownership	Help clear illegal operations on site	Slope cutting and maintenance may be required in some cases
	4.Brownfield	Medium to long term option; planning and engineering studies, amendments to statutory plans, land acquisition and decontamination are usually required	Sites are relatively small and scattered, although some are large sites being used for open storage	Decontamination and acquisition costly to relocate logistics and workshop operators	Impacts depends on the nature of future development and location of polluting operations	May face strong objections from landowners, operators, mainly from the industry	Potential to serve different land uses by developing the logistics surroundings	Complicated, private land ownership	Potential to improve the compatibility of surrounding land uses; may solve industrial/residential interface problem	Decontamination may be required

Sources of Land Supply	Evaluation Criteria	Timely Availability	Size & Scale	Cost	Environmental Impact	Public Opinion	Flexibility & Robustness	Land Ownership	Opportunity to tackle other issue	Technical Consideration
5. Abandoned Farmland		Medium to long term option; planning and engineering studies, amendments to statutory plans and land acquisition are usually required	Sites are relatively small and scattered	May involve high land acquisition cost	Permanent loss of agricultural resources	May face strong opposition from environmentalist and local people	Inflexible in converting back into farmland	Most of the land might involve complicated private ownership	Potential to improve living environment of urban dwellers	Relatively less technical considerations as it mainly involves flatland
6. Small House Redevelopment		Require the change of Small House Policy and relevant legislations	Sites are relatively small and scattered	Loss of unique, traditional cultural village practices	Localized impacts with little effects at territorial level	Objections from some indigenous villagers that redevelopment of Small House with higher intensity will affect village character and "feng shui". May be welcomed by villages with little land for expansion.	Mainly for residential purposes.	Complicated land ownership. Consensus among villagers is required	Opportunities exist to allow intensification of small house plots for villages with no land for expansion	Relatively less technical considerations as it mainly involves flatland

Sources of Land Supply	Evaluation Criteria	Timely Availability	Size & Scale	Cost	Environmental Impact	Public Opinion	Flexibility & Robustness	Land Ownership	Opportunity to tackle other issue	Technical Consideration
7. Reclamation		Lengthy process of public engagement, site selection processes and site-formation construction work are needed	Can create extensive flat land for development	HKD 400/m ³ for water depth of 15m ¹⁷	Adverse, irreversible impacts to marine habitat; a way to resolve and reuse construction waste	May face strong objections from green groups and the public	For large scale reclamation, once started will be difficult and costly to abandon scheme in case the demand for land drops	Simple land ownership as the government is the sole landowner	A solution to tackle construction waste and fills from excavation from other construction sites	Reclamation techniques are mature. Mechanical and hydraulic dredging are required
8. Rock Cavern		Require sophisticated study and land use planning	Can free up existing land after relocation of locally cost unwanted land use (LULU)	High construction and operation cost	Development that are close to ecologically sensitive areas may threaten wildlife	Safety concerns during construction if sites are close to residential area	Less flexible in terms of land uses that can be accommodated	Simple land ownership as the government is likely to be the sole landowner	Ability to relocate LULU from populated area	Require detailed survey on geological conditions, carrying capacity problems
9. Ex-quarry site		A readily available source for different types of land use	Small to medium scale of elevated land	Considerable infrastructural and restoration costs	Environmental improvements for some ex-quarry sites with proper restoration and development of appropriate scale	Unlikely to result in public objections and controversies towards redevelopment	Could serve as a flexible source for different types of land use	Simple land ownership as the government is the only landowner	Can restore degraded landscape	Require detailed survey on geological conditions, carrying capacity problems

Sources of Land Supply	Evaluation Criteria	Timely Availability	Size & Scale	Cost	Environmental Impact	Public Opinion	Flexibility & Robustness	Land Ownership	Opportunity to tackle other issue	Technical Consideration
10. Country Park		Normally require 10 years or more before land is ready for use; lengthy consultation process, planning studies, change of statutory plans are required	Protected by Country Park Ordinance, limited land available for development	High cost on infrastructure and supporting facilities; No/Low cost of land acquisition	Adverse, irreversible impacts on natural habitats; loss of recreational spaces	Highly controversial; may face strong objections from green groups and the public who concerned about opening the floodgate for further rezoning of Country Parks	Very unlikely to be converted back to Country Park	Simple land ownership as the government is the primarily landowner	Unlikely to solve other issues other than housing problem but may create demand for redevelopment from landowners with land inside Country Parks	Slope cutting and maintenance may be required. Additional infrastructure like roads and drains are needed.

Table 3: Evaluation on possible sources of land supply

4. Concluding Remarks

Towards an objective, comprehensive land supply framework

Today, the supply of land falls short of the estimated demand of 4500 hectares. With price escalation for different types of properties, Hong Kong is undoubtedly facing a crisis in land supply. While such situation has been a prolonged and recognized issue of the territory, it is never an easy task to identify possible sources of land supply. Land demand could never be accurately forecasted, whereas supply is hard to guarantee. In recent years, there are increasing public controversies concerning different land supply options. When these issues are brought to the discussion table, it is crucial to develop an objective, comprehensive land supply framework to discuss and evaluate the opportunities and constraints of each strategy. The provision of framework will allow decision makers to select the best development option for all.

This report evaluated different possible sources of land supply, with reference to an evaluation framework comprising of timely availability, size and scale, costs, environmental impacts, public objections, flexibility and robustness, land ownership, opportunities to tackle other issues and technical considerations.

A multi-pronged approach in land supply

While a framework with nine criteria has been established for more systematic assessment of

land supply strategies, it should be noted that in reality, a project of a scale like, for example, the North East New Territories New Development Areas, will involve a mix of land supply sources to achieve certain development scale. It is therefore not realistic to argue that a single source of land like brownfield sites or golf course should be exhausted before considering other sources. Assessment of individual sites based on the evaluation criteria will help public to better understand the implications of development options. It is considered that future land supply of the territory should not depend on a single source, but a multi-pronged approach to explore a combination of land supply sources is needed.

Necessity to establish land reserve

In addition, a land reserve should be established. Land demand could never be accurately forecast due to fluctuations of market and impact of technology. Meanwhile, supply of land is never guaranteed. To deal with these uncertainties, the government could establish a land reserve for future uses. Relevant feasibility studies and planning and engineering studies should be conducted to identify potential sites for land reserve. While designating certain amount of land as land reserve, instead of leaving the land abandoned and await for development, these land reserve could be wisely used for other temporary purposes, such as recreational use. Therefore, it is crucial to establish a land reserve for Hong Kong to stabilize land supply.

Facilitate communication among the Government, stakeholders and the Public

Public objections and legal challenges against plans for land formation and reclamation will slow down the development process. With the lack of trust, communication and detailed assessment information, opposition from local residents and concern groups has remained one of the biggest development barriers. The feeling of being ignored by the authorities may increase the challenges of engagement in the procedural process (Sims and Bosetti, 2016). In order to allow the public to entirely understand the situation, consultation is of the utmost importance. Consultation which engages the concerns of the affected parties could efficiently enable planning work that is sensitive to the public concerns. It is vital to engage different parties in planning work, so that conflicts could be solved via understanding. A detailed assessment framework towards land supply is thus important in facilitating rational and informed discussion among different parties. After all, development at individual sites should be based on sufficient information of the sites, a mix of development strategies and public consensus.

To conclude, through the establishment of an evaluation framework, it is hoped that this report helps to facilitate rational and informed public debates towards land supply in Hong Kong so that the community as a whole will work together towards building a more livable and competitive Hong Kong for the benefit of all.

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NEWS

THE HONG KONG INSTITUTE OF PLANNERS HONORARY MEMBER PROFESSOR ROGER BRISTOW: AN INTRODUCTION



President Dr. Eunice Mak, The Honourable Mr. LAM Woon-Kwong, honourable guests, fellow members, ladies and gentlemen, it is my greatest honour to introduce my former teacher Prof. Roger Bristow who has been elected by the Council of the Hong Kong Institute of Planners as an Honorary Member.

Prof. Roger Bristow should require no introduction to urban planners in Hong Kong. Many of us have benefited directly either from his personal teaching or his now

classic texts on urban planning in the city. His two most influential books: *Land-use Planning in Hong Kong: histories, policies and procedures* and *The Hong Kong New Towns: a selective review*, still are must reads among planning students and scholars who are interested in urban planning in the city. It is not an overstatement to say that these classic books have continued to be irreplaceable in Hong Kong.

Although Prof. Roger Bristow received his

academic training in Cambridge and has spent most of his teaching life in the University of Manchester, over his academic career he has contributed to planning education throughout Asia, including Hong Kong, Singapore, Malaysia, the China Mainland and Taiwan.

Prof. Bristow's long-term connection with Asia started when Hong Kong students studying at the University of Manchester sought his advice on urban planning. This not only prompted his interest on urban planning in the city, he also discovered that not much had been published on its planning in English. Hence, during his sabbatical leave in 1980, he became a visiting Lecturer in the then Department of Geography and Geology in the University of Hong Kong and started his research work on the city. The rest is history.

Prof. Bristow is probably the only academics who has published planning books on Hong Kong as well as Taiwan. His book on land-use planning in Hong Kong not only takes us through the genesis of urban planning in the city, his work also sensitises us to the complexities, nuances and politics involved in the institutionalization of the urban planning system. Besides diligently synthesising the various historical documents to make sense of planning and urban development in Hong Kong, his book is definitely one of the earliest texts that relates planning practice to theories. Students of planning in Hong Kong should

be familiarized with his conclusion that the Hong Kong style of 'land-use planning... is a product of the environment and society within which it is operating... [planning in] Hong Kong represents an art of the possible, rather than an imposition of an ideal. Change in the future as in the past will only come when it is demanded and it is acceptable'. 'It is up to its citizens to make known their demands and to see that their planners are given the necessary means to achieve them' (1984, p.293).

In *The Hong Kong New Towns: a selective review*, Prof. Bristow traced the origin of the city's new town planning strategy back to the 1948 Abercrombie Plan. He canvassed not only the first generation new towns including Sha Tin and Tuen Mun but also the 1980s new towns, Tseung Kwan O and Tin Shui Wai. Again, Prof. Bristow had then prophetically argued that the China factor and internal politics would determine the future of Hong Kong new towns.

Prof. Bristow's contribution to Asian planning does not stop at Hong Kong. Since the early 2000s, he has been visiting professor to National Taipei University, National Taipei University of Technology, and Feng-Chia University in Taichung etc. His 2010 edited book on *Planning in Taiwan: Spatial Planning in the Twenty-first Century* can be argued as Taiwan's most important English book on its spatial planning. The book invokes global planning debates to review spatial planning practices in Taiwan

at different geographical levels. Its conclusions bear serious implications for the planning of the Asian cities, including Hong Kong. These include: the role of envisioning in the planning process especially at the strategic and regional levels; the power play that constantly threatens to corrupt the planning system; the need for a more transparent and participatory urban planning process that goes beyond the control of 'appointed officials and experts'; resilient planning in the face of climate change and global warming, and the need to rally community, business and policy support to lower carbon emission and combat environmental threats etc. All these topics are of contemporary relevance and urgency to planning scenes in the Asian contexts and beyond.

On behalf of the Council of Hong Kong Institute of Planners, I hereby announce the election of Prof. Roger Bristow as an Honorary Member for his tireless contribution to urban planning education in the United Kingdom and Asia as well as his ground breaking contributions to bridging urban planning theories and practices between the United Kingdom and Asian cities.

Thank you!

[Citation presented by Dr. M.K. Ng, FHKIP, FAcSS, Vice-Chairman of the Department of Geography and Resource Management, The Chinese University of Hong Kong at the 37th Anniversary Dinner of HKIP held on 17 November 2016.]

THE HONG KONG INSTITUTE OF PLANNERS HONORARY MEMBER DR. SHI NAN: AN INTRODUCTION



Today, I'm very glad and honoured to represent the Hong Kong Institute of Planners (HKIP) to introduce Dr. Shi Nan, the Honorary Member elected by the Council for the year 2016.

Dr. Shi Nan is the Vice-President and Secretary General of the Urban Planning Society of China (UPSC), Vice-President of ISOCARP, Executive Chief Editor of "City Planning Review" journal, and Senior Urban Planner at the China Academy of Urban Planning and Design. Dr. Shi Nan is also a planning advisor of several major Mainland

city governments, and is holding offices with numerous planning academic and research organisations in China and overseas.

Dr. Shi Nan has made various contributions to the planning realm, and I'm here to talk about two aspects.

The first one is on fostering the development, training and continuing professional education of the talents in China's town planning profession. Dr. Shi Nan has longed been the Secretary General of UPSG, and is also its Vice-President.

He is the main executor and facilitator of UPSG's activities. Through participating in various UPSG's academic and professional exchange activities, we witness the strength and development of the Mainland planning professionals, as best illustrated in the number of participants in the China Annual National Planning Conference.

HKIP has started deploying delegations to the Annual Conference since 2004. At that time, the total number of participants in the Annual Conference was less than a thousand. In recent years, the number of participants has risen to some five to six thousands. Every year, several hundreds speakers publish papers and working reports in dozens of the breakout forums, reflecting the vigorous professional exchange and bountiful working experience in the Mainland planning sector. The Annual Conference has become a high standard professional and academic platform in the Mainland planning sector which is of the largest scale, the densest data pool, and with conference themes serving directional functions. Since the implementation of the opening up policies in the Mainland of China, the urbanisation process has been fruitful, thereby providing an effective spatial carrier for economic development and livelihood improvement. It is considered a miracle in the socio-economic development history of mankind. All these are indispensably related to the multiplying number and enhancing ability of the fleet of Mainland

planning professional talents. We heartily respect the sustained effort and contribution of Dr. Shi Nan in fostering the development of the Mainland planning professional talents.

The second one is on establishing a professional exchange platform and channel between the Mainland and Hong Kong town planning counterparts, and personally involving in it to provide an effective bridge of communications between the two places.

The Mainland and Hong Kong town planning counterparts were involved in rather frequent exchange and mutual visit activities in the 1980s. In February 2004, UPSG and HKIP signed a "Cooperation Memorandum", and the one who represented UPSG in signing the "Cooperation Memorandum" was Dr. Shi Nan. Since then, the exchange between the two counterparts has become more regularised and institutionalised. The best example is from the recurrent participation of HKIP's delegations in the Annual Conference every year since the one held in Beijing in 2004, and we never miss any. Since the 2009 Tianjin Annual Conference, we are also responsible for organising a special forum to exchange the work experience and share case studies between the Mainland and Hong Kong counterparts. More remarkably, since the 2011 Nanjing Annual Conference, HKIP's Young Planners Group has also been responsible for organising another special forum to rethink

some controversial planning issues, using a more lively presentation tone, a critical way of expression, and from the perspective of the youngsters. These two forums organised by HKIP enable the voices of our Hong Kong counterparts be heard every year, and they also facilitate the Mainland counterparts to raise discussion and give views. We have benefitted a lot through them.

Under the framework of the “Cooperation Memorandum” of HKIP and UPSG, we have jointly hosted several international symposia, covering a wide spectrum of topics, including innovative industries and urban development, planning for a low-carbon city, and liveable city, etc.

Under the framework of the mutual town planning qualification recognition agreement signed by the two places in 2005, which was effective for five years, Dr. Shi Nan has organised training classes for us and taught us himself. Ultimately, 66 HKIP members have obtained the Mainland Registered Urban Planner Qualifications. Even though the number was not considered a lot, its significance was to let our Hong Kong planning counterparts learn and understand systematically the planning system, laws and regulations, work procedures and various planning case studies of the Mainland, thus enabling the two places to make cross reference to each other’s experience and to achieve mutual learning and enrichment.

Whenever we want to organise exchange activities with the Mainland, we always think about asking Dr. Shi Nan to help. Dr. Shi Nan is already the link in maintaining planning professional exchange between the two places, and the key person in bridging and threading our relationship.

We are deeply grateful to Dr. Shi Nan for his unremitting efforts in fostering the exchange and cooperation between the town planning counterparts of the two places!

Clause 5 of the HKIP Constitution has provided the Council the power to elect persons who have made outstanding contribution to town planning and the work of HKIP as Honorary Member. Accordingly, the Council elected Dr. Shi Nan as the Honorary Member of HKIP from 30 May 2016 to pay tribute to Dr. Shi Nan’s remarkable contribution to the planning profession.

May I warmly congratulate and welcome Dr. Shi Nan in becoming HKIP Honorary Member. May I wish Dr. Shi Nan to continue making achievements in and contribution to China’s town planning sector, and to maintain the exchange and collaboration between the Mainland and Hong Kong planning counterparts.

Thank you! (Announced on 25 Sept 2016 in the China Annual National Planning Conference-Shenyang by past president of HKIP, Director of Planning Department, HKSAR)

NEWS

香港規劃師學會榮譽會員： 石楠博士



今天，我十分高興及榮幸，代表香港規劃師學會介紹理事會 2016 年推選的榮譽會員石楠博士。

石楠博士現任中國城市規劃學會副理事長兼秘書長、國際城市與區域規劃師學會 (ISOCARP) 副主席、《城市規劃》雜誌執行主編、中國城市規劃設計研究院教授級規劃師。石楠博士亦兼任多個內地主要城市政府的規劃顧問，及擔任多個中外規劃學術及研究機構的職務。

石楠博士在規劃工作方面建樹良多，在這裏主要談談兩個方面。首先是推動中國城市規劃專業人材的發展、培訓、與持續專業教育。石楠博士長

期擔任中國城市規劃學會秘書長，現在亦擔任學會副理事長，是學會具體工作的主要執行者和推動者。我們透過參與中國城市規劃學會的各類學術和專業交流活動，見證了內地規劃專業人材隊伍的壯大和發展，每年全國規劃年會參會人數便是最好的說明。

香港規劃師學會在 2004 年開始正式組團參加年會，當時參會總人數未過千人士，到最近幾年參會人數多達五、六千人。舉辦的分論壇數十個，發表論文和工作報告的講者每年多達數百人，反映了內地規劃界活躍的專業交流和豐富的工作經驗。年會成了內地規劃界規模最龐大、信息量最密集、會議主題具指導性作用的高水平專業和學

術平台。中國內地自實施改革開放政策以來，城市化的進程碩果纍纍，為經濟發展和民生改善提供了有效的空間載體，被認為是人類社會經濟發展史的奇蹟，這一切都離不開內地規劃專業人材隊伍在數量上的成長和能力上的提昇。石楠博士在推動內地規劃專業人材發展方面作出持續努力和貢獻，我們衷心敬佩。

第二是搭建內地與香港城市規劃同行的專業交流平台與渠道，並親自參與其中，成為兩地溝通的有效橋樑。

內地與香港的城市規劃同行，在上世紀 80 年代起已經進行了頗為頻密的交流和互訪活動。中國城市規劃學會和香港規劃師學會在 2004 年 2 月簽訂了《合作備忘錄》，代表內地簽署《合作備忘錄》的，正是石楠博士。自此，兩地同行的交流變得更為規範化和制度化，最佳的例子便是自 2004 年北京年會開始，每年香港規劃師學會都組團參與年會，至今每年都沒有缺席。而且自 2009 年天津年會開始，我會還負責舉辦一個特別論壇與內地同行交流香港的規劃工作經驗和分享工作個案。更令人注目的，是在 2011 年南京年會開始，香港規劃師學會的年青規劃師組也負責舉辦另一個特別論壇，以活潑輕鬆的表達手法，具批判性的表述方式，從年青人的視角，反思一些具爭議性規劃的議題。這兩個由香港規劃師學會舉辦的論壇，讓香港規劃同行的聲音每年在年會得到聆聽，也讓內地同行對我們的工作提出討論和意見，使我們獲益良多。

在兩地學會《合作備忘錄》框架下，兩會在香港合作舉辦了數次國際學術研討會，涵蓋廣泛的議題，包括創意產業與城市發展、構建低碳城市，宜居城市等。

在 2005 年簽訂，有效期為五年的兩地城市規劃師資格互認協議的框架下，石楠博士為我們組織培訓班，並親自為我們授課，最終有 66 位香港規劃師學會會員取得了內地註冊城市規劃師資格。人數雖然不算多，但重要的意義是使香港的規劃同行開始有系統地學習和了解內地的規劃制度和法規、工作流程和各類規劃案例，使兩地的規劃工作經驗能互相參照、互相學習，共同進步。

當我們要到內地組織交流活動時，想到的往往便是找石楠博士幫忙。石楠博士已經成為維繫兩地規劃專業交流的紐帶，是鋪橋搭路，穿針引線的關鍵人士。

我們對石楠博士為促進兩地城市規劃同行的交流與合作所作出不懈的努力，滿懷感激！

香港規劃師學會會章第五條賦予理事會權力，推選對城市規劃及香港規劃師學會的工作有傑出貢獻的人士為榮譽會員。按此，理事會推選石楠博士自 2016 年 5 月 30 日起成為香港規劃師學會的榮譽會員，表彰石楠博士對規劃專業的傑出貢獻。

我熱烈祝賀並歡迎石楠博士成為香港規劃師學會的榮譽會員。並祝願石楠博士為中國城市規劃事業，為維繫內地與香港規劃同行的交流與合作，繼續做出成績，作出貢獻。

謝謝各位！

（由香港規劃師學會原會長，香港規劃署署長凌嘉勤，於 2016 年 9 月 25 日在中國瀋陽舉行的全國規劃年會中宣讀。）

NEWS

HKIP Awards 2016

Silver Award

Industrial Land Use Changes in Response to Economic Restructuring in Hong Kong¹

Prof. Jimmy Leung, Dr. Kenneth Tang and Dr. Catherine Bai
Department of Urban Planning & Design, the University of Hong Kong

The aim of the research is to make policy recommendations regarding industrial premises in Hong Kong, and its main objectives are to address the following research questions:

- What has been happening in the industrial premises in Hong Kong?
- How did the problems faced by users of industrial buildings emerge and develop?
- Why does industrial stock matter to Hong Kong?
- What kind of policy measures should the government take to truly optimise the use of industrial premises?

To answer these research questions, a number of tasks have been conducted. First, data on industrial buildings was collected from Buildings Department and Planning Department as well as websites of other government departments and the Hong Kong Science and Technology Parks Corporation with a view to drawing up a comprehensive list of industrial buildings in Hong Kong. Secondly, a 20% sample of establishments with information on the business registration address, type of trade and range of employment were drawn and supplied by the Census and Statistics Department. Matching the addresses of sampled establishments with the list of industrial buildings thus provided an overall picture of the types of trade and employment size of establishments operating in industrial buildings. Thirdly, in-depth interviews with more than 50 stakeholders in government, statutory bodies, universities and trades were conducted. Lastly, an analysis of past and current government policy measures and surveys conducted by the Planning Department and the Hong Kong Art Development Council on the use of industrial premises complemented the quantitative analysis in explaining the land use changes in industrial buildings in the territory.

In addition, visits to London, Taipei, Hsinchu, Shenzhen and Dongguan were made to examine how industrial premises had been converted to co-working spaces as well as cultural and creative parks in the light of economic restructuring of these cities. What makes Hong Kong different from these cities is that the territory's industrial buildings are mainly characterised by high-rise development and more often than not under multiple ownership. This poses significant difficulties in their subsequent adaptive re-use and redevelopment. However, there are still lessons from these cities, which can serve as useful reference for Hong Kong.

Based on the above analyses, the research has drawn five conclusions:

- Affordability, flexibility and accessibility have made industrial buildings ideal work spaces for various industrial sectors.
- There is a pressing need to resolve the issues and problems of fire safety of old industrial premises.
- Shortage of developable land is the bottleneck of current and future development.
- It is imperative to provide more land for future demands of the logistics and manufacturing industries.
- Hong Kong's innovation and creativity sectors need more affordable spaces.

Based on these conclusions, 12 policy recommendations have been made:

- To continue with the existing revitalization policy but restricted to non – “I” zone only (i.e. for “OU(B)”, CDA, R(E) zones), successful applicants would be required to dedicate a portion of the space free of charge to government. The dedication is only restricted to the life of the existing building. Upon redevelopment, the premises will be returned to the landowner unconditionally.
- To preserve warehouses and cold storage particularly those located near the port, airport and major transport infrastructure linking Hong Kong with the Mainland. Any application for rezoning or redevelopment of purpose-built facilities to other uses should be treated cautiously.
- To dispose sites with regular shape and sufficiently large floor plate for modern logistics facilities as early as possible.
- To adopt a prudent approach in rezoning of “I” zone and change of use particularly for ground floor space in industrial buildings on “I” zone.
- To encourage high-tech industries to be set up in Hong Kong, new sites should be made available for industrial estate development.
- To build generic factory for leasing in more flexible terms to industries which are considered suitable for establishing in an industrial estate but do not require a whole site.
- To lease back underutilised premises in industrial estates for re-allocation.
- To review the admission criteria for industrial estate to encompass other considerations such as the future prospect of the industry, multiplier effect on the economy, the number and type of jobs to be created and the amount of R&D investment.

- To revise future leases of industrial estates to 30 years certain with an option to renew for another 20 years subject to mutual consent.
- To permit a certain portion of a building for co-living spaces in industrial buildings converted purely for co-working spaces and CCI uses in non-“I” zones.
- To adopt a reverse BOT model for government to secure a long lease of an industrial building and convert it for CCI and other related uses. Under this model, government would lease an old industrial building, renovate it and grant it to the HKADC or other agents for allocation and management of the space at subsidised or market rents. This is the most preferred way to address the shortage of affordable space for artists.
- To develop the “C” site at Lei Yue Mun road/Cha Kwo Ling Road/King Yip Lane at Kwun Tong for CCI and related uses. This will help to provide space for artists displaced by the redevelopment of industrial buildings to office buildings in Kwun Tong and Kowloon Bay under the CBD² initiative.

The researchers aim at achieving a better understanding of Hong Kong’s industrial premises before suggesting implementable policy recommendations that will benefit Hong Kong society as a whole. This study is not making recommendations on industrial policy, or intended to be a strategic plan for Hong Kong. As argued in this research, affordability, flexibility and accessibility have made industrial buildings ideal work spaces for the selected sectors and possibly more. Therefore more general, macro conclusions and detailed policy recommendations are drafted for the government’s consideration.

¹ This research project (Project Number: 2013.A8.012.14B) is funded by the Public Policy Research Funding Scheme from the Central Policy Unit of the Hong Kong Special Administrative Region Government.

NEWS

HKIP Awards 2016

Silver Award

From Brown to Green Hung Shui Kiu New Development Area

Planning Department; Urbis Limited

Other contributors:

Civil Engineering and Development Department; AECOM Asia Co Ltd

Green = Sustainability + Optimisation

Land is a scarce resource essential for sustained social-economic development. The proliferation of brownfield on abandoned agricultural land which arose largely as an unintended consequence of the Melhado court case has underutilised the valuable land resources and has degraded the rural landscape. In transforming HSK into a new generation new town, a vast extent of brownfield land (about 190 hectares) will be turned into a sustainable self-contained human settlement of the highest achievable environmental quality. Through comprehensive planning and design, the HSK NDA will provide 61,000 new flats to address the prevailing territorial deficit in housing provision. HSK combined with Tin Shui Wai (TSW) will form a major new town development cluster which will promote economies of scale and efficiencies in the provision of social and economic infrastructure.

Green = Balance + Growth

Capturing its strategic location, the HSK NDA is positioned as the Regional Economic and Civic Hub of the NWNT. The NDA has been planned with large amount of spaces for economic uses. The proposed volume and diversity is unprecedented in the history of Hong Kong's new town development. Their planned spatial distribution enshrines flexibility to respond to changing economic circumstances and market requirements. The plan has deliberately sought to create an employment centre in the NWNT to redress the existing imbalanced territorial spatial distribution of jobs. The 150,000 newly created employment

opportunities will span across a wide spectrum of economic sectors and require workers of different profiles and educational attributes. The job variety will reduce the chance of mismatches with the skill sets of the available labour supply in the region.

Green = Nature + Wellness

An integrated blue and green network is planned. This will be focused on a 5 km continuous riverside promenade linking up different nodes in the NDA from the south to the north. A flood retention lake is proposed as an integrated part of the open space system which will also provide a micro climate cooling mechanism. The existing TSW River Channel will be upgraded and revitalised to enhance the biodiversity. The removal of Tin Ying Road on a raised embankment alongside the channel will be a major facilitator of this initiative and will allow better connection between HSK and TSW.

Green = Efficiency + Innovation

Smart and green mobility is proposed in the HSK NDA to promote sustainable urban living, and enhance accessibility, connectivity and vibrancy of activity nodes. While the railway system will serve as the backbone transport, a proposed Green Transit Corridor comprising a highly efficient Environmentally Friendly Transport Services, pedestrian walkways and cycle tracks will be introduced to support the internal movement between the development clusters. Resilient green infrastructures covering total water management, sustainable drainage system, solid waste management and green energy saving have been comprehensively planned.

A New Live-Work Environment for the 21st Century

The combination of the preceding elements will provide the basis upon which a new generation sustainable new town living environment can be created. The plan leverages existing resources to generate a blue green community. The composition, location arrangement and massing of development combined with vital environmentally friendly transportation corridors will showcase the character of a compact city. Of vital importance is that the composition of land uses seek to not only address present shortfalls in residential provision but also introduce significant employment opportunities requiring different skill sets. To this extent a range of employment generating land use reserves have been provided. The future population of HSK NDA will therefore have access to a unique live – work environment within which sustainable design solutions have been applied; and the existing extensive brownfield area in HSK will become a 21st century new town for Hong Kong which is economically vibrant, smart, green and resilient.



RE-CONNECTING PEOPLE TO THE WATER *Wan Chai North & North Point Harbourfront Areas*

Background

Over the past centuries, the shoreline of Victoria Harbour has evolved through various stages of reclamation to provide land for development and infrastructures. Functional requirements have long dictated the harbourfront. While traffic has improved, accessibility to the water edges is constrained. The stretch of newly reclaimed land along the Wan Chai North and North Point presents a rare opportunity for a new public space at the harbourfront. Suffused with the passion to create an attractive, vibrant and world class waterfront, Planning Department strives for innovative and creative urban design solutions and planning strategies to guide future development of the Wan Chai North and North Point Harbourfront Areas.

Urban Design Framework and Harbourfront Enhancement Proposals

Through an in-depth understanding of the existing site constraints, local history, heritage context, design opportunities, and public aspirations, an urban design framework has been formulated. Vested with the public consent to diversity and vibrancy as well as flexibility and multi-purpose, five distinctive character precincts have been created as the basis for formulating the Harbourfront Enhancement Proposals, each having its own identity, echoing that part of the city it represents, breathing life to the neglected and disconnected waterfront. The urban design has also put emphasis on shared uses, a sense of place, water-friendly activities, green and sustainability, natural amenities, historical and cultural heritage elements, as well as harmony with the harbourfront. The 10ha new harbourfront parkland and 22ha enclosed water bodies represent a golden opportunity for developing a series of activity nodes for the public to enjoy.

Continuity and Connectivity

Accessibility and connectivity are the prime factors for a successful waterfront and they are the key requests from the general public. An east-west continuous waterfront promenade of 3.2km in length is planned along the waterfront, which is equivalent to about 45 minutes of leisure walk. A comprehensive Pedestrian Network Plan depicting the connectivity of the waterfront with the hinterland has also been formulated. Barrier-free access is emphasized for the aged and physically challenged. Streetscape and way-finding enhancements will be incorporated to ensure a pedestrian-friendly walking environment. Recognizing the public aspiration for a continuous cycle track, a cycling network for leisure purpose is planned with due consideration given to safety and physical constraints at some bottleneck sections.

Engaging the People in the Planning Process

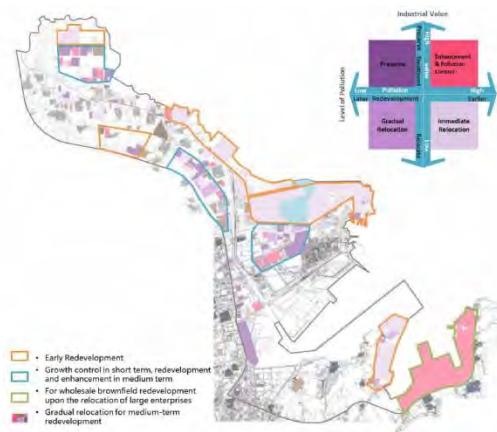
The public's participation in the early planning stage would be of utmost importance to ensure that the plan would meet the aspirations of the community. A two-stage public engagement exercise has been integrated into the study process. In addition to formal briefings to boards and committees, a series of interactive and lively public engagement programmes including puppet shows, model building workshop, heritage and cultural boat tours, idea café, sketching and voting exercises, on-street exhibition and a design ideas competition have been organized. These events were all well received by the general public. They had been successful not only in arousing public awareness and initiating public discussion, but also allowed planners to have face to face discussion with the general public to gauge their views. Dialogues with stakeholders are still ongoing. Together with the community at large, we look forward to creating an attractive and vibrant harbourfront that re-connects people to the water.



Project Significance – Our planners savoured a complete process from strategic and conceptual planning for 103km² to the detailed urban design for 1.15 km². We assisted in the implementation of advanced planning principles by working closely with the QFTPZ Administrative Committee (the Client), working to transform the site by seizing opportunities from policy impetuses including the livability enhancement of Jiaozhou Bay (2010) and the establishment of Pilot Free Trade Zones in China (2013).

Innovation

We aimed to innovate on the site’s foundational role as an industrial port, incorporating a 3.3-km autonomous vehicles (AV) loop in the core area of the master plan for both internal transport and testing of latest technology. We also focused on managing large-scale urban regeneration. To rapidly prioritise redevelopment of industrial uses during the conceptual planning stage, we created a new method by mapping over 240 existing industrial operations on a “value-pollution” bipolar matrix, allowing quick judgment on preliminary development phasing.



Sustainability

Working to reconstruct the site’s ecology, we increased natural and residential coastlines by three-fold in our plan. We also incorporated “Sponge city” principles for urban regeneration, focusing on “retention” and “infiltration”-based low-impact development principles, while further proposing turning the patrolling road into bio-swales and turfs as a new green infrastructure.



Social Impact and Benefits

Endeavoring to construct a strong image of the city through the public realm, we incorporated context-specific design interventions such as the creation of the green loop within the core area. Urban retrofitting strategies were also adopted, such as securing common trenches along four major arterials to minimise road digging in future, smart lighting and sustainable building refurbishment for bringing in high-value economic activities.



The Conservation Plan for Large Archaeological Site of Baidi City

Project Description:

The Baidi City Large Archaeological Site is located on the north Yangtze River between Fengjie County and Qutang Gorge. It is a heritage complex that includes ancient city, ancient architecture and some surrounding heritage remains* with about 2000 years history. With the long history and the plenty of the heritage remains, the Baidi City Large Archaeological Site contains important value in history, local culture, art, archaeology, local society and economy. The Conservation Plan for Large Archaeological Site of Baidi City is a conservation plan base on the heritage protection and coordinates the relative environmental plans such as Urban Development Plan, Local Tourism Plan and Land Use Plan. The main propose of this project was to experiment a new planning methodology and system to reduce the conflict between heritage protection and the urban development and to benefit the society by protecting and reusing heritage resource. The project was featured by the following characters:

1. It is a heritage conservation and usage plan. It is a plan base on the protecting and creating the new function of this heritage site by combing the requirements of heritage conservation, academic research and local economic development. It not converts the heritage site to the main source for benefiting the society and but also continuing the value of those heritage site and item.
2. It is a large scale and multi realms planning. The protect object in this project is the Large Archaeological Site which includes not only an individual historic item but also the surrounding environment and relative issues such as history, transportation, religious and etc. The roject demonstrates an overall system to protect the heritage site completely.
3. It is a practical and comprehensive planning base on the heritage protection. It coordinates several local plans in different planning hierarchy, such as Urban Development Plan, Land Use Plan, Local Transportation Plan, Local Tourism Plan and etc. to achieve the balance and generate profits between heritage conservation and urban development. The negotiation and communication during the process ensures all the design approaches are clear and coherence in different plans.

* Three Gorges Dam Project is one of the most important construction projects in China. Due to the huge flooding area, some heritage remain along the Yangtze River were moved to other place for safe and protection.

Planning Department;
Civil Engineering and Development Department

Cavern Master Plan to Unlock Hong Kong's Hidden Land

Cavern Development – Sustainable and Innovative Long Term Land Supply

Hong Kong is compact and high density with limited developable land. Cavern developments, with proactive facilitation and guidance via the planning mechanism, would be a sustainable and innovative source of long-term land supply in creating development capacity for Hong Kong's sustainable growth. Hong Kong's hilly terrain with strong crystalline igneous rocks is highly suitable for developing rock caverns.

Cavern Master Plan – a Strategic Planning Tool

The Cavern Master Plan (CMP) is the result of the Study on “Long-term Strategy for Cavern Development – Feasibility Study”. It is the first planning tool of its kind in Hong Kong to provide a broad strategic planning framework to guide and facilitate territory-wide cavern developments as well as to include an expanded list of potential land uses for cavern development.

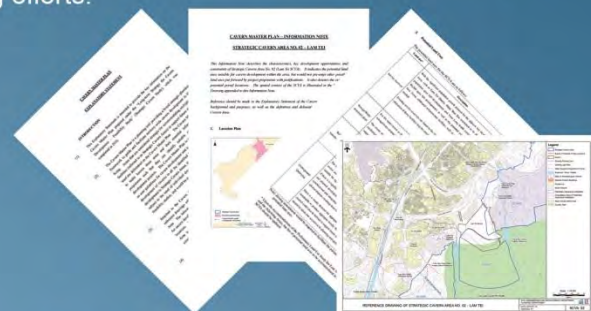
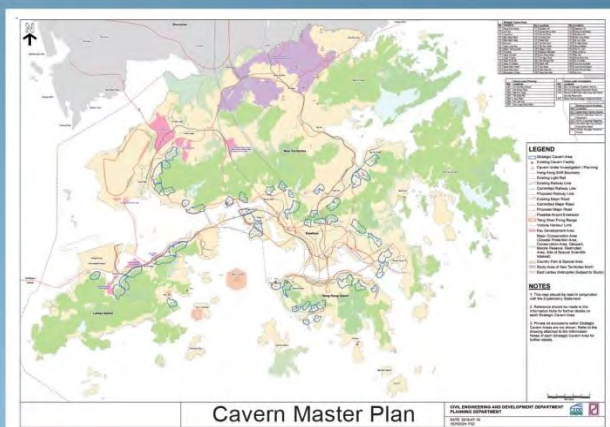
The CMP shows the Strategic Cavern Areas (SCVAs) in the territory and is accompanied by an Explanatory Statement and a set of Information Notes of each SCVAs which collectively serve to fulfill the objectives of facilitating territory-wide cavern development by the public and private sectors. It will be promulgated in the Hong Kong Planning Standards and Guidelines.

Create Development Capacity for Sustainable Growth

The CMP delineates 48 SCVAs that are well placed for developing rock caverns by giving due consideration first from geological suitability and then on relevant planning considerations including land use potential, portal areas, environmental and infrastructure considerations etc.

The benefits of cavern development are manifold: (i) release surface land by relocating existing government facilities to caverns; (ii) remove incompatible land uses by placing unpopular facilities in caverns for minimizing their nuisance to the community; (iii) reduce surface land take by accommodating new facilities in caverns; (iv) reserve developable land for other priority uses such as open spaces, community/residential uses by accommodating facilities in caverns; and (v) rocks arising from cavern construction could also be used as aggregates to support the local construction industry. The space created in cavern is versatile for a wide variety of economic and community land uses (e.g. data centre, archives, logistic centre, restaurants, swimming pool etc) that help in enhancing the liveability of the congested urban environment.

The CMP is the product of the Study on “Long-term Strategy for Cavern Development – Feasibility Study” which is a synergy of planning and engineering efforts.



The CMP is accompanied by an Explanatory Statement and a set of Information Notes. Together, they composed of a territory-wide plan showing the location and boundary of all the Strategic Cavern Areas delineated with due consideration on the geological perspective and other relevant planning and technical information.

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Soh Chun Kwok	M254	Chan Wai Man, William	M298	Fong Wai Kit, Billy	M339
Kau Kin Hong, Louis	M255	Ng Tak Wah	M300	Wong Wai Man, Gina	M341
Shaw Catherine	M257	Ying Kong Chau, William	M301	Cheng Ping Lun, Otto	M342
Jane Fung Tin Yin, Tim	M258	Tsang Wing	M302	Chiu Sung Pak, Edmond	M343
Leung Wing	M260	Keung Cheng Wan Ying,	M303	Chan Yuen Mei, Phoebe	M344
Kwong, Kris Tang Man Hung, Roger	M261	Johanna Leung Siu Ping,	M305	Ho Yuen Ching, Jessica	M345
Ng Yuk Man, David	M262	Amy CHIUI Kit Yee,	M306	Man Nga Chee, Irene	M348
Cheuk Hau Kwan	M263	Kitty Chan Chung Yun	M307	Pun Lim Shuet, Paulina	M351
Chin Man Yi, Maggie	M265	Kun Ka Yin, April	M308	Tong Po Wong, Emily	M352
Chan Pak Hay, Simon	M266	So Yuet Sin	M309	Wu Ming Yee, Amy	M353
Kiu Chung Yin, Alexander	M267	Ho Kim Kam, Bonita	M310	Sin Wai Yu	M354
				Lee Kit Tak,	M355
				Jessica So Mei Ling,	M357
				Eliane Black Philip	M358
				Douglas	

Kwan Ping	M360	Wong Heung	M396	Yuen Man Sin,	M435
Chung, Benny		Wing		Michelle	
Chan Suk Kam	M362	Cheung Chi	M397	Lo Yuk Man,	M436
		Keung, Simon		Josephine	
Cheung Yi Mei,	M363	Yeung Wing	M398	Siu Ka Lay, Grace	M437
Amy		Shan, Theresa			
Lee Kai Wing,	M365	Tsang Ann Lee,	M399	Chan Wai Sum,	M438
Raymond		Cindy		Venus	
Lai Wai Yee,	M366	Ng Kwok Leung,	M400	Lam Man Ying,	M439
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Fung Chi Man,	M367	CHAN King Kong,	M401	Chan Kok Yun	M440
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Wong Hau King,	M369	CHU Wing Hei,	M403	Ho Wai Hung	M442
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Lee Kin Shing	M370	Au Yu Lun, Alan	M404	Lee Thomas	M443
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Eureka				Cheung, Terence	
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		Elaine		Kepler	
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Yvonne				Lautrec	
Mok King Kwong,	M384	Wong Chiu	M420	CHAN Kwun	M459
Dennis		Sheung		Hang, Coway	
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Kee, Michael		Timonhy		CHAN Suet Ying,	M461
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				WONG Elim	M462
Yick Hong Nien,	M388	Wong Wai Yee,	M424		
Hannah		Michelle		IP Wai Man, Emily	M463
TING Suet Yi,	M389	Lung Yan	M425		
Doris		Cheung, Helen		Leung Hoi Chun,	M464
Cheung Yuk Yi,	M390	Lai Shin Kwan,	M427	Edward	
Alice		Flora		Lee Mei Fun,	M466
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Cheung Simon	M392	YUEN Hou Yee,	M430	Patrick	
		Angela		LAU Chun Him,	M468
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Pamela					

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GOVADA Sujata M476 Subbu	Chan Ka Wai, M535 Karen	Lay Voon Hoong M590
Ip Kui Chi, M478 Anthony	Kwong Wang M536 Ngai	Lee Wai Lam , M591 Lirivs
Leung Wai Yee M479	Wong Cho Wa, M537 Ivy	Leung Zin Hang, M592 Ebby
Lee Ki Na M480	Au Pui Yu M538	Mou Ka Yan M593
Ng Wing Fai, M481 Stanley	Lee Ka Kay M539	Lau Sau Yee M594
Lau Chi Fai, M482 Stanley	So Shuk Yee M540	Wong Ho Yee, M595 Katherine
Chan Wing Chuen M483	Wong Pui Sai, M541 Kitty	Cheung Hiu Nam M596
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Tang Po Kwan M494	Chan Wai Lam M559	Au Yeung Wan M607 Man
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周珂 M520	Lo Sing Wun M577	Tam Ka Yan, Eva M620
唐震 M522		

Lok Hom Ning	M621	Fung Wing Hang,	M656	Yeung Kam	R13
Cheung Ho Wing	M622	Mathew		Chiang, Stewart	R16
Choi Yat Nang	M623	Fung Chi Keong	M657	Chau Cham Son	R17
Cheung Siu Hung	M624	Lau Sze Hong	M658	Wong Chi Kui	R17
Ng Chui Yi	M625	Leung Sui Hei	M659	Woo Chi Sun	R18
Chan Yuk Yee,	M626	Leung Yin	M660	Kwan Tsoi Kwai,	R20
Anna		Cheung, Barton		Anthony	
Kwok Man Hin	M627	Yip Kam Yee	M661	Li Chi Kwong	R22
Lam Tsz Kwan	M628	Lee Cheuk Hei	M662	Lau Yiu Kwong,	R23
Lau Wai Cheung	M629	Chan Hoi Kei,	M663	Alfred	
Lo Janice	M630	Stephanie		Mok Ping Chiu	R24
Bryanne Wing Yin		Lau Tak, Francis	M664	Ho Siu Che,	R26
Poon Benson Fu	M631	Chan Distinction	M665	Winnie	
Kit		Liu Ka Chuen	M666	Chan Chen Sung	R27
Wong Anita Mo	M632	Pui Shan NG LI	M667	Chan Yim Chi,	R28
Yin		Chan Yat Man	M668	Doreen	
Wong Pak	M633	To Yuen Gwun	M669	Chan Ip Wai Nor,	R30
Cheong, Kenneth		Kan Cheung	M670	Catherine	
Chan Cynthia	M634	Heng		Au Pak Man	R31
Mou Yin		Cheung Chui Ying	M671	Chan Pun Chung	R32
Tang Yiu Chung,	M635	Chiu Sung Ngai,	M672	Wong Oi Yee,	R33
Daniel		Adrian		David	
Tang Yik Ting,	M636	Woo Man Ching	M673	Lam Ho Ka Yin,	R34
Edwin		Kan Ka Ho, Calvin	M674	Angelica	
Ho Man Sze	M637	Yeung Sheung	M675	Wong Wai Man,	R35
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Lake		Yeung Cheryl Hiu	M676	Lau Sing	R36
Wong Ngar Wing,	M639	Lam		Lui Chun Wan,	R38
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Chan Ka Kei,	M640	Wong Cho Ting	M678	Fan Siu Wah,	R39
Shirely		Chiu Pak Him	M679	Connie	
Chan Wing Tak	M641	Ho Chi Kin	M680	Ling chi tak	R40
Choi Man Kit	M642	Chan Ka Chi	M681	So Ying Leung,	R41
Kwok Sin Kit,	M643	Cheung Man Yee	M682	Wilson	
Kate		Wong Po Kit,	M683	Lee Shu Wing,	R42
Kira Loren	M644	Jeffrey		Ernest	
Brownlee		So Tsz Lui	M684	Woo Man Yee	R43
Chu Suet Wa	M645	Chan Yee Tak	M685	Mok Wai Man,	S325
Chung Ho Ting,	M646	Leung Sau Man,	M686	Karina	
Elton		Esther		Lo Wing Yee	S329
Luk Lok Yin	M647	Law Ho Hei	M687	Lam Yuk Ching,	S341
Cheung Ching	M648	Tang Wai Lap	M688	Connie	
Yan		Kwok Tze Yu,	R06	Tang York Wan,	S369
Lok Mable Mei Bo	M649	Henry		Angela	
Wan Wai Yan	M650	Leung Chun Wai,	R08	Yap Kwok Keung,	S375
Cheung Ling Chi	M651	Joseph		Kevin	
Koon Sun Fai	M652	Siu Lai Yee, Maria	R12	Wong King Wan,	S403
Law Yuk Ling	M653			Bille	
Leong Ka Ho	M654			Hurlow John	S410
Hung Ting Wai,	M655			Philip	
David				SUN Kwok Kee	S461
				IP Chi Tim	S522
				LEE Chun Kit	S529
				Tsang Yi Ching,	S575
				Vivian	

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Cheung Ka Chun	S583	Chan Wing Yan	S782	Theodora	
Lam Wing Ching,	S585	Lee Yin Ting	S784	Chan So Man	S879
Chrisilia		Leung Chik	S785	Ip Yuk Wai	S880
Wan Cheuk Wai	S589	Keung, Abraham		Kau Tin Chak	S881
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Choi Kam Lung,	S602	Cindy		Siu Carmen	S885
Franky		Ho Wing Hei,	S796	Tsui Ka Yan,	S886
Leung Wai Man	S610	Nancy		Karen	
Wong Hang Yee	S616	Pang Yiu Fai	S797	Wong Wing	S887
Cheng Man Wah	S625	Ma Chiu Ming	S810	Tsung, Anthony	
Chan Dick Sang,	S630	Wong Tak Wun	S811	Chun Wan In	S891
Philip		Chan Ka Wing,	S815	Ho Joseph Junior	S892
Ng Suet Wing	S639	Connie		Wong Hon Yip	S893
Calvin Cheng	S653	Chan Kwan Lee,	S816	Chan Chi Hang,	S894
Li Wai Kit	S655	Silvia		Ronald	
Yau Sau Yee,	S666	Choy Yik Fung,	S818	Chui Loreen	S895
Sophie		Edwin		Fan Xiao Wei	S896
Serena Tong	S667	Kwok Wai San,	S822	Kwok Chung Kit	S898
Cheng Ka Man,	S673	Michelle		Lau Ka Chun	S899
Clement		Lam Hei	S823	Lee Si Wai	S900
Tam Wing Lun	S677	Lee Ho Ching,	S826	Wong Sau Yin,	S902
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Or Pok Man	S680	Mo Cui Yu	S832	Li Haniel	S904
Yu Lin Keung	S684	Tse Chun Yu	S836	Lee Wing Sum,	S905
Wu Ho Kei,	S693	Pang Yuen San,	S838	Winsome	
Maggie		Helena		Ngai Hoi Yan,	S907
Chiu Wai Yee,	S694	Chan Lok Ting	S840	Janet	
Betty		Chow Chun Chi,	S842	Wong Pok Shaan	S910
Chan Kwok Ying,	S695	Cecil		Chan Hiu Yan,	S911
Cecilia		Mak Ka Lam, Ariel	S846	Sharon	
Leung Wai Kit,	S699	Tse Kit Ha,	S847	Chung Wing Yee,	S912
Ricky		Jacqueline		Vanessa	
Tam Chi Ho,	S703	Lam Sau Yin	S852	Chow Chi Fung	S913
Raymond		Sin Ho Ting	S853	Fu Hoi Him,	S914
Chiu Chi Yeung,	S708	Au-Yeung Kwan	S856	Nicholas	
Eric		Chan Chun Yim	S857	Li Emerson Si	S915
Kong Sze Nga	S710	Kwok In Wai	S861	Juan	
Lee Ka Ho, Carol	S723	Lau Chi King,	S862	Tsoi Tak Chun	S916
Chan Che Ho,	S733	Vincent		Wong Delius Ho	S917
John		Li Chun Yu	S863	Ki	
Lam Tat Leung	S736	Wang Hai Tian	S866	Chan Tsun Lok	S918
Wu Peter	S746	Zhang Yuan	S870	Au Ho Cheong	S919
Mak Tsz Wai	S748	Chen Ting Ting	S871	Elizabeth Ng	S923
Ma Lai Kei, Vicky	S751	Lang Wei	S873	Sandi Tang Wai	S924
Miu Clement	S761	Ng Pui Shan	S876	Shan	
Chan Lok Yi,	S779	Tam Tsz Chung	S877	Wong Tsz Hei,	S925
Natalie				Alice	
Wei Daniel James	S781			Cheung Hung	S926

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Cheung Ka Kan	S927	Yu Tsz Yan,	S940	Mathew	
Hung Chi Wai	S928	Amanda		So Sin Man	S953
Kwan Chuk Man	S929	Au Hei Man	S941	Wong Pak Ho	S954
Lee Sze Yan	S930	Chan Hiu Man	S942	Yeung Yun Wing	S955
Lam Ka Wai	S931	Cheung Ming Kit	S943	Ling Chi Ho	S956
Lee Wing Ki	S932	Ho Jacqueline Lily	S944	Yeung Min	S957
Li Mei Huen,	S933	Kok Man Chun	S945	Wu Long Chi	S958
Madelene		Lau Chui Yu	S946	Choi Wai Yin	S959
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Lo Sum Yuen,	S935	Li Man Kit	S948	Chan Hoi Ming,	S961
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Law Ting Hin	S936	Rebecca		William Ho Kwan	A-02
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Wai Che Hong	S938	Leung Jessica	S951	Lau Man Kwan,	A-04
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131	WU YIU CHUNG	胡耀聰	180	HO CHI WING	何智榮
132	AU HEI FAN	區晞凡	181	WONG WAI YIN	黃偉賢
134	AU CHEUNG MING	區長明	182	SIU WAI YIN FLORENCE	蕭瑋賢
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138	CHENG TAT CHEONG	鄭達昌	186	LI MAN WAI KENNETH JOHN	李民威
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144	KWAN PING CHUNG BENNY	關炳松	190	NG WING FAI STANLEY	吳永輝
			193	LEONG YEE TAK YVONNE	梁懿德
			195	HARRAD BERNARD WILLIAM	

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203	FUNG MO YEUNG PATRICK	馮武揚	258	KWAN YEE FAI MIKE	關以輝
205	CHEUNG CHO LAM	張祖霖	259	SZE LAI HUNG	施麗虹
206	NG KWOK LEUNG STEVEN	吳國良	260	LAU FUNG YEE	劉鳳兒
208	TSE PUI KEUNG	謝佩強	264	CHU WING HEI ALVIN	朱永熙
210	SUN CHE YUNG DEREK	孫知用	266	TSANG WAI MAN VIVIAN	曾慧雯
213	CHEUNG CHI KEUNG SIMON	張志強	267	LAM KWOK CHUN	林國春
214	LAI PIK HUNG	賴碧紅	268	WONG WAIYEE MICHELLE	汪慧兒
215	TSANG WING KEUNG	曾永強	269	CHAN SHUK WAH ANNIE	陳淑華
216	AU YU LUN	區裕倫	270	LEUNG KWOK MAN LAUTREC	梁國民
217	CHAN WAI YI	陳慧儀	273	LAI SHIN KWAN FLORA	黎倩君
218	TANG WING KEUNG	鄧永強	274	LO YUK MAN JOSEPHINE	盧玉敏
219	LAM LIT KWAN	藍列群	275	LEE WAI YING JOANNA	李慧瑩
221	LAM YUK CHING	林玉清	276	YANG CHING	楊倩
224	CHAO TAK SUM TERENCE	巢德森	278	TSANG HUNG SHEEBA	曾紅
225	WONG YUK SUM	黃旭森	280	LO WING YEE	盧穎儀
226	LAW CHUN PONG	羅振邦	281	LEE SIN YEE CINDY	李倩儀
227	WU YUK HA	胡玉霞	282	YUEN MAN SIN	阮文倩
228	CHEUNG YUK YI ALICE	張玉儀	287	LAM MAN YING JOSEPHINE	林敏瑩
229	LEE HOI YEE	李愷怡	288	LUNG YAN CHEUNG HELEN	龍欣翔
230	WONG MAN KAN	王民勤	291	CHOW MAN HONG	周文康
232	CHEUNG SIMON	張業文	292	CHAN KWUN HANG COWAY	陳冠恆
233	YEUNG WING SHAN THERESA	楊詠珊	294	CHAN KOK YUN	陳國欣
235	YAM YA MAY LILY	任雅薇	295	LIU CHUNG GAY, SHARON	廖頌基
236	TAM KIT I	譚潔儀	296	LAU KIT YING	劉潔瑩
237	WONG CHIU SHEUNG	黃超常	297	NG KA WAH	吳家華
238	CHOW WAI LING	周惠玲	299	LAM MEI YEE	林美儀
241	TONG YUET KING	湯月琼	300	CHAU YIN MAI LISA	周燕薇
243	AU CHIN PANG	歐展鵬	302	LEE THOMAS	李建華
244	TSANG CINDY ANNE LEE	曾思蒂	308	LEE KIN KI	李建基
245	AU CHI WAI DAVID	區志偉	309	CHAN LAI CHEUNG	陳禮璋
247	POON KAI LOK	潘啟樂	304	CHANG MING LAI REGINA	張明麗
248	CHAN KING KONG THERON	陳勁剛	310	KAN KA MAN	簡嘉敏
250	TONG PO WONG EMILY	唐寶煌	306	LAU TAK FRANCIS	劉德
251	SO YUET SIN	蘇月仙	313	IP KUI CHI	葉鉅志
252	SO OI TSZ TERESA	蘇愛慈	314	LUK SIU CHUEN	陸紹傳

315	LUK YIN SHEUNG VERONICA	陸迎霜	354	CHENG KA MAN, CLEMENT	鄭加文
316	NG HIU MING HERMAN	吳曉鳴	355	LOK HOM NING	樂晗寧
317	LEE KA KAY	李家琪	356	IP PAN WAI	葉斌緯
319	SIU KA LAY, GRACE	蕭嘉莉	357	CHEUNG HO WING	張浩榮
320	IP WAI YI, ALISON	葉慧儀	358	AU YEUNG WAN MAN	歐陽允文
322	HUI PUI YEE, PEARL	許貝兒	359	CHAN WING KIT, KENNY	陳榮傑
321	YEUNG SHUI LING	楊瑞玲	360	FUNG KA WUN, EDITH	馮嘉媛
323	FOK CHI WAI, DAVID	霍志偉	361	KAN CHEUNG HENG	簡昌恆
324	WONG PUI SAI, KITTY	黃沛茜	362	POON FU KIT BENSON	潘富傑
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347	LAU SAU YEE	劉秀儀			
349	LEUNG ZIN HANG EBBY	梁善姪			
350	CHAN HON LEI	陳康妮			
351	SIU YIK HO STEVEN	蕭亦豪			
352	TANG KING YAN SUNNY	鄧敬思			
353	LO JANICE BRYANNE WING YIN	盧穎妍			

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THE HONG KONG INSTITUTE OF PLANNERS

Unit No. 201, 2/F, Prosperity Millennia Plaza, 663 King's Road, North Point, Hong Kong

URL: www.hkip.org.hk

Email: hkiplann@netvigator.com

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