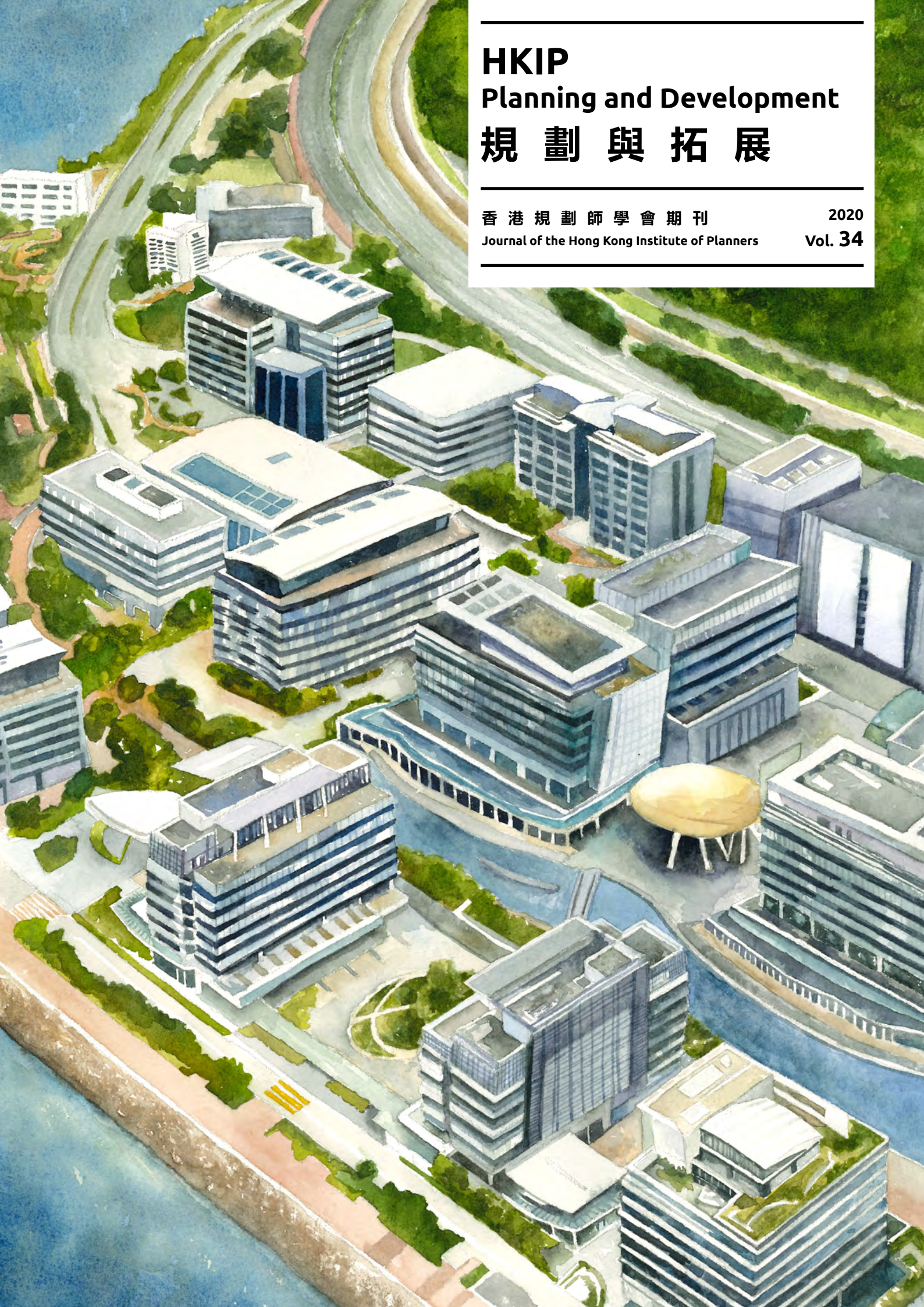

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Message from the Editors

The outbreak of the Covid-19 pandemic has disrupted lives in many parts of the world including Hong Kong. Yet, this extremely difficult situation has not thwarted the passion and professionalism of the Editorial Committee Members, authors and columnists.

The theme of the current issue "Application of smart technologies and smart planning for a quality environment" is a timely topic that is very relevant to Hong Kong in the transformation into a smart and sustainable city. We have received a number of interesting articles and columns.

Ada Fung explained how disruptive technologies including BIM and GIS are applied to advance smart planning and design, citing examples from the public housing developments in Hong Kong.

Andrew Armbruster and Atlas Chan share with readers real cases of marriage of technology and high-level planning administration, originated in the vacuum of data-poor environments and out of a form of necessity.

Adolphus Lau and Yujie Wang put forward a conceptual environmental management strategy, namely Internet of Breaths (IoB), for building up cities' capacity through application of wearable technology for resilience against air pollution. They believe a better living environment can be built up by applying this kind of smart strategy and technology.

Jimmy Leung's column explores what the implications are for the planning profession in meeting challenges of infectious diseases such as Covid-19. Betty Ho puts forward a number of viewpoints in her column regarding how a quality environment can be achieved through smart planning. Andrew Lam calls attention to the inadequacy of the current strategic and statutory planning systems in the face of rapidly changing space consumption patterns.

In the Viewpoints section, Dr. Peter Cookson Smith recollects his experiences about the evolution of Hong Kong. He has witnessed a number of significant changes in government policies and offers suggestions to make Hong Kong a better and healthier city. T.W. Ng's short article covers the essence of walking with town planning. He suggests a number of ways to shape Hong Kong into a walkable city.

In the Student Corner, Anutosh Das discusses the role of ICT development in the transformation of the urban planning domain using the exploratory research approach. Illustrated with real-life examples, he presents how ICT is being adopted at the forefront of planning practice.

All these articles are stimulating and provide us with much food for thought. Our gratitude to the contributions of the columnists, authors and some unsung heroes who continue to provide unwavering support to the journal.

Finally, may we wish you all health, joy and happiness in the difficult time of the pandemic.

Editorial Committee

September, 2020


A
Feature

Feature

Disruptive Technologies for Smart Planning and Design of Built Asset and Environment

Ar. Ada YS FUNG, BBS, FHKIA
Chairperson of Committee on BIM, Construction Industry Council of Hong Kong;
President of Hong Kong Alliance of Built Asset & Environment Information Management Associations cum Chairperson of Hong Kong Chapter of buildingSMART International;
Director and Board Secretary of World Green Building Council;
Former Deputy Director of Housing (Development & Construction)

A **disruptive technology** is one that displaces an established **technology** and shakes up the industry or a ground-breaking product that creates a completely new industry. Harvard Business School professor Clayton M. Christensen (1997) coined the term **disruptive technology**.

Christensen separates new technology into two categories: sustaining and disruptive. Sustaining technology relies on incremental improvements to an already established technology. Disruptive technology lacks refinement, often has performance problems because it is new, appeals to a limited audience and may not yet have a proven practical application.

Built assets include all forms of infrastructure and buildings, and our environment includes built and natural environment on planet Earth. In this digital era, we are entering another wave of "industrial revolution" where smart use of Information Technology (IT) or "disruptive technologies" will bring significant changes in all aspects of the ecosystem of our industry. To quote a few examples, this host of "disruptive technologies" may include Building Information Modelling (BIM), Geographic Information System (GIS), Internet of Things (IoT), Virtual Reality (VR), Augmented Reality (AR), Robotics, 3D Laser Scanning, Photogrammetry, Drones, RFID, Smart Machines, 3D Printing on site, Big Data etc. wisely applied and integrated in a smart and intelligent manner. Although we have been witnessing rapid development of these technologies in recent years, and one may argue that they are no longer "disruptive technologies" anymore, we are still seeing "disruptions" every day, because we have yet to mature on our way to digitalisation for the entire life cycle of built asset. Start with the end in mind, and we should "feed forward" our digitalisation requirements from asset & facilities management's perspective to the planning and design stage. This, however, has yet to be developed, and we are awaiting more research and development work for the built asset industry on this front.

The potential benefits of data, information, automation and Artificial Intelligence are widely recognized. There are huge opportunities to **transform the DNA of our industry**, build capacity to recognize and harness disruption, thereby achieving sustainability on Planet Earth with smart living in smart cities. The final outcome would be a more efficient process, more economic products with better quality, more satisfied stakeholders, healthier living environment whilst minimizing our carbon footprint.

This paper shows how disruptive technologies have been applied for smart planning and design, with historical examples from the Hong Kong Housing Authority, including integration of BIM and GIS in the last decade. Given the limited

scope, this paper does not cover the full spectrum of disruptive technologies in other phases of asset life cycle.

Building Information Modeling (BIM)

Commonly known as "Digital Twin" or "Single Source of Truth", BIM calls for better integration and collaboration of the entire project team to work smart, and it stimulates continuous innovation as well as continuous learning as a progressively evolving technology at this point in time. The United States' National Building Information Model Standard Project Committee (2014) has the following definition:

> *Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.*

Traditional building design was largely reliant upon two-dimensional plans, elevations, sections, etc. although we are living in a three dimensional world. BIM extends this beyond the three primary spatial dimensions (width, height and depth) with time as the fourth dimension and cost as the fifth dimension. BIM covers more than just geometry. It also covers spatial relationships, light analysis, geographic information, and quantities and properties of building components, manufacturers' details, etc. Indeed, one can augment these dimensions in the life cycle of their built assets to suit their needs.

BIM is disruptive as it shifts the resource curve upfront to achieve synergistic results, and in return it helps generate better solutions for a better built environment with better productivity and quality as illustrated by the MacLeamy Curve in Figure 1.

We need concerted efforts to drive BIM in the industry, to enhance the ability to impact cost and functional capabilities at the early stage of design, and hence avoid waste of resources in design changes and rework for the Architecture, Engineering, Construction, Owner-operator (AECO) Family.

For the last decade or so, BIM has come a long way from clash detections, to optimisation, and

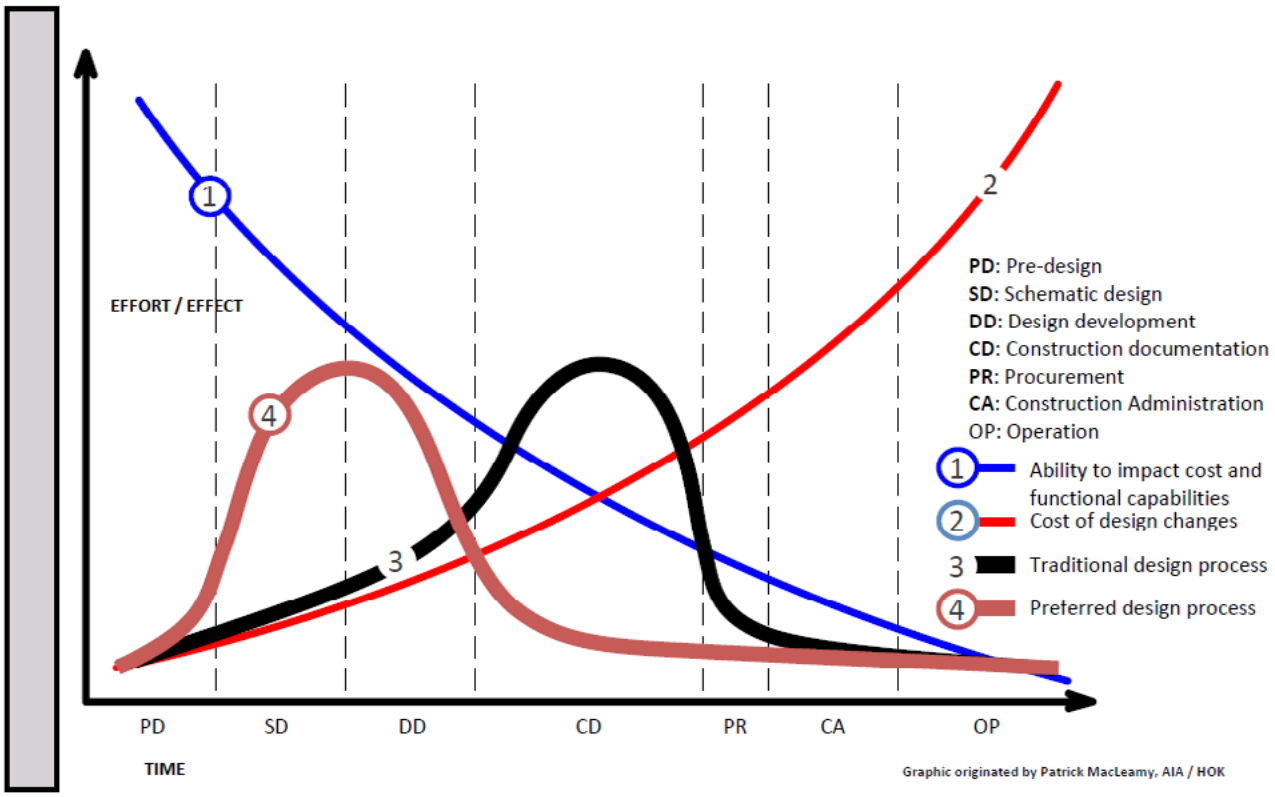

Figure 1. MacLeamy Curve (Graphic originated by Patrick MacLeamy, AIA/HOK)

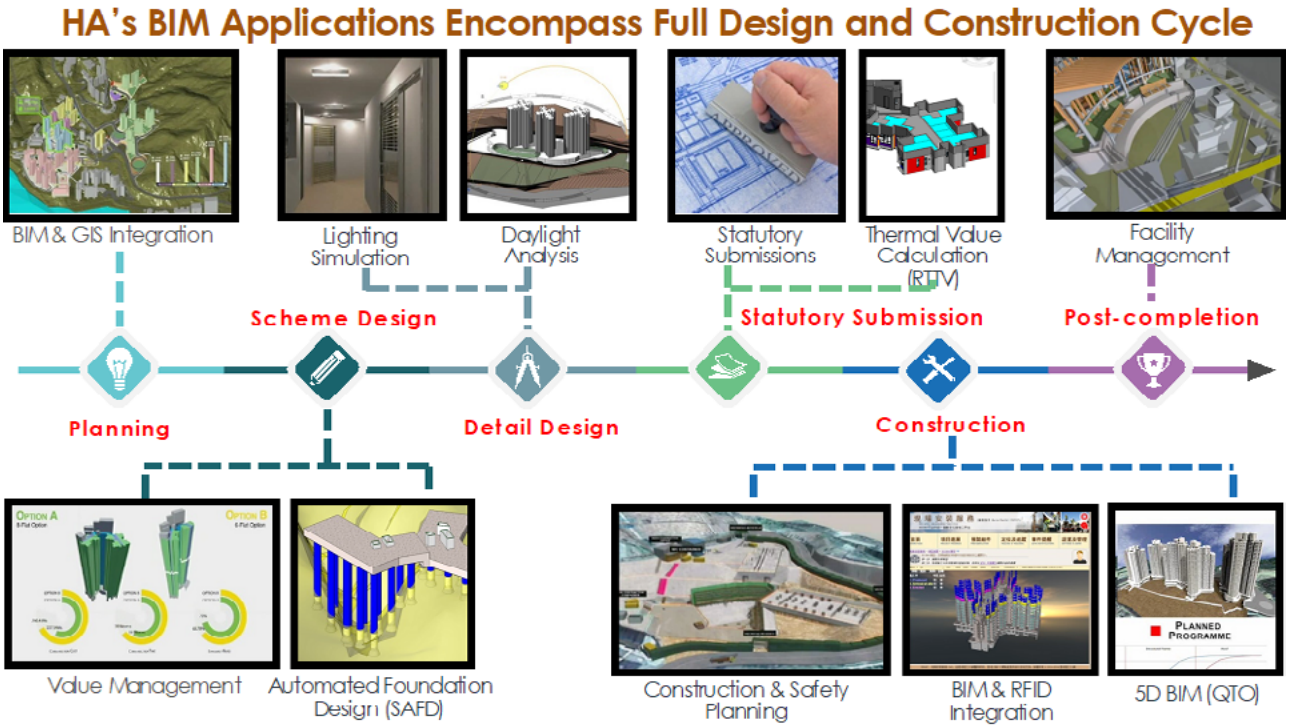

Figure 2. HKHA's Application of BIM innovations in all stages of work

now to collaboration. For better clarity, I use the term "BIM" to describe an activity (meaning Building Information Modelling) rather than an object (building information model). BIM is changing the way we work, the way built assets look, the way they function, and the way in which they are procured, manufactured, assembled, commissioned, and maintained. BIM creates opportunities for society to achieve sustainability. It calls for transformation of the process, products, and way people work. It helps reduce risks and material wastage, improving design quality, productivity and performance.

Case Study : Hong Kong Housing Authority's BIM Experience

The Hong Kong Housing Authority (HKHA) started using BIM in 2006, and has developed a number of different BIM applications in the last decade. Through the concerted efforts of all disciplines of staff, including architects, planners, engineers and surveyors, in collaboration with consultants, service providers, academia and contractors in the supply chain, HKHA has applied these innovations of BIM to all stages of work, from Planning, Scheme Design, Detailed Design, Statutory Submission, Construction to Post-completion, as depicted in Figure 2. With 4C's Core Values being Caring, Customer-focused, Committed and Creative, HKHA adopts a **people-centric approach** in all project stages, caring for the public, customers, staff, stakeholders, service providers, right through to front-line workforce throughout the entire life-cycle from cradle to cradle.

During the Scheme Design Stage, HKHA has applied BIM to conduct value management exercises to derive an optimum design, holistically considering time, cost, buildability etc. As an effective measure to ensure rational use of resources since 2007, HKHA has applied BIM to build up a suite of standard modular flats to optimize indoor living space for better air flow, better liveability and sustainability, and for better buildability by Contractors downstream. Designers could use them like "Lego blocks" to create a building in a 3D format as shown in Figure 3. Details of precast facades, volumetric precast bathrooms and kitchens have already been built in at Scheme Design stage.

In 2009, HKHA was determined to apply BIM to all projects at planning and design stage in five years' time, i.e. by 2014/15. In 2009, HKHA published

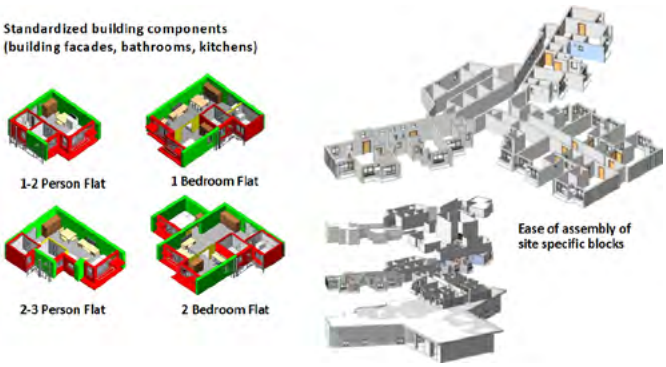

Figure 3. Application of BIM to generate modular flats, typical floor plans and buildings

its BIM Standards Manual for Development & Construction Division. It established a BIM Service Team and a BIM Centre using existing available resources, in order to help build capacity to train staff and test new BIM soft-wares. These targets and measures are instrumental for HKHA to succeed in implementation of BIM and other digital applications in the daily work of staff. PEOPLE is the most valuable and critical resource in BIM adoption.

During the Detailed Design Stage, HKHA has developed a Semi-Automated Foundation Design application to resolve technical issues, optimize foundation design and material consumption, as shown in Figure 4, featuring:

1. 3D Visualization;
2. 2D Drop-Off for True BIM statutory submission;
3. Multi-directional exchange of BIM data;
4. Automatic update of Piling Schedule and Material Tables; and
5. Quantity Take-off.

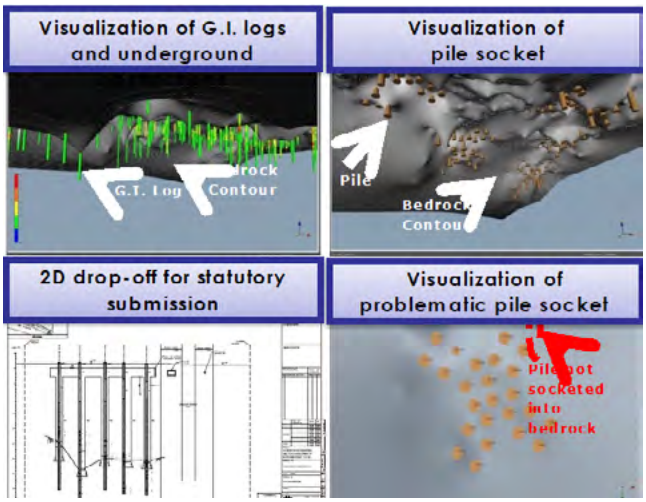

Figure 4. Semi-Automated Foundation Design application

On another front, HKHA has also developed BIM applications for environmental analysis, using BIM model together with a lighting simulation software to optimize lighting design for energy saving during the Detailed Design Stage as shown in Figure 5. These include optimising lighting for external areas, as well as two-level lighting design for lift lobbies and corridors at typical floors.

Figure 5. Optimizing lighting design with BIM

Enhancing the energy performance of these buildings is an important part of the government's strategy in achieving a more environmentally friendly and sustainable built environment. There is a set of design and construction requirements for improving the energy efficiency of residential buildings, through monitoring and controlling the **R**esidential **T**hermal **T**ransfer **V**alue (**RTTV**) of building envelopes which is based on light transmittance and external reflectance of the glazed portions. HKHA has developed BIM for calculation of RTTV as part of the General Building Plans submission. Building parameters such as areas of

1. windows;
2. external walls; and
3. roofs

and their corresponding orientations are extracted from the BIM model for the calculation as shown in Figure 6. These will help optimize design as well as improve productivity in the process of calculation (Fung, 2018). How does it work?

1. First, the architectural model and the structural model have to be linked together such that a combined single model can be used to facilitate the identification of all external facades, walls and windows.
2. Second, a plug-in freeware called "CASE"

is used to identify the orientations of external walls automatically in the Revit model. An additional information showing the orientation is added in the "Properties" of wall after running the "CASE".

3. Third, a "material" property will be assigned for each wall orientation and the roof to facilitate quantity take-off (QTO).
4. Fourth, the external walls in different orientations and the roof are now assigned with different "materials". The "Paint" function performs to assign the walls with different "materials".
5. Fifth, the Overhang Projection Factor (OPF) and the Side Projection Factor (SPF) required for RTTV calculation can also be retrieved by using the data contained in the window properties.
6. Then, we use another plug-in called "EqBQ" (Electronic quick Bill of Quantity), which is originally designed for QTO). Through applying the codes automatically to the relevant objects, the sum of the area of external facades and roof can now be obtained. Now, the required area of external facades, windows, as well as the factors required are now ready for RTTV calculation. At the end of the process, the retrieved data will be input to the standard template for RTTV calculation.

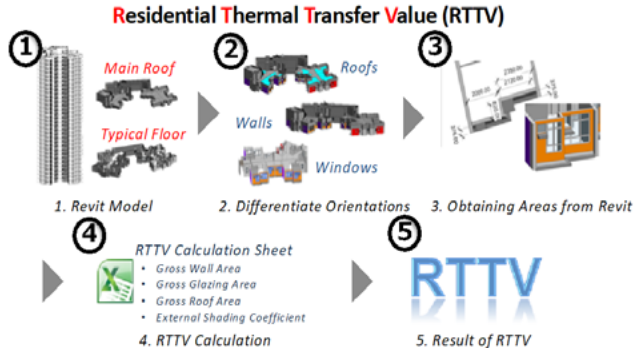

Figure 6. Calculation of Residential Thermal Transfer Value (RTTV) for submission of General Building Plans

The benefits of the integration with BIM for RTTV calculation include:

1. Enhancing speed, traceability and accuracy of the RTTV calculation;
2. Reducing manpower resource to perform the RTTV calculation. Compared to traditional method, approximately 6 man-days can be saved by using BIM to perform calculation for a domestic block;
3. Enable building envelope to achieve better energy efficiency and human comfort through design optimization.

For statutory submission, HKHA has also developed BIM for drawing production with a pilot project. 2D submission drawings could be derived from the 3D model and the scope of coverage was comprehensive and included the following, as shown in Figure 7:

- General Building Plans; and
- Structure Plans including those of Foundation and Superstructure.

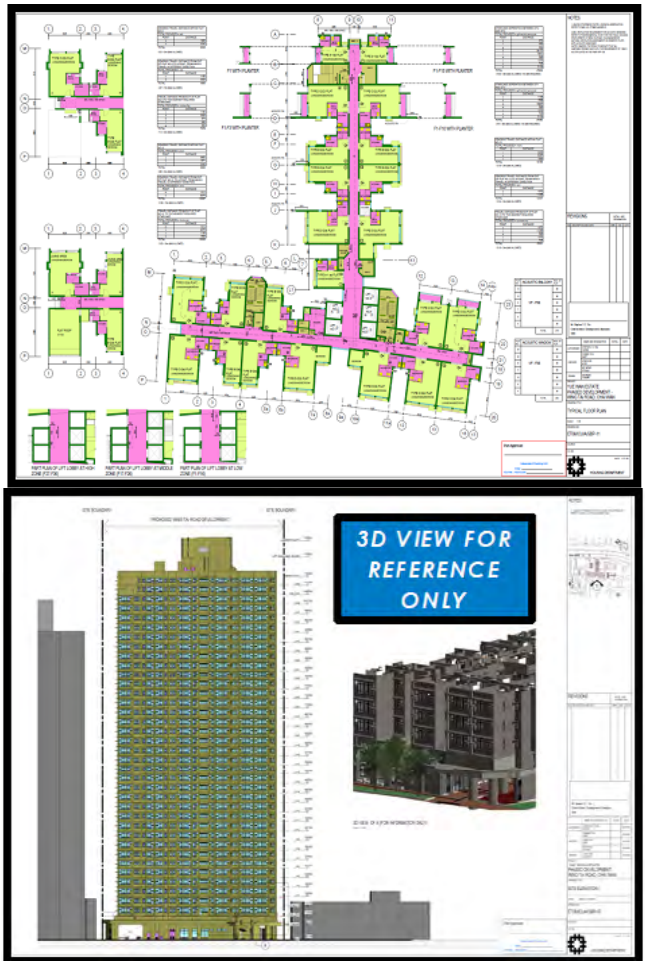

Figure 7. Use of BIM for drawing production and building plan submission

Dreams Come True : Integration of BIM and GIS

BIM experience alone is not disruptive enough. We need to find all forms of digital solutions to solve problems in our daily work. When I was the then

Deputy Director of Housing back in 2009, I was a dreamer and firm believer that IT systems must further integrate to enable us to work smarter and excel. I will show how we can improve the work process with better collaboration and better integration of Information Technology (IT), where dreams come true, by using a few illustrations of HKHA's work towards integration of BIM and GIS.

HKHA delivers functional and cost effective site-specific public housing from urban planning and urban design at the Macro level to interior living space and details at the Micro level. Since the new millennium, HKHA has been adopting site-specific design in lieu of standard block design for new public housing estates so as to maximize development potential for each and every site, having regard to scarcity of land. HKHA provides through-train services from planning, design, tendering, construction, maintenance, estate management and redevelopment from cradle to cradle. As such, HKHA possesses all types of professionals under one roof, and they must collaborate and align themselves with a united front.

Smart use of IT has enabled more effective use of resources and assure better communication and collaboration on all fronts. HKHA has set forth to create more liveable environments by introducing Computational Fluid Dynamics (CFD) to conduct microclimate studies since 2004, so that designers can find optimum solution for estate layout and building disposition for all new projects in the planning and design stage. By 2007, Architects and Engineers had forged ahead and applied BIM for better coordination and avoided clashes. In parallel, Planners and Land Surveyors have been applying GIS to facilitate geo-spatial studies like vantage point analysis etc. I required both camps to work together with BIM-GIS integration in order to reap the best benefit for the same project.

My dream for collaborative design was to integrate Geographic Information System (GIS) and Building Information Modelling (BIM) in 2009/2010, so that various professional disciplines in the HKHA could collaborate for more effective operation and better productivity during the planning and design stage. I spoke with the Chief Executive Officers of both Autodesk (BIM) and ESRI (GIS) about my dream in 2009 and 2010 respectively. I then requested colleagues to embark on a R&D project to integrate BIM and GIS through Industry Foundation Class (IFC), which is a schema developed to define an extensible set of consistent data representations of building information for exchange between AEC software applications. One of the focuses was to integrate the use of three major soft-wares, namely Civil 3D, ArcGIS and Revit. The other focus was to develop a script to convert BIM models for importing to GIS. As expected, our colleagues found a solution for both and successfully integrated BIM and GIS in 2011-2012. This then became a very useful tool for our early stages of planning work, for Visual Impact Assessments, as well as Site Appraisals as shown in Figure 8 (Fung, 2017).

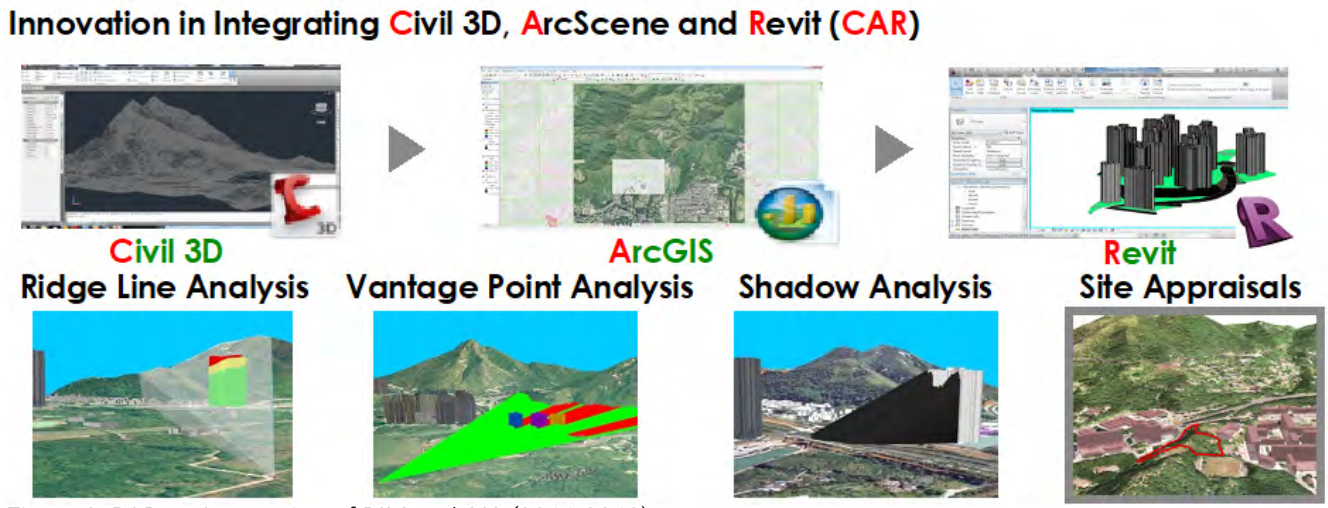

Figure 8. R&D on Integration of BIM and GIS (2011-2012)

My dream came true in 2013 after vigorous R&D with further refinement of the workflow in integration, four years before the BIM and GIS gurus in the world joined hands in November 2017 to embark on this collaborative mission. It was a significant achievement, and in fact, HKHA must be one of the first, if not the first, organizations in the world to have successfully integrated BIM and GIS.

It made our work so much easier and productive. Just to illustrate my point, in the good old days when I was a Project Architect, if we have to conduct a vantage point analysis, we have to physically travel to the specific location to take a photograph and do a photo-montage to overlay our proposed buildings. Notwithstanding the fact that the process is slow and cumbersome, the most troubling fact was that this workflow was prone to error due to the inherent nature of photo-montages. However, it is not the case if we do the same thing with an integrated BIM and GIS platform. As we have accurate 3D spatial data of Hong Kong's natural terrain and the man-made environment (i.e. buildings, infrastructure), we can carry out as many Visual Impact Studies as we need in order to find the best solution, in our office, and with the ease of a few mouse-clicks. Since the success in integrating BIM and GIS, we have applied it to a total of 81 projects from 2014 to 2017.

The workflow for converting a BIM model for importing into the 3D GIS platform is as follows, as illustrated in Figure 9:

1. start by adding Geo-reference to the BIM model components;
2. then export the spatial data and attributes with IFC and Excel;
3. align the data in the Feature Manipulation Engine (FME) using a tailor-made script prepared by our staff; and
4. import back into the ArcGIS platform I the File Geodatabase Format.

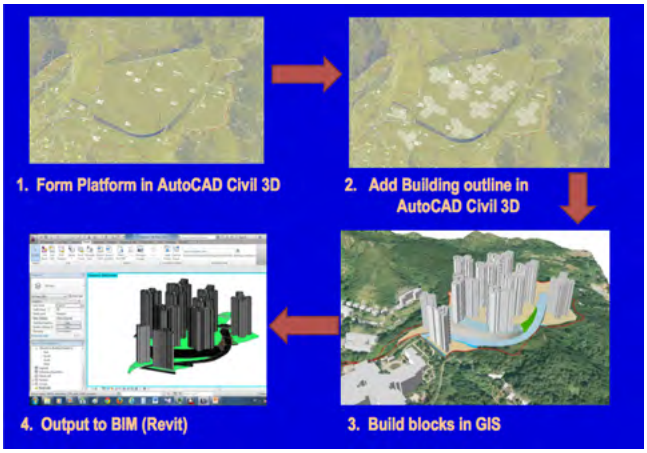

Figure 9. Design Workflow with the intergration of Civil 3D, GIS and BIM

The tailor-made FME script is the key component in the whole BIM-GIS integration, as shown in Figure 10. In future, we can produce a BIM model with a lower level of details, which will be used for adding back to the 3D GIS platform upon completion. This completes the full cycle BIM

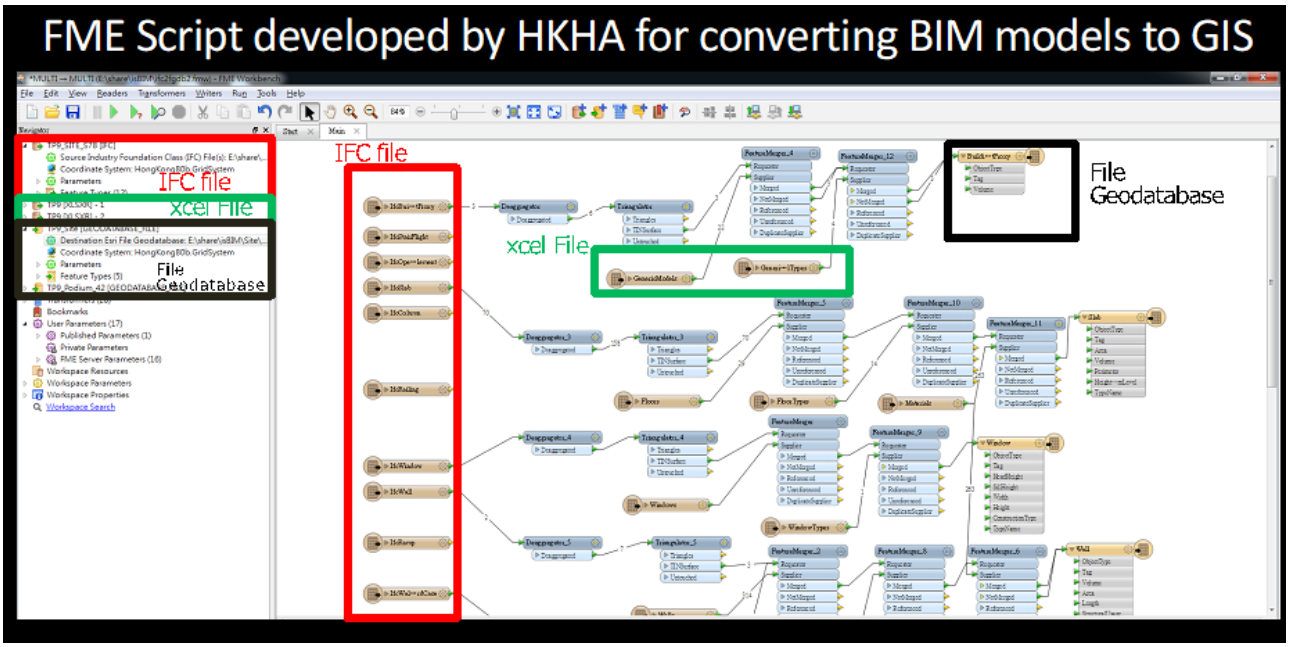

Figure 10. FME Script is the key component for converting BIM models to GIS

and GIS application from feasibility study to completion.

For project applications, essentially the 3D natural terrain, existing buildings and infrastructure are all coming from GIS while the proposed buildings within our housing estates are BIM models. In terms of project stages, the integrated use of BIM and GIS happens by and large at Planning and Feasibility Stages where we need to consider our development options in a much larger geographic context in the district in the Macro-scale. We can also use it to analyse air flow and ventilation, solar radiation and shadows at the urban scale, as shown in Figure 11. When we proceed to detailed design, tender and construction stages, we focus on working on the BIM model.

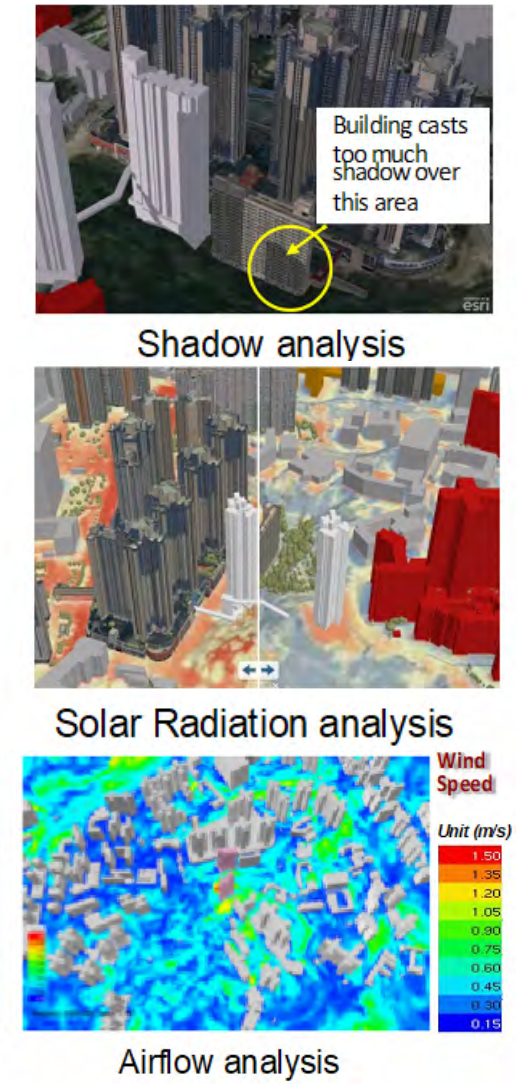

Figure 11. Use of Integrated BIM + GIS for simulation and assessment of environmental performances at the urban scale.

In November 2017, BIM and GIS gurus in the world joined hands to embark on this collaborative mission for integration, to reap best benefits for the whole life-cycle of built assets, driving business with smarter decisions. This was more than eight years after I had first made a plea to them for such integration.

Since we started using BIM in 2006, we have in the past decade or so developed a number of different BIM applications. Through the concerted efforts of all disciplines of our staff, including architects, planners, engineers and quantity surveyors, we have applied these innovations to all stages of our work, from Planning, Scheme Design, Detail Design, Statutory Submission, Construction to Post-completion. PEOPLE is the most critical ingredient for success in this paradigm shift in a new era of digital transformation.

My dream about integration of information technology does not stop here. Our journey must go on, and I have at least two more for the future. First is about integration. Riding on HKHA's success in integrating BIM and GIS, I hope that we can integrate more technologies in future, such as Internet of Things, etc. The second is about collaboration. We need collaboration amongst all stakeholders of the BIM and GIS Community in a Common Digital Platform that can be shared and used by all, as we join hands to develop and apply "Disruptive Technologies" in Hong Kong, covering all types of developments in our built asset industry throughout the entire life cycle.

Two Directions for Development

(1) Mega-Trends and Aspirations

Digital transformation with "disruptive technologies" serves not only our industry to work smarter, but more importantly it also serves human beings to achieve sustainability on Planet Earth, balancing economic, environmental and social aspects in development and not at the expense of our future generations. The Smart City Blueprint embraces innovation and

technology to build a world-famed Smart Hong Kong characterized by a strong economy and high quality of living. Green buildings preserve precious resources and improve our quality of life, in line with the mission of Smart City Blueprint to consume fewer resources and make Hong Kong more environment-friendly while maintaining its vibrancy, efficiency and livability.

Indeed, we have been riding on our vehicle for industry and digital transformation with a host of initiatives, local and abroad, such as the following, each with its profound meaning in the way we deliver our services and products in the built asset industry:

1. Construction 2.0,
2. Smart City 3.0,
3. Industry 4.0, and
4. Society 5.0 advocated in Japan.

On another dimension, with human-centric and in addressing social sustainability, Japan has been advocating "**Society 5.0**" (Cabinet Office, Government of Japan, 2015). It is defined as "a **human-centred** society that balances economic advancement with the resolution of social problems by a system that **highly integrates cyberspace and physical space**".

In Society 5.0, a huge amount of information from sensors in physical space is accumulated in cyberspace. In cyberspace, this big data is analysed by artificial intelligence (AI), and the analysis results are fed back to humans in physical space in various forms. In the past information society, the common practice was to collect information via the network and have it analysed by humans. In Society 5.0, however, people, things, and systems are all connected in cyberspace and optimal results obtained by AI exceeding the capabilities of humans are fed back to physical space. This process brings new value to industry and society in ways not previously possible, and it will bring about a human-centred society, balancing economic advancement with the resolution of social issues (Cabinet Office, Government of Japan, 2015).

With the above aspirations in mind, we are at the formative stage of our digital transformation for built asset in Hong Kong. As at year 2020, two major areas of development can be highlighted as follows:

(1) The Government is developing Common Spatial Data Infrastructure (CSDI) and 3D Digital Map for Smart Hong Kong. The Lands Department has made available an online CSDI Portal (alpha version), named "Hong Kong GeoData Store". The Government's goal is to developing a spatially enabled world city, Smart Hong Kong with Digital Twin. It serves to increase accessibility and usability of spatial data, use geospatial intelligence and shared applications, and enjoy an enabling eco-system to support innovation and the creation of value-added spatial products.

(2) Construction Industry Council (CIC) of Hong Kong serves as a Centre of Excellence for BIM in the form of a central hub and of the open sharing platform of BIM, including development of standards, specifications and common practices for BIM, etc. After publishing the first edition of BIM Standards for Hong Kong, CIC is now enhancing the BIM Standards (General), which would also form the local Annex of ISO 19650. At the same time, CIC is conducting a consultancy study on the 3D and BIM Data Use Case Requirements of the construction industry for the Development of Digital Hong Kong. It includes the development of Solutions to facilitate BIM sharing, BIM and GIS integration and support 3D Map, which represents the built environment for the Digital Hong Kong.

(2) Collaboration and Interoperability at the Global Level

BIM is a collaborative activity in the AECO Family. Multiple participants deploy multiple applications with overlapping data requirements to support various tasks of design, construction, operation, and maintenance. Consequently, the next threshold for better design and construction management is to improve collaborative workflows – collaborative work processes supported by smoothly sharing and exchanging information among project participants. Interoperability is the ability to exchange data between applications, which smooths workflows and sometimes facilitates their automation (Sacks *et al*, 2018).

The Industry Foundation Classes (IFC) is a neutral, independent data format with a special focus on the AECO Family. Its structure and content has been enhanced and developed by buildingSMART International, and IFC was ISO certified in 2013. IFC is a standardized, digital description of the built asset industry. It is an open, international standard (ISO 16739-1:2018) and promotes vendor-neutral, or agnostic, and usable capabilities across a wide range of hardware devices, software platforms, and interfaces for many different use cases. The benefits of open data standards are substantial, and include:

1. More transparent, collaborative and open workflows;
2. Greater information certainty due to a shared vocabulary of industry terms;
3. More open procurement processes;
4. Processes that are inclusive for companies large and small;
5. Greater re-use of data;
6. Easier integration with linked data created and shared in related industries.

buildingSMART works with members, chapters, partners, and sponsors to facilitate the development and adoption of open digital standards. One of the on-going international efforts is to extend IFC to cover road, bridge, tunnel, and railway projects. The BIM Collaboration Format (BCF), a data format for exchanging design review and coordination data, is another outcome of such international efforts. Building Room, Infra Room, Product Room, Regulatory Room (for government regulators), Construction Room, and Airport Room are examples of international collaborative efforts to share and document best practices for BIM.

Hong Kong must work closely with international standards experts in order to enhance and accelerate our pace of BIM adoption. As such, we need a Hong Kong Chapter for buildingSMART International.

HKIBIM, together with Hong Kong Institute of Civil and Building Information Management (HKICBIM) and Hong Kong Geographic Information System Association (HKGISA) is forming a "Hong Kong Alliance of Built Asset & Environment Information Management Associations" who would take up the role of buildingSMART International's Hong Kong Chapter. It will enhance the collaboration among built asset and environment information management communities in Hong Kong, promote the adoption of environment-friendly technology in order to improve the general living environment and to facilitate smart city development in Hong Kong, educate and promote built asset environment information management to general publics in Hong Kong.

Final Remarks

It takes insight, courage, creativity, collaboration, intensive human capital, critical thinking, etc. to bring a concept to fruition to build a smarter Hong Kong and create a better world. We need to go for smart digitisation, digitalisation and digital transformation, with safe, smart, green & healthy buildings for people (from property & asset owners to users and public at large) in Sustainable Built Asset and Environment on Planet Earth. Always remember: PEOPLE is the most critical element in the big picture (Fung, 2019).

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Feature

The Data-driven Planning Model that Sprung from 'Nothing'

Andrew Armbruster and Atlas Chan

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Mainland China's smart planning model: from where did it come?

Digital transformation of the planning process in mainland China is being driven by novel capabilities to create and interpret complex datasets through digital processes such as AI/ML (Artificial Intelligence/Machine Learning) and integration with sophisticated networks of sensors. This data is used in combination with the ability to digitize national municipal government regulations and guidelines for better compliance.

These factors are facilitating design of higher quality urban and natural environments through the interaction of a diverse set of considerations at the initial, conceptual stages of a project, including environmental quality through sophisticated environmental assessments, digitally-aided ecological sustainability approaches, and more fine-tuned public infrastructure considerations which strengthens the interface and transparency between government departments and the public (Cui 2017). Though China has been making steady strides to "digitize" city governance and management for nearly two decades (Wu and Liang, 2018), the ability to take these considerations into account at the initial stages of a project has only recently became possible through the interaction of advanced digital methodologies and is driving the heart of this new digital transformation paradigm. It is important to ask, what are the origins of this shift? What facilitated its rise, and how it can serve as a model to be applied to more mature planning systems that were not rife with catalysts for change?

The 'smart big bang' originated in a vacuum

The transition to smart planning in mainland China represents a substantial shift in practices, which only several years ago had barely a modicum of guidance from data analytics and relied on haphazard interpretations of scant and scattered data primarily from the "3S" technologies of remote sensing, global positioning systems and geographic information systems (Jin 2017). The parallel rise of data analytics, AI/ML, parametric processes and an exponentially growing network of (increasingly open, as in the case of Shanghai) data-creating sensors proved to be a match that had to be made (Smartcity Press, 2019). The absence of clear, substantial and mature data practices only paved the way for new and broadly sweeping methodologies to be developed that could trailblaze unabated into new guidance territory. There were simply few bureaucratic defenses that had to be broken, as a highly mature, regulated and widely adopted system of planning guidance had yet to be adopted. Thus, though initially late to the game, a digital foundation for interpreting and facilitating government regulations has been periodically built on the difficulties arising from the vacuum of basic data availability in mainland China (Hu 2019). This vacuum has expedited and catalyzed the innovations meant to fill it. At this point it would be pertinent for us to ask, why did such transformations not take place within the more mature planning frameworks of other countries?

This contrast may largely be due to the relative abundance of publicly available data in more mature economies and a mature planning framework that pre-dates the digital revolution; there was simply no vacuum to fill. If that is the case, do potential interconnections exist between these new innovations and existing systems—are retrofits possible? Indeed, the products and novel methodologies of this transformative groundwork being laid in mainland China, facilitated by its foundations as a rapidly developing though traditionally data poor area, can be imported and applied in other areas with great success. This special mixture of digital innovation which has been catalyzed in the ripe environment nurtured and made possible by rapid development and lack of data, has paradoxically produced a high-level data management and assessment methodology that can be imported into other more developed systems to enable high level multi-faceted compliance and result, finally, in the realization of better quality environments.

The importance of early stage guidance and the facilitating role of technology

Rapid urbanization in mainland China has made conceptual masterplanning a petri dish for the experimentation, growth and ultimate maturity of the early stage guidance that has proven so critical to the realization of smart planning. It has also enabled successful interdisciplinary tools to be built which aim to provide holistic and data-backed masterplanning assessments to provide objective justifications of planning strategies early in the masterplanning process. It is important to note that such tools, with their ability to distill traditionally inaccessible domain expertise into intuitive and solution-driven illustrations, facilitate public and cross-consultancy participation in the planning process in a way that has been difficult to achieve in the past.

Together these elements take a step towards bridging the difficult divide between the concept and regulatory stages of a development, and between expert and lay participation. It is important to note that a current limitation of these tools is a richer interconnection to participatory and public engagement activities. While there is no inherent disconnect between the tools and these elements—their ability to distill complex information into intuitive guidance, as well as their dynamic ability to respond to user input, makes them well-suited for such use—this functionality has not been incorporated and is therefore both a current limiting factor and retrofit opportunity in addressing more comprehensive needs.

Just how have these tools been applied in a practical manner, and what specific elements do they address? The total breadth of high level, data-driven tools is beyond the scope of this column though relevant examples follow below.

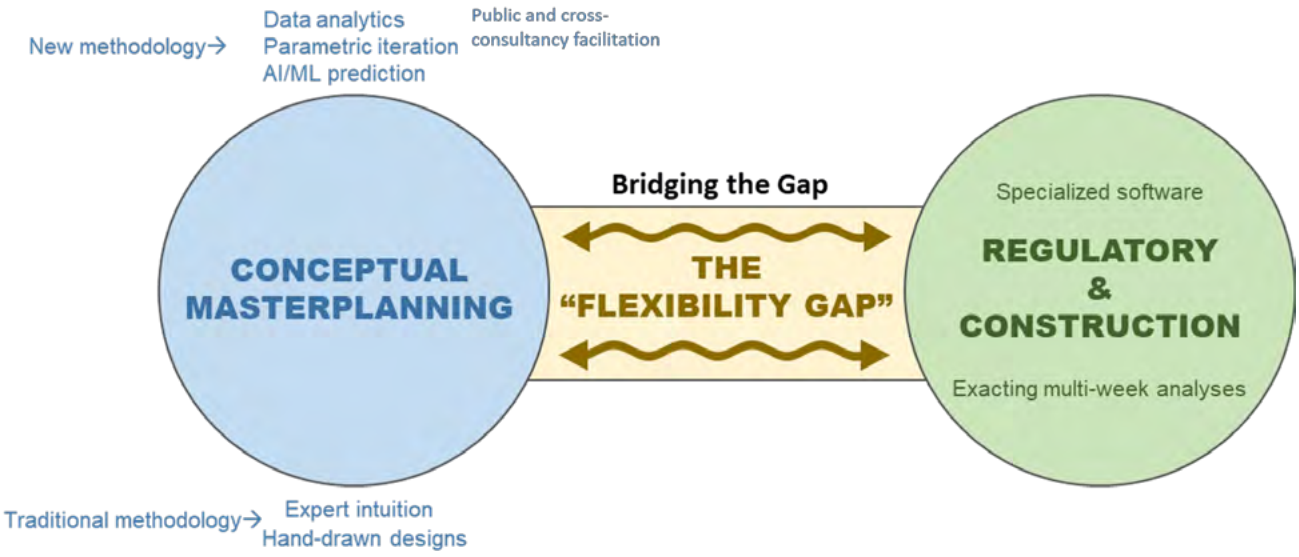

Figure 1. Placement of the high-level digital guidance methodology as a bridge between concept and construction

Examples of how smart technology application in mainland China has facilitated efficient administration and cross-stage guidance

These tools serve to facilitate both the planning process as well as to bolster the decision-making process of municipal bodies; they are designed in a way to create an intuitive layer of understanding between the laymen and the underlying technology. They also serve to match and interpret national and local government guidelines (such as the National Spatial Planning regulations, or 国土空间规划). Examples of these tools run the gamut of disciplines within the orbit of the masterplanning discipline and span the urban → rural → nature transect covering social, economic, ecological and aesthetic considerations. The following will outline some such tools representative of those actively in practice in mainland Chinese conceptual masterplanning.

Development sensitivity

This example of tool aggregates spatial data from multiple categories including developed infrastructure, land use categories, natural features and elevation and combines it with KPIs relating to development sensitivity. Through the visualization of these KPIs the planner can gain guidance toward the suitability of each portion of the land for urban development. Backed by the raw data, this intuitive window into complex spatial calculations have proven to facilitate communication with planning regulatory bodies at the very early stages of a design.

Development potential

In slight contrast to the sensitivity-focused tool, planners can combine exclusively urban elements within existing cities to gauge a variety of metrics including potential for various types of development. The tool illustrated in Figure 3 combines publicly available spatial data such as public transport stations, major roads, park systems and public service locations with synthetic or proprietary data such as building quality levels, land value data and plot development potential. The designer may then incorporate a scoring system within each data category using their domain expertise and site design principles to create a performance indicator of aggregate development potential across the design area.

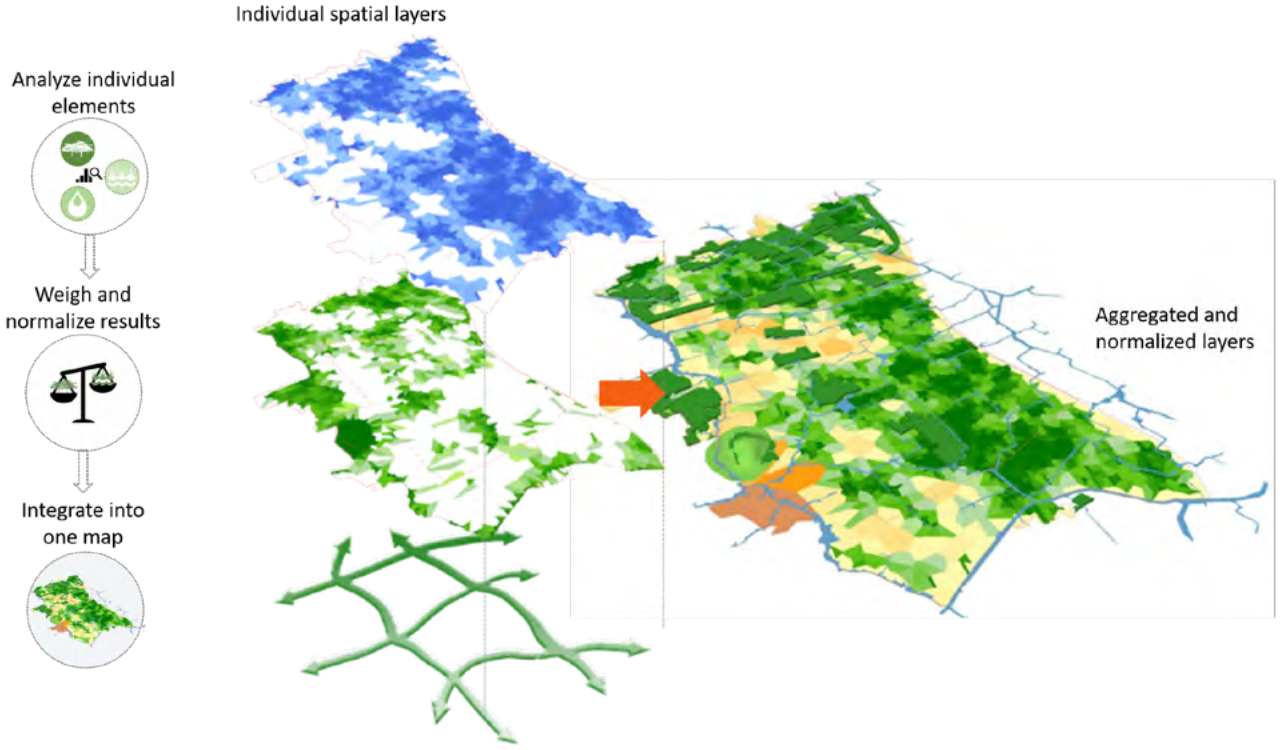

Figure 2. Illustration of ecological sensitivity data layer aggregation into holistic guidance

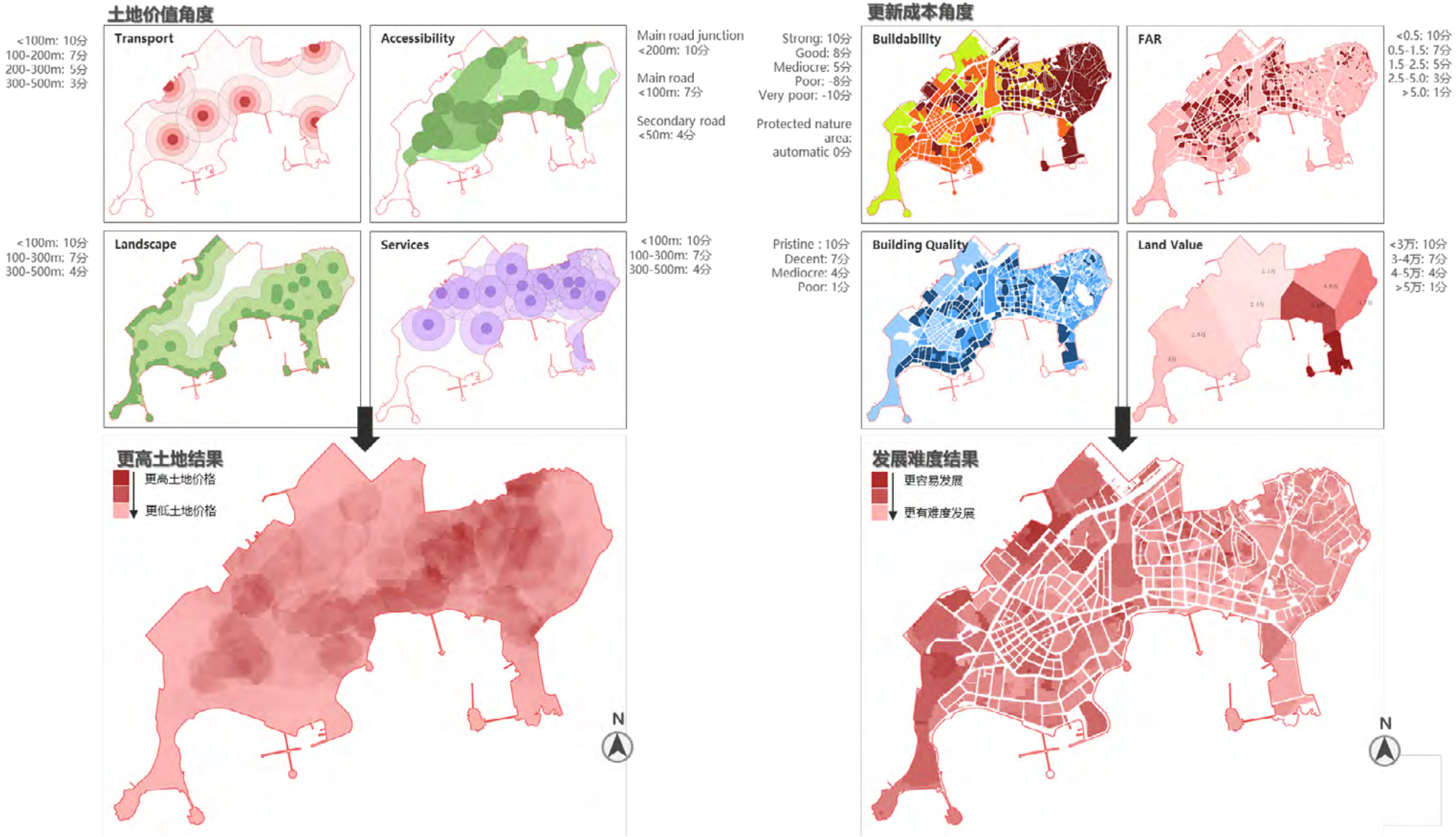

Figure 3. Development potential heatmap combining various data layers

Assembly of the indicators is often part of an ongoing and dynamic dialogue between the planner and planning authorities, allowing for relevant considerations to be made that are integral to the masterplanning process. As more data extraction methodologies become available, such KPIs become more diverse in constitution and more granular in the guidance they provide.

Plot-based density guidance

Plot-level density guidance can be greatly guided through the integrated evaluation of site surroundings and land use planning principles. This density guidance tool example creates building height profiles across a site by combining layers of design principles of various categories including surrounding mountain views, urban centers, transportation hubs, views toward prominent parks, and the enhancement of strategic vistas across the site.

For example, initial height restrictions are based on the fundamental site topography and a principle of preserving 20% of important ridgeline profiles across the site. After these initial restrictions are implemented in the tool, the designer may add an additional principle based on relaxing those restrictions within key focal points of the site. Finally, the design team may designate a series of enhanced visual vistas along which ridgeline views are protected by 30% instead of 20%. Through this process the designer may continue to add an arbitrary number of design layers, each adding further subtleties to the restriction regime.

The tool is aimed at both aesthetic and practical urban development considerations and provides a scaffolding within which the planner may work along with other design considerations.

Parametric Masterplanning Toolset as regulatory guidance

The Parametric Masterplanning Toolset allows for an interactive planning workflow which gives dynamic and real-time feedback related to adherence to local regulatory guidelines, custom design principles, urban massing profiles and transportation network design. It allows the designer to receive interactive guidance on multiple fronts throughout the design process. The design team may begin with a land use plan created using a 2d drafting application, which is then imported into the parametric toolset and visualized as a function of population density and land use. The designer then has the option to view areas where the plan is not compliant based on local regulations and designated design principles. Changes to the plan can then be made in real time as compliance checks are updated accordingly.

Additional layers of insight are available to view along the workflow, including relative transportation flow efficacy and transit station accessibility/usage, as well as automatically generated 3d building plots based on density and reactive user-definable variables such as building heights being staggered to maximize views toward parks.

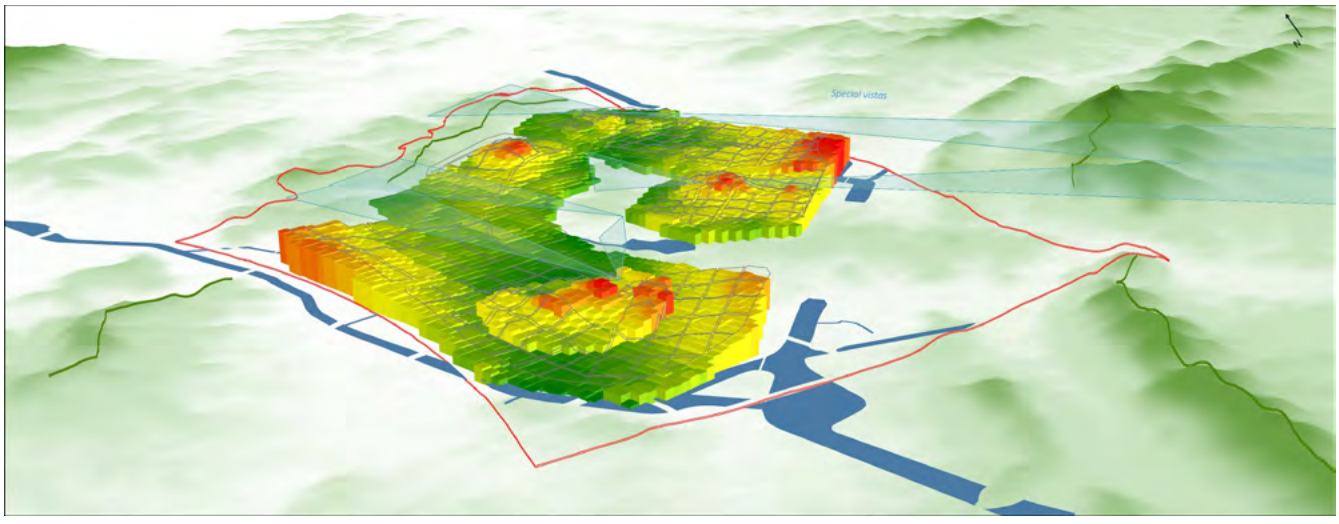

Figure 4. A density guidance tool's gradient-colored height restriction map

Figure 5. Various KPI and evaluation feedback illustrations of the Parametric Masterplanning Toolset

Importantly, it optionally serves as a communication facilitator between the planner and the client who wishes to explore the impact of land use and infrastructure adjustments side-by-side with the planning practitioner.

Importance of 'smart guidance' at the very initial stages of development

These tools together describe the shift toward smart planning guidance; however, the critical point to emphasize is that this guidance is taking place from the outset of the planning process instead of mid-to-late in the game. Just how important is this point? It leads us to the central thesis that the higher quality environments being enabled by smart digital guidance is due to their being explored and implemented at the very initial conceptual stages of a project, where sound foundations can be laid in an iterative and data-driven manner and where the congeries of planning elements are still highly plastic, instead of being relegated to later stages where flexibility and large-scale considerations are no longer tenable.

This is indeed a brave new world of planning governance through a novel medium consisting of an interplay between advanced digital technology, smart infrastructure and early guidance, all with the goal of improving the quality of the urban experience while being able to measure that improvement at every step.

The marriage of technology and high-level planning administration originated in the vacuum of data-poor environments and out of a form of necessity, and this maturing model can now be retrofit to planning methodologies in highly developed planning systems— though it would have been difficult for this model to have originated in them.

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Feature

'Wearable Infrastructure: an experimental demonstration'

Adolphus Yik Chun Lau and Yujie Wang

Adolphus Lau is a management consultant at Arcadis. He is a specialist in innovation policy planning and smart city development. He provided policy consultancy to government agencies focusing on the areas of technological innovation and sustainable development. He also had experiences launching various ventures and start-ups in China and the United States. He completed his masters at the University of Hong Kong. He is also an alumnus of the University of Toronto.

Yujie Wang is a master's student at the Massachusetts Institute of Technology with backgrounds in Human-Computer Interaction and Architecture. As an interaction design architect and a creative technologist, he investigates the future of social and technological systems by mediating human and machine perception. Working across intelligent systems, sensory experiences, tangible products, and intangible services, Yujie transforms how people interact with media such as mixed reality, self-driving vehicles, physiological sensing devices, and adaptive built environment to empower their lives with meaningful experiences.

In the Eyes of the City Section of 2020 Bicity Biennale of Architecture and Urbanism, a conceptual environmental management strategy, namely the Internet of Breaths (IoB) was introduced to increase cities' capacity for resilience against air pollutions (Lau *et al*., 2019). By infusing intelligence and data mining into everyday objects, the IoB leverages the power of real-time data to delineate an unambiguous picture of the critical socio-environmental issue.

IoB sets out a holistic framework for the promulgation of smart objects and deep urban analytics to enable strategic planning of preventative measures against air pollution among other global environmental disasters. The 2018 State of Global Air Report revealed that over 95 percent of the world's population are breathing harmful air, contributing to 3.1 million deaths in 2016 (Health Effects Institute, 2018). In developing regions, the population are exposed to even higher risks, where PM2.5 concentrations easily exceed 35. In 2016, a population-weighted annual average of 101 $\mu g/m^3$ was recorded in Bangladesh and 56 $\mu g/m^3$ in China.

The Dutch planning practice associated with water management demonstrates city resilience against natural challenges is reliant on mass public participation and communications (Woltjer, 2000). With a common rationale, IoB proposes an implementation mechanism comprising features of central coordination and citizen-driven actions. The two platforms form a feedback loop, which facilitates information exchange between the public and government institutions to assure mitigations are carried out with minimum delays and in a concerted manner. The two-fold system of IoB consists of a package of software and hardware components. On the public user end, IoB relies on smart air masks and a mobile application to collect deep data mining and distribute system information such as disaster alert. The public administration end performs information management and analysis through a real-time IoT environmental sensing network, which collects and enables deep analytics on the data from mass sources. The two-fold system aims at combining bottom-up data collection and top-down environmental management, thereby enabling effective communications and information management.

A number of theories suggest healthy behaviour can be steered by guiding the decision-making process with cognitive prompts (Niedderer et al., 2016). IoB is strategically designed to prompt such behavioural change (Brown, 2009). The

smart air mask is a detection, protection, and communication interface for the public users to measure ambient air conditions. The smart air mask's built-in MQ135 sensor monitors real-time airborne contaminants and alerts the user to wear a mask when pollutant is detected. At the same time, the sound sensor in the mask connects brightness of the light to the sound of the user's breath, creating a synaesthesia of sound and vision, making the mask 'a lighthouse in the smog', warning people around of the pollution (see Exhibit 1). These design features, combined with the data architecture, foster an urban culture that citizens would gradually develop attention and knowledge to take protective actions against air pollution and public health.

Exhibit 1: Synaesthesia of sound and vision in pollution

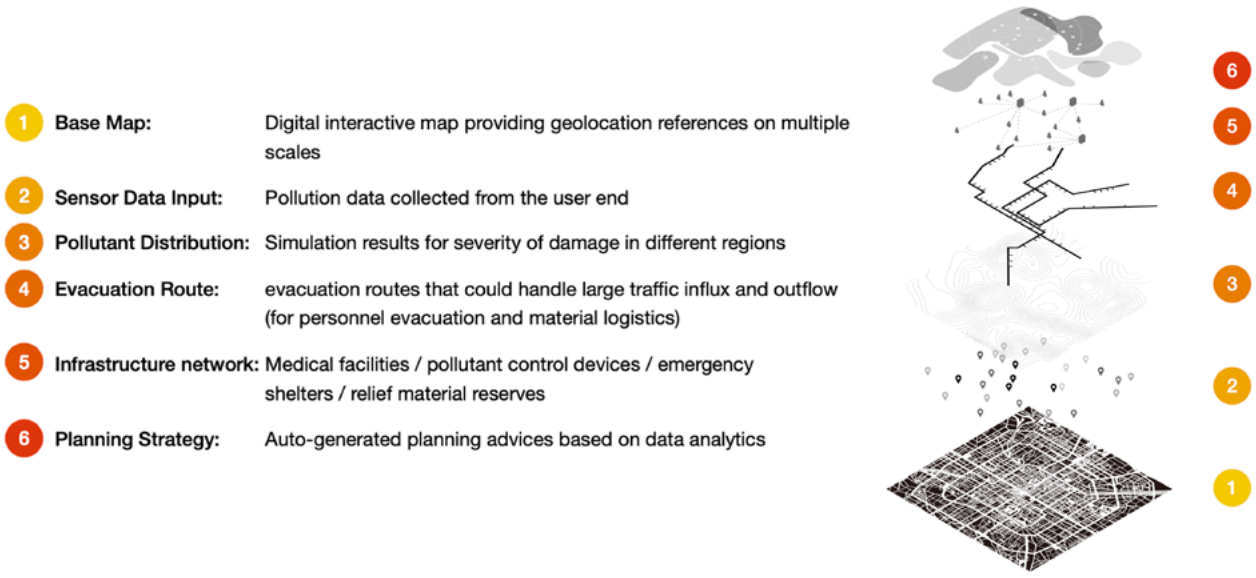
(Illustration: Team IoB, 2019)

On the system-level, the masks serve as data nodes. Sensors on the mask transmit the AQI (Air Quality Index) information and the mask's GPS location to the cloud through the GSM (Global System for Mobile Communications) network, forming a real-time IoB environmental sensing network. The real-time air condition is then visualized on a digital map accessible to public users through a mobile app and a management interface accessible to the government to take strategic combating approaches.

The real-time IoB management interface comprises multiple layers of information upon which the government can take immediate mitigative measures or strategic actions (see Exhibit 2). On top of a digital interactive base map which provides geolocation references on multiple scales, the system simulates the distribution of pollutants and severity of such damage in different regions by conducting deep learning based on the discrete pollution data. Based on these advanced analytics, the system provides different capability options. The system can plan routes for handling large traffic influx and outflow for personnel evacuation and material logistics. The system also identifies the available infrastructure network, including medical facilities, pollutant control devices, emergency shelters, relief material reserves. By integrating all this information, the system generates useful insights for disaster management and insights for wider urban planning strategies by automation.

The data insights and auto-generated action prompts are managed and distributed among government, communities and citizens through an omni-channel workflow during pre-pollution, during-pollution, and post-pollution stages (see Exhibit 3). Within each stage, stakeholders are connected via the dual platforms to support and facilitate the actions of each other, enabling continuum across each service function including, monitoring and evaluation, manufacturing coordination, data management, infrastructure

Exhibit 2: IoB system architecture



(Author, 2019)

planning, and citizen actions and that such actions are conducted in a concerted manner. All these processes are supported and further refined as new data are fed into the platforms.

Wearables and participatory governance

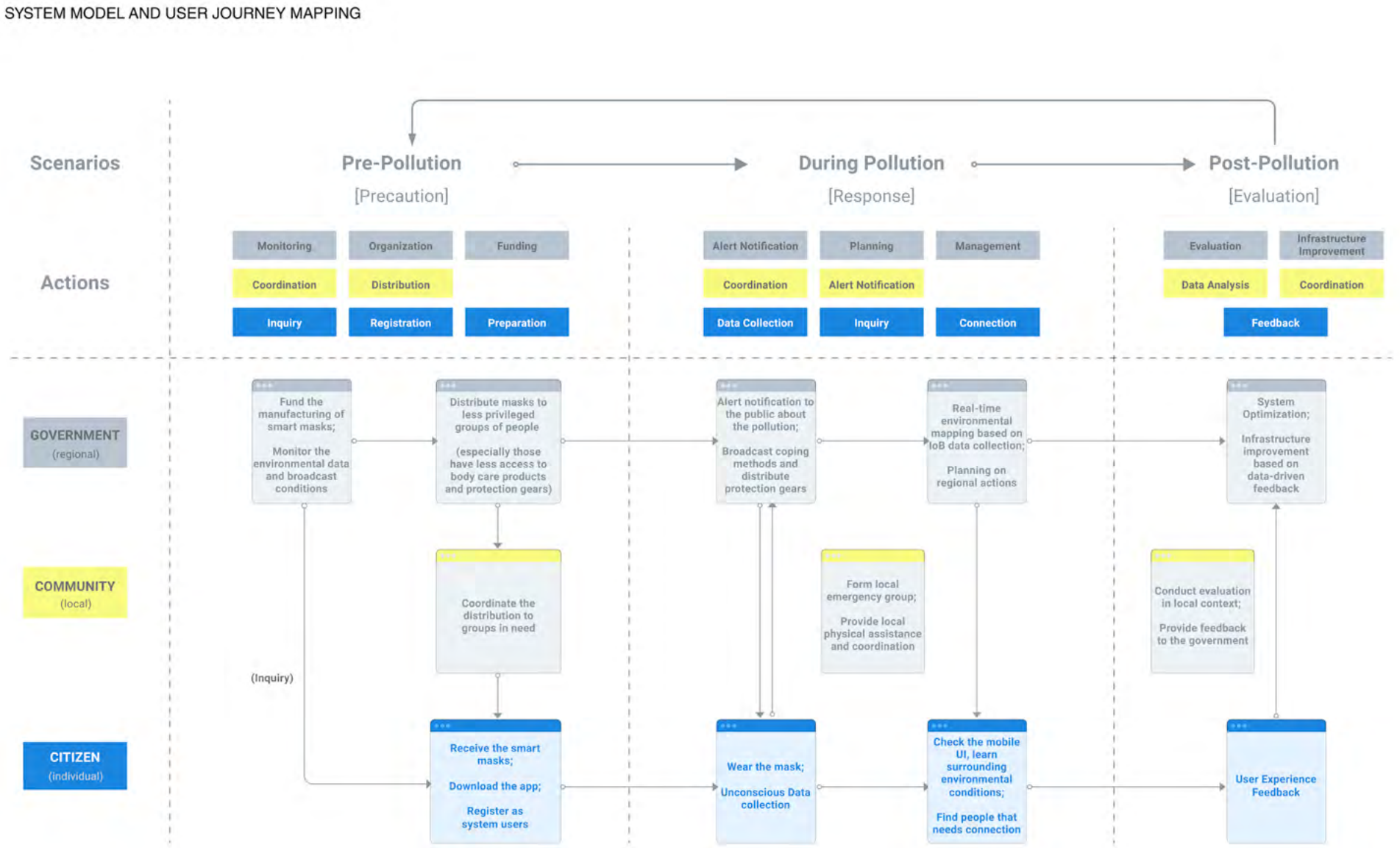
IoB is a demonstrator of the Goodchild's (2007) envisioning of "citizens as sensors" . It exemplifies how wearables are going to play a critical role in informing smart city development through tight integration of IoT and daily objects, promulgating a public-driven data culture and induce healthy behavioural change through thought design. These dynamic interactions make increased capacity resilience against natural disasters in a timely manner possible.

In the rapid rise of new generation 5G networks, cities are evolving as platforms of AI applications which fundamentally changed humans' way of life through deep integration of IoT and daily objects (Beroche, 2011). increasingly play a role in the management of societies driven by individual movements and actions. As much as the automobile has changed the way and the right of the way humans move around places, smartphones, and wearables such as smartwatches and trackers are fundamentally transforming the mechanism of information flow, human social networks and way of governance. Institutions such as Harvard Berkman Klein Centre, Oxford Internet Institute are making efforts to unleash the socio-economic value of new media and data technologies while mitigating their potential impacts through experimental with novel governance models.

Amid the increased occurrences of global disasters including global warming or the outbreak of pandemics, global governance is subject to new uncertainties that a centralized approach may expose the governance to greater risks of failing due to the lack of resilience against various risks including goal misalignment organisational misbehaviour (Lau, 2020). Furthermore, in the age of "connected societies", bottom-up input is perceived as an essential component to policy formulation and evaluation processes. Bottom-up led governance provides an opportunity for dynamic alignment of processes, goals and human labour, namely human-centres or distributed governance (Lau and Wang, 2020).

In the rapid rise of new generation 5G networks, cities are evolving as platforms of AI applications which fundamentally changed humans' way of life through deep integration of IoT and daily objects

Exhibit 3: Omnichannel disaster management



(Author, 2019)

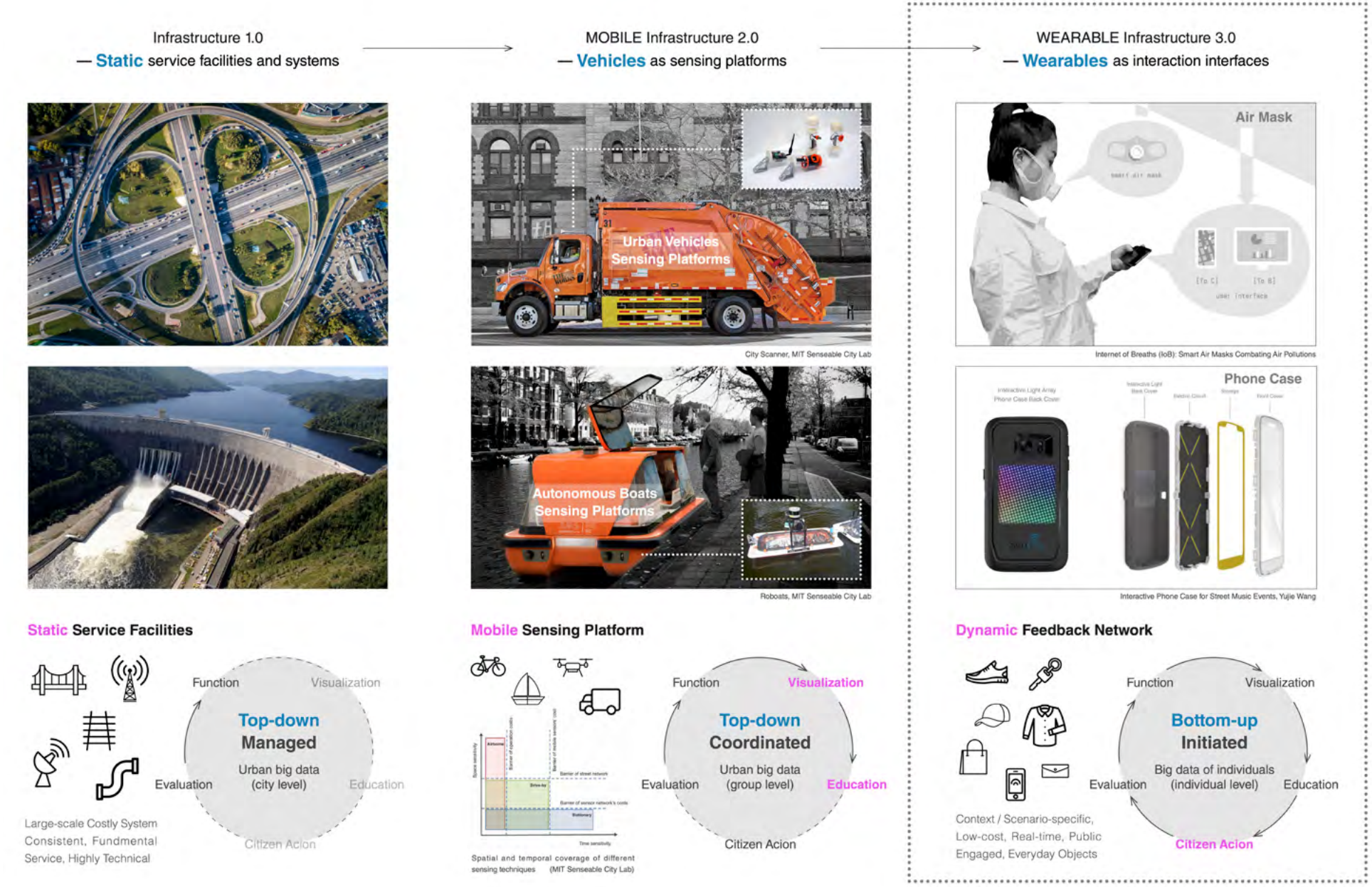
The authors interpret global infrastructural development in three phases (see Exhibit 4). The first phase, namely Static Infrastructure, is a top-down managed system and a linear process focusing on evaluation and functions. It attempts to transform cities through ubiquitous computing and embedding digital sensors into mega infrastructure such as large roadworks or tunnels (Gabrys, 2016). Because of the large scale, first phase projects are largely costly, consistent and highly technical.

The second phase, namely Mobile Infrastructure, leverages on vehicles or other forms of mobility as sensing platform. It relies on top-down coordination while also enjoying a higher degree of mobility. It inherits the linear process for evaluation and function from the first phase. However, it is equipped with visualization and education capabilities. Resembling cases include the 'City Scanner' project developed by the MIT Senseable City Lab which experimented with utilizing garbage trucks as moving data nodes to collect environmental data and to conduct sensing analysis (Anjomshoaa *et al.*, 2018).

The third phase, namely Wearable Infrastructure, leverages mobile devices (e.g. air mask, phone case) such as wearables as interaction interfaces. It is bottom-up initiated that it forms a dynamic feedback network. Its process grew into a loop of evaluation, function, visualization, education, and citizen actions. As it involves bottom-level inputs from everyday objects, it is context-and-scenario specific, more immediate and more extensive. The third phase also provides the opportunity to directly affect behaviours of an individual as the sensing functions are embedded within portable and sometimes personal items.

Development of wearable infrastructure also has important implications for public administration. The mobile platform provides a reliable connection between the government and its citizens, thereby offering a chance to radically shorten the processing time between an occurrence, and its follow-up actions including detection, notification and mitigation, with an implication for improvement in public health and reduction in related government spending. By incorporating personal objects, the infrastructure also extends its sensing area to previously untapped urban territories such as indoor environment, implying a more comprehensive data collection process and thus insights and action prompts of higher fidelity as well as a more extensive scope of urban management. On the strategic level, the platform approach would enable a more informed design and renewal mechanism for different kinds of standards and protocols. Wearable infrastructure also opens up the possibility for personalizing insights for each registered user, i.e. each citizen, when integrating his/her personal attributes in the analytic process. For example, the government can offer individualized special support or early alerts to high-risk individuals when serious air pollution occurs by interpreting his/her health risk factor alongside wider environmental observations. Personalization also makes possible to introduce new features for urban management and regulation such as health rewards.

Exhibit 4: The emergence of wearable infrastructure



(Illustration: Author, 2019; source: Anjomshoaa et al., 2018)

The likelihood of wearable infrastructure's adoption and successful development will mostly rely on the cost, technological readiness and policy support. Generally, the wearable market has already achieved economies of scale, which allows the technology to fully marketize. In the fourth quarter of 2019, the global market for wearable devices grew 82.3%, reaching 118.9 million devices shipped (International Data Corporation, 2020). Consultants estimate the prices will drop as the competition in the field intensifies further (Suematsu, 2020).

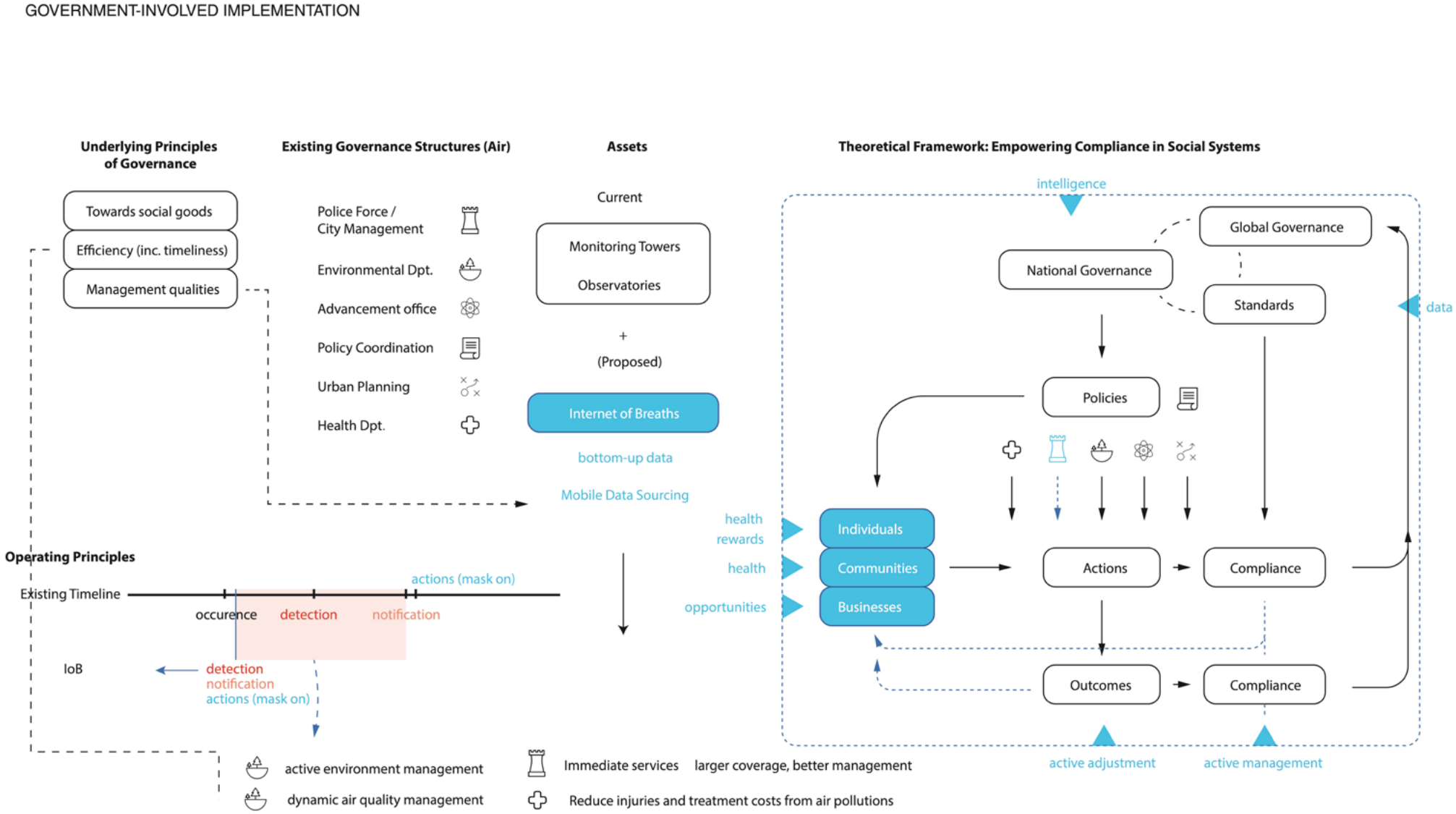
However, there are still certain roadblocks particularly associated with technological readiness and policy support that need to be addressed before such technology can be fully promulgated.

In terms of technological readiness, the major challenge lies within the interoperability among product components. There is currently lack of common connectivity protocols, standard data formats and common software interfaces (Manyika *et al*., 2015). Policy makers, industry associations and suppliers can join forces to agree on industry standards and protocols to ensure information can be extracted from devices of different manufacturers.

Challenges for public policy include privacy issues and regulatory process for technology. Increasingly, consumers demand for a greater control over the use of their own personal data privacy. A 2020 survey indicates over half of consumer respondents identify location data as a 'very important' data type (Anant *et al.*, 2020). Some governments have already introduced regulations to assure data privacy. For example, the General Data Protection Regulation (GDPR) in Europe, the California Consumer Privacy Act (CCPA) and the LGPD (General Data Protection Law) in Brazil requires or will require companies to collect, store, share and delete consumers' data in specific ways, failure to comply with which will result in arduous penalty. New clauses designated to data privacy of wearable technology can be introduced to ensure personal privacy and that institutional application of such technology are culturally accepted by the public. Furthermore, approval bodies such as health regulation authorities are running out of capacity to catch up with regulating wearable devices due to the rapid development of the wearable market (Junata and Tong, 2018). New processes can be introduced to streamline approval process for the introduction and application of wearable technologies.

As the international society is increasingly exposed to more uncertainties of unanticipated forms (Flaxman and O'Rourke, 2020), including environmental disasters, diseases, and complicating international relations, limits of existing urban governance systems around the world are being tested. Global governments are challenged to respond with governance strategies. Under these intersecting realities, new norms such as work from home and social distancing have already emerged, with some international governmental organizations claimed that there will be no return to 'old normal' (United Nations, 2020). Wearable Infrastructure, the third wave of sensing based infrastructural development, as the authors identified, provides an opportunity to deconstruct some of the uncertainties, with its capability of naturally allowing exchange of information among individuals and government authorities with minimal delay. As a result, the platform can respond to different types of uncertainties with immediacy, enabling new way of life where public participation becomes an integral part of urban management. As wearable technologies continue to grow in the consumer sector (International Data Corporation, 2020), the arrival of wearable infrastructure is foreseeable and practicable given government support and adequate incentivization.

Exhibit 5: Wearable enhanced governance



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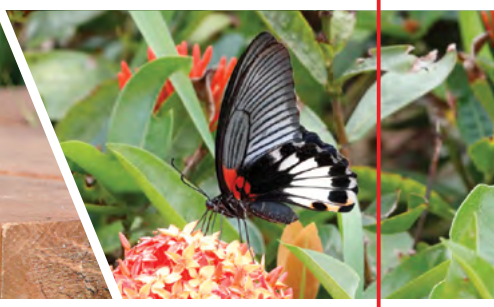

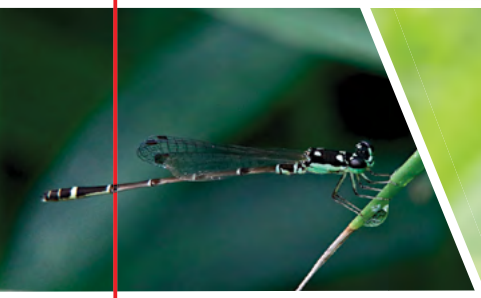

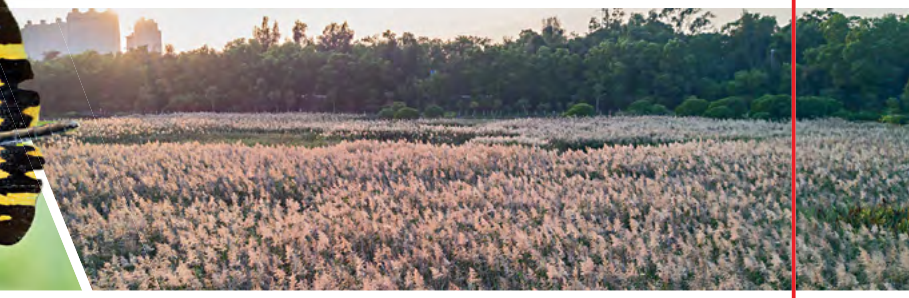

新鴻基地產重視平衡發展，是香港首批發展商將保育結合項目規劃，
當中元朗PARK YOHO更融入活化濕地，成為該大型項目一部分。

With an emphasis on balanced development, Sun Hung Kai Properties is one of the first developers in Hong Kong to rejuvenate a wetland as part of a large-scale project at PARK YOHO in Yuen Long.

新鴻基地產
Sun Hung Kai Properties

B

Column

Column

The Covid-19 Pandemic – implications for planners?

Jimmy C.F. Leung

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Introduction

2020 will surely go down in history as a year plagued by the Covid-19 pandemic, traumatised by the accompanying global economic recession and for many, tormented by the loss of their loved ones. Many countries, regions and cities have been locked down during the outbreak of the pandemic, thus severely disrupting economic activities, family life, schooling and practically every aspect of life. Infected cases and fatalities have been recorded virtually in all countries in the world. However, instead of global solidarity to fight the pandemic, what we have seen are countries finger-pointing to one another. We have also witnessed the cost of inaction is much higher than the cost of action in a few countries at the early stage of the pandemic. There are certainly lessons to be learned for the World Health Organisation, governments at the national, regional and local levels, NGOs involved in public health, the medical and the nursing staff and the community at large. This article explores what the implications are for the planning profession in the city in meeting challenges of infectious diseases like Covid-19.

Development of modern town planning linked to infectious diseases

The development of modern town planning was closely linked to public health hazards. Crowded living and poor hygienic conditions following industrialisation in the 19th Century necessitated governments to take actions. The Garden City movement, urban renewal and land use zonings were some of the initiatives adopted to improve the situation.

The development of modern town planning was closely linked to public health hazards. Crowded living and poor hygienic conditions following industrialisation in the 19th Century necessitated governments to take actions.

In Hong Kong, the bubonic plague epidemic devastated the community for three decades from 1894 to 1923. The deadly contagious disease took away more than 20,000 lives. Apparently, many were living in houses under unsanitary conditions at the Tai Ping Shan area, which was subsequently resumed and cleared for urban renewal.

The crowded and poor housing conditions in the territory led to the establishment of a Housing Commission charged with the responsibility "to enquire into the housing difficulties in Victoria and Kowloon with special reference to overcrowding and its effect on tuberculosis and suggest steps which should be taken to remedy conditions". Published in 1935, the Commission Report recommended, among others, that a permanent Town Planning and Housing Committee be formed and a permanent Town Planning and Housing Sub-department of the Public Works Department be created[1].

One thing led to another, the Town Planning Ordinance was passed in 1939. The preamble of the Ordinance states that "[*T*]*o promote the* ***health****, safety, convenience and general welfare of the community by making provision for the systematic preparation and approval of plans for*

[1] https://www.legco.gov.hk/yr02-03/english/bc/bc12/papers/bc12-441-e-scan.pdf

the lay-out of areas of Hong Kong as well as for the types of building suitable for erection therein and for the preparation and approval of plans for areas within which permission is required for development" (emphasis added). In a nutshell, public health concerns and poor living conditions were the driving forces for the development of planning in Hong Kong following the outbreaks of bubonic plague, tuberculosis and cholera in the late 19th and early 20th Centuries.

Hong Kong was put to test once again in 2003. The city was hard hit by another contagious disease – SARS, which was really terrifying at the time as no one knew for sure what the virus was, where it originated, how it was transmitted and how fatal it could be. The community learnt the lesson collectively. The government, the Hospital Authority and more importantly, the community were readily mobilised into action with the outbreak of Covid-19.

Combating infectious diseases

Infectious diseases can develop into epidemics or pandemics like influenza, HIV, SARS, Ebola and Covid-19. Not only do infectious diseases become more frequent, their impacts are felt everywhere in a highly interconnected world. In compact and densely-populated cities like Hong Kong, to contain the spread of infectious disease is especially challenging.

According to Dr. Paul Farmer, medical anthropologist and physician at Harvard University, the four "S's", namely staff, stuff, space and systems are crucial in combating infectious diseases. Staff refers to properly trained doctors, nurses and community health workers. Stuff are medical equipment and safety gear. Space refers to a clean and sanitary environment to house and treat patients and systems are infrastructural and logistical organisations[2].

The shortage of medical professionals has been a deep-rooted problem in Hong Kong. Unfortunately, there is no sign of it being resolved anytime soon. Hong Kong is a well-off society. To purchase the necessary medical equipment and personal protective equipment (PPE) for the medical staff should generally not be an issue. However, during the Covid-19 pandemic, simple things like face masks and other protective gears are in short supply globally. It is very difficult for the government, let alone members of the public, to purchase masks for their daily use. Keeping a sufficient stock for emergency use is therefore a must. Developable land or rather the lack of it in Hong Kong is a persistent problem that the Government has been trying to grapple with for many years. Public hospitals are often stretched to their limits during outbreak of diseases like flu. As manifested in the current pandemic, spaces for triage and quarantine are sorely needed. The AsiaWorld-Expo and a new public housing at Fo Tan have been converted for such purposes on a temporary basis. It is often said that a good system is an everyday system that can detect an outbreak of diseases via an effective surveillance and reporting mechanism. Public health experts should be able to judge how such systems work in Hong Kong.

Developable land or rather the lack of it in Hong Kong is a persistent problem that the Government has been trying to grapple with for many years. Public hospitals are often stretched to their limits during outbreak of diseases like flu.

Under the Hong Kong Planning Standards and Guidelines (HKPSG), the standard for hospital beds required is 5.5 beds per 1,000 people (including both public and private hospitals)[3]. With a population of 7.32 million at the end of 2015, there were 38,287 hospital beds available which is equivalent to 5.2 beds per 1,000 people[4]. A requirement of 40,260 beds is needed in accordance with the HKPSG. With an ageing population, the demand for hospitalisation and

[2] https://medium.com/@simpsoncenter/stopping-infectious-disease-requires-staff-space-stuff-and-systems-paul-farmer-argues-with-8f59e5ad79d4

[3] https://www.pland.gov.hk/pland_en/tech_doc/hkpsg/full/pdf/ch3.pdf

[4] https://www.gov.hk/en/about/abouthk/factsheets/docs/public_health.pdf

convalescence will go up. However, there is no point talking about enhancing the standard when the current one cannot be met.

To prevent cross contamination, the provision of hospital beds in negative pressure wards is crucial in the fight against contagious diseases. During the current pandemic, makeshift negative pressure wards are built in Hong Kong and elsewhere in the world. Due to the rezoning of non-designated government/institution/community and other vacant sites for housing in recent years, there is practically nothing left in the barrel no matter how hard one scrapes. The shortage of appropriate hospital beds is one of the reasons why relatively high mortality rates are recorded even in the developed countries. Identification of new sites and extension of medical and related facilities in and around existing hospitals should be expedited.

As mentioned earlier, there is a shortage of quarantine accommodation in Hong Kong. The use of newly built public housing estates for such purpose was at best greeted by local objections and at worst met with vandalism resulted in severe damages to the housing blocks. Consideration should be given to identifying suitable sites near the airport and the boundary control points for quarantine facilities. This will minimise the risk of transferring travelers to and from the quarantine centres in the crowded urban areas. When such facilities are not used for quarantine purpose, they can be put to other uses like youth hostels.

With the completion of Liantang/Heung Yuen Wai Control Point in the offing, boundary control points with substandard facilities like the Lok Ma Chau Control Point should be re-planned with quarantine facilities incorporated. It is reported that Shenzhen is currently re-planning the Huanggang area where the boundary control facilities is located and that co-location of immigration and customs facilities is intended[5]. If this is the case, the area of Lok Ma Chau on the Hong Kong side can be freed up for other uses such as housing and back-up area to supplement the Lok Ma Chau Loop development.

Opportunity should also be taken to review the accommodation for laboratory, triage, training, storage space for personal protective equipment and other medical equipment for public hospitals. The space can be made available in the vicinity of existing hospitals or at strategically located sites for centralised facilities, which will minimise the distance travelled to different hospitals.

Whether it is the provision of clinical services via the Internet or leveraging on robotics to take up the more routine works of medical personnel, there is enormous potential to adopt technologies in the delivery of healthcare services. This can be part of the smart city initiative that Hong Kong is embarking on.

Back to the basics for planners

With the Internet of Things, Artificial Intelligence and Blockchain Technology, changes are witnessed in the way that work, business transactions, education, shopping, meals, leisure and entertainments are organised. No economic sector can be spared from such disruptive technologies. What the Covid-19 pandemic has done is to drive these changes in a much faster pace resulting in significant impacts on space requirements and employment structure. Demand for logistics space have increased in recent years as more and more transactions are conducted on-line. Distance-learning and webinars will become more common. Work from home will gather pace, although it will be a challenge to live and work in small apartments with multiple household members. The long-term demand for space for office, retail, logistics, home, medical and other facilities will need to be carefully re-assessed. In short, it is going back to the basics for planners – to increase land supply as well as plan and manage the changing demand for different uses.

[5] https://news.rthk.hk/rthk/ch/component/k2/1534040-20200625.htm

Column

The Challenge of Getting Smart

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 Member of Lantau Development Advisory Committee, and Member of Advisory Committee on Countryside Conservation.

COVID 19 has certainly impacted on the pattern of our daily life. While digital and electronic entertainments can hardly be new experience for anyone living in a modern city, social distancing forced many of us to minimise physical contact and rely more on electronic means of communication.

Some of us foresee a shift in paradigm that may lead to a complete change in city management, including spatial demand, planning and design, in response to how various social and economic activities are being carried out in the future. Yet, when allowed, there are scenes everywhere that people rushed back onto streets and parks, chatting and hugging, or at least texting on their mobile in a packed cafe.

Shopping and working from home are popular these days; in fact, many home-based production and mercantile businesses have long been carried out in our city within residential units as well as neighbourhoods. While our system may choose to "tolerate" or accommodate some "unauthorised" activities of temporary nature, there is no sign of any serious discussion on the impact of extended self-employment in multi-function space; i.e. "working at home" instead of from home.

Technology changes our life. History showed that means of transportation and communication determined not just the pace of life but also how settlements were planned. Human settlements began with little diversification of labour. Skill sets apart, the cost, including risk, of transportation has been a key factor in directing evolution of settlement. Hundreds of cities thrived due to their proximity to resources and their location along trade routes; and died because of exhaustion of those resources or alteration in route. Cheaper and quicker means of transportation facilitated centralisation and specialisation in production in the past, and enabled the growth of gigantic activity base of various nature orchestrated by multinational corporation through economy of scale.

Technology changes our life. History showed that means of transportation and communication determined not just the pace of life but also how settlements were planned.

In view of the change in global politics with greater emphasis on "local" production, coupling with the maturity of technologies that allow compact production set up and the potential of IOT, what will likely happen?

Many futurists have projected scenes of a world mastered by artificial intelligence and robotic services. Let's not go too far into the time of simply asking the computer to "print" us a meal with steak and greens by a "cell tissue printing machine" and also a set of recyclable tableware by a "multipurpose 3D printer". What has just gone through rocket speed development was the integration of business-to-customer logistic services into our mode and mechanism of daily consumption. Experience in Mainland China showed us how that system may work almost seamlessly during time of locked-down.

The current version perhaps is only a primitive

one: an on-line service network linking up suppliers with dense distribution nodes at local level plus a delivery service network with a troop of “infantry” and “calvary”. Shopping experience has already been redefined, and the interpretation and demand for shopping space is undergoing extremely critical market trial. What is interesting from a land use planning viewpoint is in what way spaces in general retail stores, supermarkets, groceries, convenient stores, fishmongers and eateries; etc. are being converted into delivery preparation and storage spaces? And to what extent, such change in operation impacted on the spatial demand of the conventional distribution chain?

Same question for office space. The key issue is certainly on how much office work could be done from home. That is however not simply a question of technology available but rather a socio-economic issue with much wider implications. Using the example of a family with parents working as an investment analyst and a nurse, and two children at the age of eight and ten respectively. The analyst has frequent meetings and the nurse will stay home for rest after night shift when their kids are at school; the kids are normally energetic and inquisitive. In case the entire family is “working from home”, the situation would be very different if their flat is 1600 square feet instead of 600 square feet.

Further complications may come from the various licensing fees for obtaining real-time market information for the office of the analyst, and the Youtuber lives next door who is coaching gymnastic exercise with hard rock music background by live streaming. Can the analyst work at home? For sure he can, but can he deliver quality service?

Space can always be designed and used in a flexible manner, the question to ask perhaps is at where certain activities could best perform. It leads all the way back to the fundamental challenge of land use planning, especially statutory planning. Should the system proactively respond to or even facilitate the development of “slash” career at home for the new generations, or should it look into how adverse impact could be mitigated through regulation?

While we are still pondering upon how to regularise the vehicles used by the “calvary”, the market might have switched to using drones for literally “door to door” delivery when the earlier debate is over.

No matter which way we are heading, what is certain is that the current strategic and statutory planning system and the associated uses definition will soon be found inadequate and falling far behind from how space are being consumed in the brave new world which is both smart and flicking.

Column

Smart planning for a quality environment

Betty Ho

Ms Betty S.F. Ho is the Director of PlanArch Consultants Ltd. She is dedicated to integrating environment conservation and urban planning. She was appointed to many boards and committees, many of which are related to the environment, including Advisory Council on the Environment, Marine and Country Parks Board and the Sustainable Development Council. She is currently the Chairperson of Continuing Profeesional Development Committee of HKIP, a member of the support group of the Long Term Decarbonisation Strategy and Director of the Conservancy Association.

With rapid growth in population, modern industrial economy and consumption lifestyle, both the natural environment and our living environment are at risk!

One of the biggest challenges to the environment is global warming. With largely unrestrained burning of fossil fuels and massive deforestation, the atmospheric concentration of carbon dioxide (CO_2) has increased by over 40% since pre-industrial times. When heat is trapped by the increasing greenhouse gases, temperature rises abruptly and causes widespread melting of snow cover, ice caps glaciers and leads to the rise in global sea level.

Global warming also leads to more evaporation of sea water and increases the chance of heavy rain and extreme weather which, in turn, will proliferate consequential problems such as reduction in agricultural production, aggravation in scarcity of water resource, spread of disease, loss of ecological and environmental balance, etc.

Climate change in Hong Kong

We can easily feel the impact of global warming. Hong Kong has experienced significant local warming trend since the last Century. Both global warming and urbanization/ intensive development are major contributors, with the latter estimated to contribute up to 50% of the local warming. According to the Hong Kong Observatory, the number of hot nights (with daily minimum temperature ≥ 28°C) and very hot days (with daily maximum temperature ≥ 33°C) in Hong Kong has increased by manifold over the last century while the number of cold days (daily minimum temperature ≤ 12°C) has decreased significantly. In June this year, we had a total of 18 hot nights which set a new record for June in Hong Kong.

Extreme precipitation incidents also become more frequent. The hourly rainfall record at the Hong Kong Observatory headquarters has taken new records in the last few decades. As temperature continues to rise, extreme rainfall is expected to increase and flooding becomes not uncommon, as experienced in various parts of Hong Kong in the past decade.

Applications for Smart City

The government, professionals and scientists have been advocating “Smart City” concept to develop and implement initiatives that strive to make our city smarter and a better place to live in. A real smart city should be able to optimize its resources in the development, protect our environment, be resilient, plan preventive measures and provide good maintenance of various infrastructures, monitor safety and public health aspects and optimize services for the enjoyment of urban life. It is believed that, by

adopting emerging technologies such as Internet of Things (IoT), Artificial Intelligence and Big Data, the technological know-how would contribute to smart and sustainable urban development and the city should be capable of sustaining social, cultural, economic and environmental progress.

A real smart city should be able to optimize its resources in the development, protect our environment, be resilient, plan preventive measures and provide good maintenance of various infrastructures, monitor safety and public health aspects and optimize services for the enjoyment of urban life.

Currently, we have various models and smart technologies to help increasing the capacity of the infrastructural facilities. For example, application of Air Ventilation Assessment to enhance air flow in dense urban area, traffic detection and control devices to improve traffic flow, sensors to monitor air quality and noise levels in real time, etc. It is expected that, with the increase in the infrastructural capacity, our city will be able to accommodate a higher population.

Reducing/ reversing Carbon Emission

In order to enhance a better living environment and reduce carbon emission, our Government promulgates green and innovative buildings. Tax incentive for renewable energy installations (such as solar photovoltaic panels and wind turbines) and energy-efficient building installations is introduced with a view to achieving a low-carbon future for Hong Kong.

Sustainable Building Design (SBD) Guidelines

Since urban heat island effect is an important concern in local living environment, urban climate warrants an important consideration in the planning and building design process.

Lands Department, Buildings Department and Planning Department have issued Sustainable Building Design (SBD) Guidelines which stipulate the provision of three key building design elements, including building separation or permeability, building setback, and site coverage of greenery. Fulfillment of these key building elements will be the pre-requisite of GFA concessions to motivate developers to construct buildings with green features. Building environmental assessment methods like BEAM Plus is adopted to assess the environmental performance. Whilst these green features will enhance buildings with better ventilation and visual effect, the GFA concession scheme generates some adverse effects since the additional GFA will inevitably increase building bulk and population density. However, can the carrying capacity of our city, not only for infrastructure, but also for social, environmental and ecological aspects, be increased without limit?

In order to combat climate change and mitigate urban heat island effect, many professionals use blue-green infrastructure and planting in our built environment. SBD Guidelines and Beam Plus also require certain level of greening within the building site, but these guidelines are concerned more about the percentage of greening, rather than the design and the connection with people.

However, can the carrying capacity of our city, not only for infrastructure, but also for social, environmental and ecological aspects, be increased without limit?

Biophilic Design

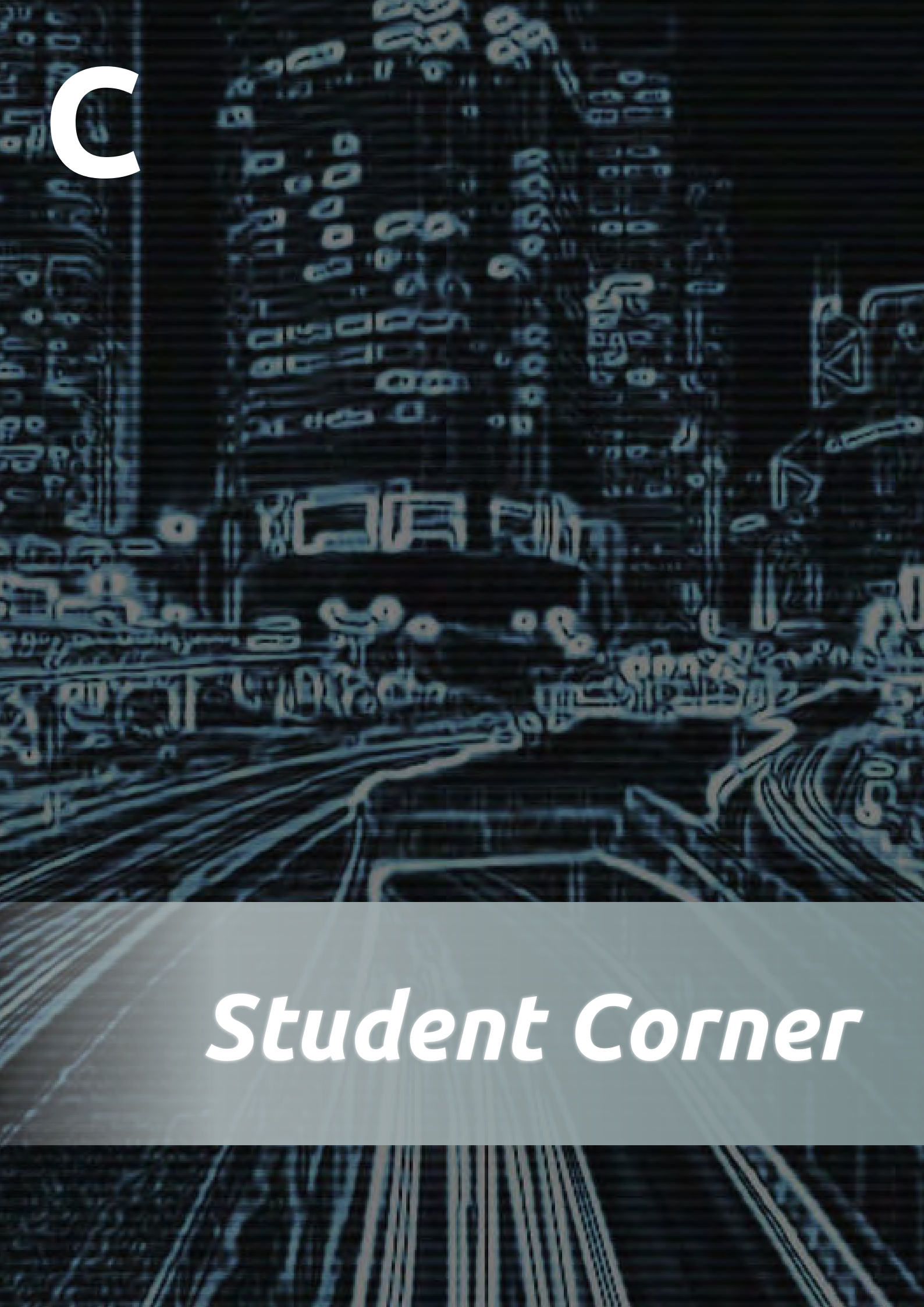
With scientific and psychological research findings, we understand that there is an intrinsic need in human for exposure to natural environment, and the nature has a strong positive impact on our health and well-being. In planning our city, we should promote biophilic design and incorporate elements of nature in the built environment, as we need design features that reconnect people with nature. Biophilic design can be implemented at

the community, building, or small-project level. In the built environment, direct experience of nature which includes green elements like plants, natural day light, flowing water, natural air movement, etc., can be introduced. The incorporation of sounds, smells, sight and touch would contribute to a multi-sensory, biophilic experience in our neighbourhood.

Protection of Natural Environment

While biophilic design improves our well-being, it alone is not adequate. A smart city is not only about urban development. A real smart city should also protect and preserve our natural environment as this can contribute to soil retention, flood protection, water conservation, enrichment in habitat, attenuation of rising temperature and reduction of urban heat island effect. Moreover, it will enhance social values in providing recreational opportunities and improve our health and well-being.

In response to the COVID-19 pandemic, lots of Hong Kong people go to the countryside and beaches to hike, exercise, or just relax, as we did during the SARS period. Nature is always the refuge when we are at risk. Indeed, we should appreciate and connect more with nature. We have to protect and treasure our natural environment, respect the ecology and recognize nature's therapeutic value. Not only should we strive to provide greening in our built environment, we should also proactively conserve the remaining natural places in Hong Kong, such as our country parks, green belts and conservation areas, as well as marine assets. Only by protecting our natural assets can we enjoy a quality environment.



Student Corner

Student Corner

Urban Planning In The ICT Age: The Chronicle of Evolution

Anutosh Das [a, b]

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Anutosh Das is an Urban Planner by Passion and Profession who wishes to comprehend the interplay between haphazard urban growth and environmental Sustainability of cities from a global, inclusive viewpoint. Mr. Das is a Faculty Member in the Department of Urban & Regional Planning at Rajshahi University of Engineering & Technology (RUET), Bangladesh since 2016. He is a graduate in Urban Planning from Bangladesh University of Engineering and Technology (BUET) and currently pursuing MSc. in Urban Planning at the University of Hong Kong (HKU) as an ADB-JSP Fellow. As a professional, he is predominantly interested in effecting positive change in cities and urban environments globally. His research interests are diverse but all revolve around Environmental Planning & Natural Resource Management focusing Climate Change Adaptation and Natural Resource Economics, Natural Hazard & Disaster Risk Management, Regional Econometric Analysis and Spatial Planning. His profound academic and professional background focuses on the sound assimilation of the global economic and socio-political context in mainstreaming governance issues as an adaptive measure of global climate change.

Introduction

Urban planning dated back its history since the cities have existed. Early city planning was revolved around some vital elements as buildings and fortification and has undergone a massive transformation throughout the centuries. The 20th century has witnessed several audacious ideas that radically changes the course of conventional urban planning (Routley, 2018).

City planning has always been a challenging and complicated job due to the complex nature of cities as a dynamic living organism. It has never been easy in planning to address diversified city issues holistically in the plan-making process. Nevertheless, in the modern era, the rapid boom of the Information and Communications Technology (ICT) and Artificial Intelligence (AI) has more significant potential to integrate diversified issues of city planning to a common platform as well as leading to address the challenges of complexity (Hamilton et al., 2005). Meanwhile, the development and advancement of ICT have generated new socio-economic urban activities as well as brought cultural diversities within cities eventually mounting the needs for more flexible and changing responsive planning intervention. The exponential growth of ICT has merged into the urban morphology despite being prominent in appearance. Eventually, a new form of functional space, a virtual environment called "Cyberspace" for urban socio-economic activities have emerged. Growing improvement in ICT and AI sector requires cities to integrate the physical and virtual environment in a way to showcase its flexibility to grasp ever-changing complex socio-political interaction happening in the city (Cohen, 2001; Hamilton *et al*., 2005; Shiode, 2000).

Therefore, this article is an effort to scrutinize the role of ICT development in the chronological transformation of urban planning domain using the exploratory research approach. In this research, it is argued that the theoretical and practical understanding of urban planning should absorb and integrate the bright outcome of the rise of ICT to foster congruent future urban development. The article addresses the trends of transformation in the urban planning domain through the myopic lens of the expansion of ICT era followed by investigating the key drivers shaping the interaction between modern-day urban planning and ICT considering both the dark and bright sides into account.

The Growth of Information Technology and the Evolution of Urban Planning

The contents and methods of planning change over time from physical and spiritual to multi-dimensional and more technical perspective. From a historical perspective, modern urban planning was primarily concerned with the physical arrangement of activities before the 19th century. However, physical planning and design alone were not sufficient to meet societal needs due to overemphasis on top-down planning approach neglecting the citizens' experience and input. Modern town planning in the 20th century has witnessed a paradigm shift in its approach from Idiographic via Positivist to Structuralist approach. While the idiographic approach of urban planning focuses on more detailed information about a narrower domain, the Positivist approach comprises more technical and scientific focus with minimal public participation apart from the true participatory nature of the Structuralist urban planning approach. However, the latest trend of urban planning demonstrates an amalgam of Structuralist and Technological Approach since the late 1960s to date (Li, 2019; Yeh, 2020).

It has been nearly fifty years since ICT and AI has been used to assisting our lives. A remarkable development in the ICT sector has undoubtedly contributed to the propagation of modern-day urban planning as the majority of such systems were deliberately designed to accomplish explicit demands. An exquisite example can be the use of a computer-aided design system (CAD) in urban planning as a powerful tool to design urban and architectural scenes. But at the beginning of the ICT era, the majority of the systems, devices and tools were solely designed to serve specific purposes with minimal effort devoted to collaboration with users. In 1990, the induction of internet and web service boosted notably which fostered the emergence of cyberspace that was visually enhanced. At present, the importance of ICT and AI is unavoidable in every aspect of life and it is continually in the grow making urban planning system more efficient day by day (Firmino *et al*., 2008; Shiode, 2000). The chronological use and integration of ICT & AI in urban planning are empirically demonstrated in Figure 1.

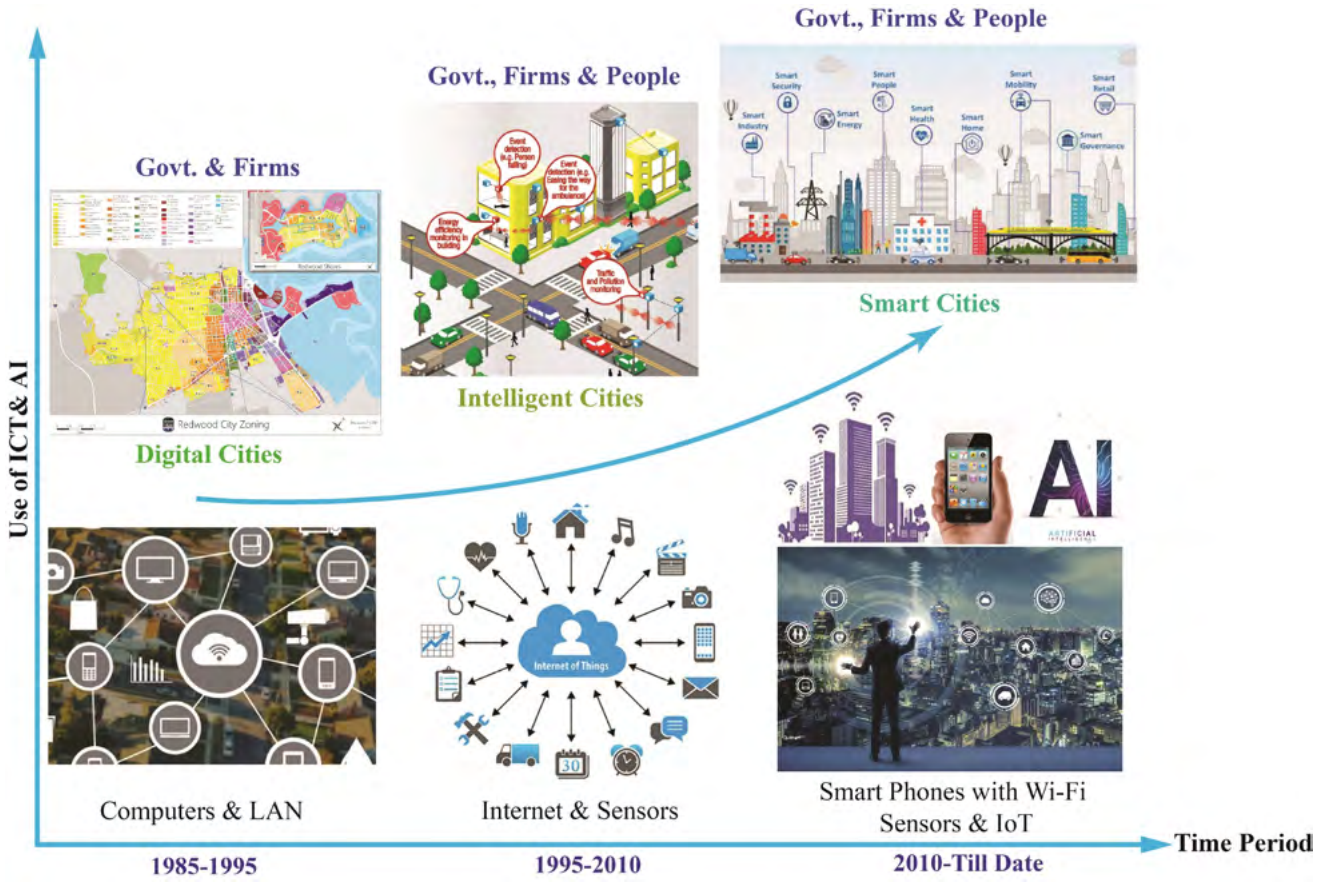

Figure 1: Chronological Integration of ICT & AI in Urban Planning (Source: Adapted from Yeh, 2020)

Computers have always assisted in urban planning and management over the last three decades despite the short antiquity of ICT. Moreover, growing dependency on advanced level ICT and AI tools not only complements the contemporary components of cities but also add another dimension to urban planning in that socio-economic transformation in cities is increasingly characterized by the intermingling of physical and electronic space, which has resulted in "Augmented Space". Lev Manovich first coined the term "Augmented Space" in his article "The poetics of augmented space" and defined it as the physical space overlaid with dynamically changing information, multimedia in form and localized for each user. To put simply, it refers to the spaces where various information can be accessed wirelessly e.g. shopping or entertainment areas or other spaces and how people experience spatial forms when they are filled in with dynamic and rich multimedia information (Manovich, 2006). It has remolded the conventional ways of urban planning i.e. the way we use, control and plans physical spaces in the cities. Augmented Spaces are very crucial to the socio-economic, political and cultural activities as Augmented Reality assists in transforming 'space' to 'place'. It changes the socio-cultural experience of individuals and social groups about the built environment and even cultural elements through actions and activities, memories, practices, living experiences and meanings in a way that people attach to a place. Real-life example of Augmented Spaces includes the use of building walls as massive electronic screens of the urban spaces with improved ability of feeding changing information in response to the dynamic environment i.e. shopping and entertainment areas in contemporary smart cities like Hong Kong, Tokyo, Seoul and so on (Cohen, 2001; Jin, 2017; Manovich, 2006). As electronic and physical elements are mutually dependent here, urban planning should seek options to re-think the new mode and instruments to fit in the transformed cities. To Firmino *et al.* (2008), "*This is hard not "just because contemporary cities have reached levels of extreme complexity, but because the notion of 'city' itself is facing a crisis never encountered before*" (Firmino *et al.*, 2008, p.79).

Augmented Spaces are very crucial to the socio-economic, political and cultural activities as Augmented Reality assists in transforming 'space' to 'place'.

ICT-Urban Planning Interaction and Core Challenges

Han & Kim (1989) have argued that urban information system and AI has focused primarily on providing indispensable information for decision making and more intelligent and effective solution to urban problems through integrating data from various sources using emerging and promising technology. The extensive use of the internet results in the emergence of a new urban infrastructure called "Cyberspace' which requires distinguished planning and management concerns. Alongside, with the continuous development of the ICT sector and its intervention in urban planning, new planning concepts like E-city (electronic city), the ICT city, the information city etc. are on the rise. All these terms highlight the ICT and city's interdependent nature. These urban spaces will be mostly driven and governed by the AI and ICT sector. The urban policies incorporating ICT in urban planning are widely being recognized as practical tools for sustainable urban management.

Generally, the sound urban environment is a prerequisite for efficient urban development and ICT sector now plays a critical role in this respect to foster environmentally balanced economic growth. Moreover, urban activities are also believed to be primarily affected by the exponential growth of ICT in this modern era. Urban planners should be aware of this situation about how these changes affect the urban infrastructure and the way to integrate the new ways to planning measures for improving the cyberspace. Most of the social challenges that urban planners

face nowadays arise from the intermixing of culture in the highly concentrated cities and new transportation and information network development induced spatial inequality. Modern-day urban planners have also responded to the growing concern by developing and modernizing different supportive tools, i.e. Geographic Information System (GIS), Online-based public participation tools like E-participation and so on. These trendy technologies increase the opportunity for bottom-up participatory planning approach, reduce effort and time for planning activities, handling urban infrastructure and big data etc.

Interlinkage between ICT and the cities can lead to the classification of contemporary urban space. Figure 2 demonstrates the typical key interactive drivers between these two entities into consideration where the horizontal axis embodies the shifting nature of space within the information network from physical space to a more flexible, metaphorical space of cities and the vertical axis represents the category of planning contexts. Both the event-oriented and application side, the infrastructure and facilities management side of urban planning is mostly governed by the ICT sector. Advancement of ICT and its extensive use in urban planning complements the existing components of the cities by reflecting the current social condition, offering useful tools for planning and adding another dimension to planning (Shiode, 2000).

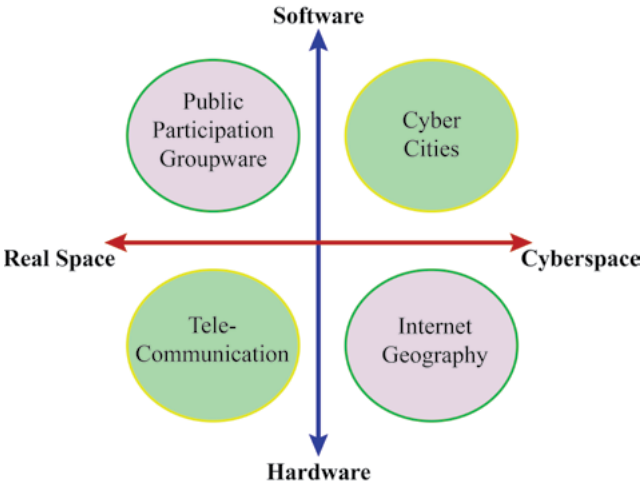

Figure 2: Interaction between Urban Planning and ICT (Source: Adapted from Shiode, 2000)

Information and Communication Technology and Artificial Intelligence: The Contemporary Urban Planning Support System

Digitalization of city and development of ICT has modified the conventional notion of urban space and information and hence the urban planners must adapt to this change concentrating the interdependence of ICT and urban planning. The rapid boom of communication and transportation networks, as well as the interdependent nature of ICT and cities, have improved cross-boundary accessibility beyond the political as well as geographical boundaries of the cities and the nations. The enormous development of ICT sector has a subsequent direct impact on the accessibility and spatial order, real-time information sharing and new opportunities in urban economic activities as well as most importantly the evolution of cyberspace as an alternative living environment. In the age of globalization, the development of ICT is believed to build virtually a single structure through interconnection among the global cities via communication networks (Shiode, 2000). The subsequent sections will highlight the groundbreaking interventions bring into light by the development of ICT and AI sector in the urban planning domain.

Smart Cities: New Sphere of Urban Planning

In recent times, the concept of "Smart City" is at the crossroad and literally, it is difficult to find any city now without any smart city development initiatives. The future of our cities may be defined more by bytes than bricks in the epoch of big data and urban analytics. Extensive use of Smart Technologies in data collection (i.e. GIS, Sensors, Internet of Things, Big Data), Information processing (e.g. Cloud computing, Machine learning, Data mining) and service provision are the backbones of concurrent smart cities. It has made a paradigm shift in the widespread use of traditional big data source as Census Data, Remote Sensing, Credit Card Data to a more integrated new data source for smart cities like Spatio-Temporal Data, Smart Grid and Sensor Data, Social Network Data for effective decision

making (Yeh, 2020).

To be smart, a city should encompass six core areas of intervention as a smart society, smart mobility, smart economy, smart environment, smart life and smart governance (Routley, 2018; Semiz, 2016). It encompasses nearly all of the local government intervention areas in urban planning, i.e. amenities and service provision, solving an energy crisis, urban transportation, democratic transparency and so on. As a growing smart city, Hong Kong has a smart city blueprint aiming to build a world-famed Smart Hong Kong covering "Smart Travel", "Smart Life", "Smart Environment" and "Smart Citizen" sectors with prime focus on the strong economy, improved urban management, high quality of living and promoting sustainable development through using innovation and advanced technology (Innovation and Technology Bureau, HKSAR, 2017).

Sensors, ICT and AI are at the heart of transformative mechanism of conventional cities becoming smart as demonstrated in Figure 3. Barcelona, one of the leading smart cities in the world is using sensors, AI to ensure sustainable use of energy. It uses energy-smart streetlights i.e. motion-activated LED lights and smart parking technologies to improve the flow of traffic. Largest smart cities like Seattle have implemented many smart city systems e.g. using cameras and other sensors to aid law enforcers, reducing pollution via traffic optimization and using AI to monitor the weather to alert people

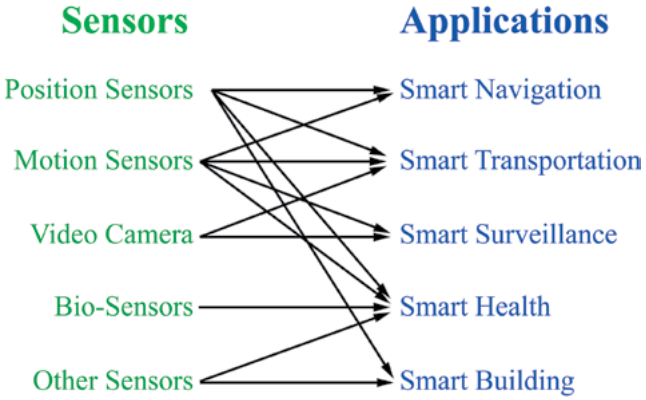

Figure 3: Sensors & Related ICT Services in the Heart of Smart Cities (Source: Adapted from Yeh, 2020)

of dangerous conditions. Singapore has installed a vast number of sensors to detect littering and smoking in forbidden areas, a mandatory connection of vehicles to the satellite navigation systems for effective traffic management and so on (Almirall *et al*., 2016; Here Mobility, 2020; Yeh, 2020).

Smart city movement is an indicator of more technology-oriented urban planning and sign of efficient use of ICT in city planning and management measures to offer more efficient city administration and better city services. Merely city planning authority now aims only at creating a smart city but also focus on developing futuristic and innovative solutions to contemporary urban problems (Axelsson & Granath, 2018). Currently, in smart cities, the government is focusing more on disseminating the big data collected from citizen through improved ICT services to ensure the provision of public services in a more sustainable and well-organized manner. A new way of city planning intervention is required to facilitate smart city development initiatives where ICT and AI will be integrated to govern city management function and critical infrastructures management. Smart cities like Singapore have adopted such measures and demonstrates a promising accomplishment in integrating advanced technologies and Artificial Intelligence into urban planning. The city uses a dynamic 3-D model namely "Virtual Singapore", which is a dynamic three-dimensional (3D) city model and collaborative platform for easy visualization of the planning ideas and city's future scenario utilizing smart mobility policies and technology as well as its wireless connectivity. Moreover, smart cities like Singapore, Barcelona, Amsterdam and London are also trying to engage their citizens to help determine what to do for generating knowledge-intensive options for ensuring more functional administration services to the citizen. The city of Amsterdam has created an interconnected platform through wireless devices to enhance the city's real-time decision-making abilities to promote primarily reducing traffic congestion, saving energy and improving

public safety and improving financial technology. (Almirall *et al*., 2016; Axelsson & Granath, 2018; Here Mobility, 2020).

Geographic Information System (GIS) Applications Usage in Urban Planning

GIS is a modern tool that is widely used in urban planning through handling geographic location of different areas and services, networking the data and information to the maps which can be updated periodically (Yousef, 2007). It helps urban planners to stimulate rapid data organization, handling and processing big data to prompt the decision-making process for urban development (Aldegheishem & Alqarni, 2012). It has given another dimension to the urban planning through its contribution in the diversified domain of urban planning e.g. identification of different types of land uses, locational distribution of different amenities and services, providing clarification for the overall vision of the city to meet future urban requirements and other city management functions. It is a very innovative, quick and convenient tool to use for capturing, analyzing, modelling and representing the geo-referenced database in different stages of urban planning (Criado *et al*., 2019).

The application of GIS in urban planning as a principal component of planning support systems is diversified in terms of stages, levels, sectors, and functions. Urban planning practitioners primarily use GIS as an analysis, modelling tool as well as a spatial database as exhibited in Figure 4. As a formalized computer-based information systems, it assists in providing necessary information for effective urban planning decision-making integrating spatial and aspatial database from various sources. In urban planning, GIS serves the purposes equally as a toolbox and a database. Both spatial and aspatial database can be stored and linked in a database-oriented GIS using geo-relational models that support subsequent efficient data retrieval, query spatial analysis and mapping. Moreover, GIS offers the function of spatial analysis in urban planning as a toolbox utilizing geoprocessing functions i.e. buffering, map overlay, connectivity measurement and so on (Berry, 1987; Han & Kim, 1989; Tomlin, 1990; Yeh,1999).

Implementing the long-run planning decisions accurate geographic information is of utmost interest in the planning process. Adopting the latest method and techniques, it affects the life and quality of the urban environment directly. Nowadays, urban authorities take advantages of rapid development is GIS technology to develop and provide spatially integrated databases for accurate decision making toward increasing urban development. Consequently, it has

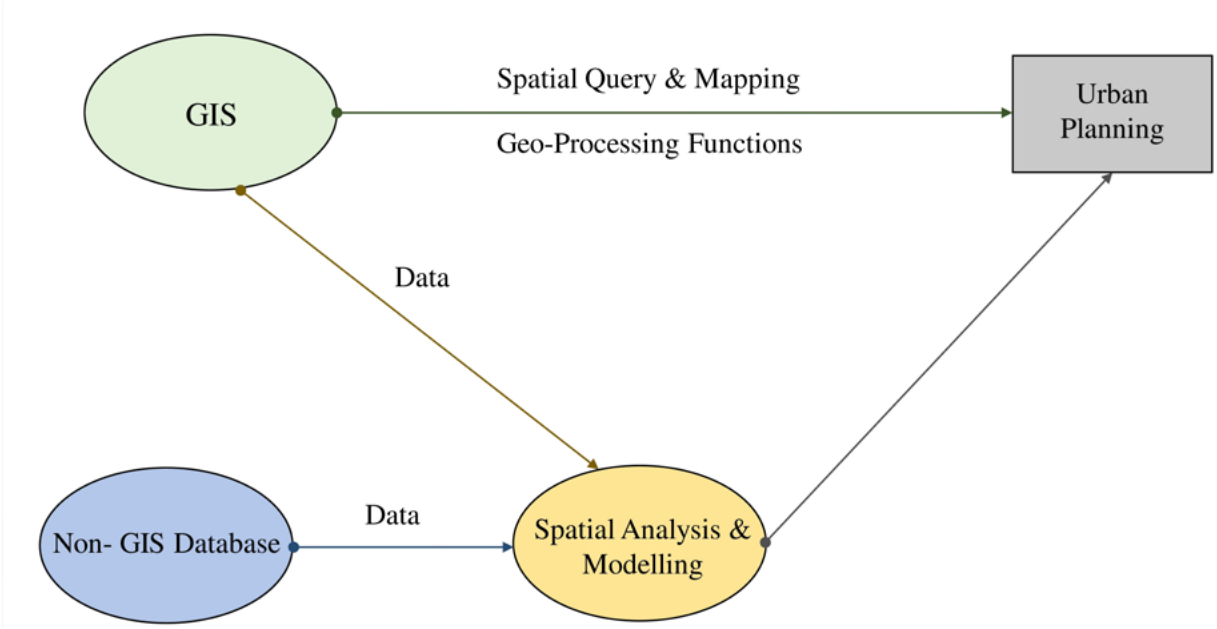

Figure 4: Interaction between GIS & Urban Planning (Source: Adapted from Yeh, 1999)

become quite impossible to move forward to any urban or socio-economic development without considering the contribution of GIS in Urban Planning (Al-Humaili, 2005).

Nowadays, GIS has been widely used in the diversified arena of urban planning e.g. resource management, regional planning, disaster management, economic development and much more in both developing and developed countries as Australia, North America, Europe, Singapore, Japan and developing nations in the global south. Singapore has made widespread use of GIS for planning and making the best use of the limited land space available. The Urban Redevelopment Authority of Singapore extensively employs geospatial tools to guide land use and historical conservation efforts in city planning measures. The United Arab Emirates have embraced GIS tools and leveraged geospatial data to assist in managing and extending the reach of resources, public services, disaster response planning and information-sharing between departments. As an example, for command and control, emergency field management and automatic vehicle location, the GIS Center for Security in Abu Dhabi deployed a distinguished enterprise system. Japan has made a successful GIS application in the local government decision-making process. The Urban Plan Information Inquiry System developed by Yokohama City called 'Mappy' is an example of its kind (Gillis, *et al*., 1992; Kohsaka, 2000; Mennecke and West, 2001; Todaro, 1994; Yeh, 1991). Hong Kong has adopted advanced and innovative approaches for the integrated use of geographic information as a principal planning support system e.g. GIS-based framework for supporting land use planning, spatial analysis, hazard assessment, smart transportation & logistic and so on. Moreover, Hong Kong has created an open data pool with various comprehensive spatially enabled data available for public use. In the developing countries like Bangladesh, India and other countries in the Asia-Pacific region, GIS technology can help stakeholders, decision-makers and citizens track social changes, economic growth as well as centralized planning, management, and decision making amid increasing pressures from overpopulation, depletion of natural resources, and financial instability. Despite the growing use of GIS in the diversified domain of urban planning in the developing countries, the foremost hindrance in the use of GIS in urban planning today is not related to the technical issues, but the availability of data, organizational structure, staffing and planning practice. Therefore the developing nations should adopt international best practices and policies of application of GIS in urban planning, in particular, prioritizing the compilation of targeted and nuanced information about specific regions and their needs to overcome this overarching problem (USC GIS, 2019; Wang *et al*., 2015; Yeh, 1999; Yeh, 2008).

Despite the growing use of GIS in the diversified domain of urban planning in the developing countries, the foremost hindrance in the use of GIS in urban planning today is not related to the technical issues, but the availability of data, organizational structure, staffing and planning practice.

Online Participatory Tools (E-participation and M-participation)

The continuous development of ICT and AI has offered a new way of citizen participation in urban planning through online participatory tools (OPTs) as E-participation and M-participation. Planning theories always evolve through debate and communication and public participation is a must in the plan-making process (Das, 2020a). The wide-ranging use of ICT has facilitated the decision-making process integrating mass public demands and opinions (Angelidou, 2014; Evans & Manta, 2006; Hanzl, 2007; Healey, 1997; Laurian, 2004; Schweitzer, 2014).

Two distinguished technology predominates OPTs e. g. (a) Different web-based tools as Crowdbrite, Internet as participatory web i.e. Web 2.0, PlaceSpeak, MySideWalk etc. that are

Table 1: Widely used E-participation Tools, Methods & Technologies

Level of Participation	Description	Web 2.0 Technologies and Social Media Tools	
		Method of Participation	Tools Used
E-consulting	Two-way channel for collecting public feedback and alternatives.	E-Polls, Newsgroups, Weblogs (Blogs), Online Community Networks, E-Survey, Feedback Forms, E-Mail, Consultation Platforms.	E-Participation Chat Rooms, Video Conferencing, Text-To-Speech Technology, E-Panels, Podcasting, Wikis, E-Referenda, Instant Messaging.
E-collaborating	Enhanced two-way communication between citizens and the government.	E-Debates, Web Virtual Meetings (Chat-Rooms, Discussion Forums/ Boards), Decision-Making Games.	Virtual Communities/Online Community Networks (Social Networks, Data Analysis Tools).
E-informing	A one-way communication that provides citizens with online information concerning policies and citizenship.	E-Participation Chat Rooms, Mobile Phones/Devices (Text Messages), E-Mail (Mailing List), E-Meetings, Virtual Communities/ Online Community Networks (Social Networks).	Online Newsletters, FAQs, Web Portals, Webcasts, GIS-Tools, RSS Feeds, Weblogs (Blogs), Video Conferencing, Alerts, Wikis, Podcasting.
E- empowering	A delegation of decision-making rights to the public, and implementing citizens' decision.	E-Polls, Virtual E-Meetings, Chat-Rooms, Discussion Forums/Boards, E-Petition, E-Voting Tools, E-Bulletin Boards, Epanel.	Argument Visualization Tools, Virtual Communities/Online Community Networks (Social Networks), Natural Language Interfaces.

(Source: Adapted from Al-Dalou & Abu-Shanab, 2013; Bawack et al., 2018)

mainly designed for public engagement (b) Social networking sites as Nextdoor, Facebook that can be used for participatory planning centric (Albino *et al*. 2015; Fathejalali & Jain, 2019; Kitchin, 2013; Townsend, 2013). Many governments throughout the world are using social media platform and multiple modes for information dissemination i.e. E-informing as well as interaction i.e. E-involving, E-collaborating, E-empowering (Thompson, 2008). Table 1 summarizes widely used E-participation Tools, Methods & Technologies used at different stages of e-participation initiatives in developed as well as developing countries.

Nevertheless, for supporting and stimulating good governance, worldwide E-participation has become an integral part of E-government initiatives. Countries like Egypt, Morocco, Bahrain, Tunisia, Iran, Libya, Mexico, Indonesia uses Web 2.0 or social media tools e.g. Blogs, YouTube, Twitter, Facebook, for citizen to citizen participation as e-democracy, public advocacy, political, social activism and so on. For government to citizen participation as Information dissemination, civic engagement, government transparency, decision support system countries like Egypt, Peru, Ethiopia, Indonesia mainly focuses on media like Forums, Survey, YouTube, Twitter, Wiki page, LinkedIn, Skype, Google Docs, Facebook, justice information system, transport management information system and so on (Abdelsalam, et al., 2013; Bawack *et al*., 2018; Belachew, 2010; Bossio, 2012; Chatfield & Brajawidagda, 2013; Cropf, *et al*., 2012; Murti, 2013; Sandoval-Almazan & Gil-Garcia, 2013).

In practice, OPTs have both its dark (non and negative participation) and bright side (supporting and facilitating participatory planning processes actively, creating smart cities). In practice, several factors i.e. organizational resources, community characteristics, planners' expertise, technology literacy of citizen etc. determine the effectiveness of OPTs in the planning process (Afzalan & Evans, 2017; Belanche *et al.*, 2016; Brabham, 2009; Evans & Hollander, 2010; Mandarano & Steins, 2010; Schweitzer & Stephenson, 2016).

Democratic E-governance

E-government is a comparatively new concept in urban planning particularly to assist local planning departments in informing and engaging their citizenry. It is usually defined as the use of ICT for

Table 2: Functions, types and tools of E-participation associated with E-Governance

Function of Citizen Involvement	Description	Type of E-participation	Tools Used
Monitoring	A basic category of participatory activities comprises monitoring and control of political processes, actors and decisions via access to relevant digital information, online deliberation and discussion.	• E-information • E-deliberation • E-complaints	• Tools for monitoring, questioning and advising political representatives
Agenda setting	The process started accessing politically relevant information and discussing political issues but extends to activities such as mobilising support for political projects and submitting formal requests to government institutions.	• E-petitions • E-initiatives • E-campaigning	• Citizen initiatives • E-petition
Decision-making	The process of providing cognitive or evaluative input to political decisions, setting priorities for or determining budget expenditure and casting votes on political alternatives.	• E-consultations • E-participatory budgeting • E-voting	• Crowdsourcing for law proposals and policymaking • Internet consultation, collaborative decision making within political parties • Consultative participatory budgeting • Participatory budgeting • E-voting

(Adapted from Hennen et al., 2020)

the provision of public services. The development of ICT based e-government tools potentially increase the opportunity for citizen participation in the plan-making process (Blanc, 2020; Healey, 1992; Innes, 1996; Kwan and Weber, 2003). The core focus of this system is to transform the customary file and face oriented jobs to a digital platform. Benefits can be expected from this modernized e-governance in the form of equality of opportunity for the citizen, enhanced efficiency, improved dispersion of public information and so on (Kaylor *et al*., 2001). The potential and challenge for incorporating e-government tools (i.e. e-commerce) into the plan-making process to urban planners and statutory bodies are both from technical expertise and financial capacities (Conroy & Evans, 2006; Lee, 2019).

E-participation and E-government are usually considered complementary to each other. The goal of E-governance is to strengthen the relationship between government and citizens by offering various ICT services to citizens efficiently and economically. However, nowadays the scope of E-government has broadened beyond the delivery of public services to "digital government" and "digital governance", emphasizing the role that ICT in governance (Blanc, 2020). Table 2 summarizes the diversity of e-participation practices for E-governance including the function of citizen involvement, type of E-participation and tools as well as the method used. For structuring the diversity and key functions of e-participation practices, a simple threefold structure of major tools used in different types of participation i.e. monitoring, agenda-setting and input to decision-making is adopted.

The number of countries using e-government has risen sharply in recent years to facilitate access to public services, accountable and transparent decision-making process (United Nations, 2016). In practice, several methods of Government to Citizen (G2C) E-governance; a two-way communication are available e.g. instant messaging directly with public administrators, electronic voting, instant opinion voting, online payment of taxes and services, E-deliberative designs, E-consultations, E-initiatives or E-petitions etc. A broad framework of G2C technology has been adopted by the Federal Government of the United States like launching a distinguished official website (benefits.gov) to notify eligible citizens of particular benefits and providing necessary information regarding the process of applying for assistance. Countries like Brazil, Latin America, Porto Alegre has practically implemented a new instrument

termed "participatory budgeting" where citizens have been participating in processes to determine the distribution and investment of municipal budgets. In European countries, online government initiatives include a single point of access for citizens of Europe to supports travel within the region, providing public information, allowing customers to have access to basic public services, simplifying online procedures and promote electronic signatures. Estonia is the sole country in the world with facilities of E-residency enabling easy accessibility to Estonian online services for anyone in the universe. Among Asian countries, Singapore offers an E-Citizen Portal as an organized single access point to government information and services. In South Korea, important services like tax declaration are provided by an official online platform named Home Tax Service (HTS) (Lee, 2004; Lufkin, 2017; Miller & Walling, 2013; Talpin, 2012).

Smart Urban Ecosystems and Combating Climate Change: ICT Based Environmental Decision Making

The world is continually witnessing a breakthrough in technologies and simultaneous population growth and drastic natural resource use as well. The outcome of haphazard human activities has resulted in excessive pressure on the overall carrying capacity of the earth and the resources required to sustain lives. Whereas, the ICT sector only improved the efficiency and performance of urban economies, but also improved numerous tools and techniques to balance environmentally sustainable growth. It offers a new way to engage a community-based environmental decision-making process to support the emergence of a smart urban ecosystem through Visualization and simulation solution for resource conservation, climate change impact mitigation, multitude modelling and so on (Yigitcanlar, 2009).

Cities with high population density accompanied by high energy consumption and GHG emission as well contribute largely to the global climate change. In the context of climate change, The ICT and AI are primarily used in the transportation and infrastructure solutions, finding measures to increase energy efficiency in the urban context. ICT supported urban spatial planning and a powerful ecosystem based on information and communication technologies offers an efficient way to use the tools, techniques and methodologies for enabling the adaptation of specific environments to climate change and mitigating the effects of climate change in cities (Das, 2020b; Marić & Kovačević, 2016).

ICT has a potential role in climate change adaptation and adaptation measure e.g. utilizing ICT for enhanced disaster risk management through vulnerability and risk assessments by GIS and modelling techniques, improving city resilience and adaptive capacity by gathering city-specific evidence on adaptation practices, informed adaptation decision making through online training, improved knowledge access and so on. Web-based Geographic Information Systems (Web-based GIS) e.g. Internet Map Server has proved efficient to toward public participatory environmental decision making through an exchange of web-enabled GIS data and services. This virtual decision-making environment may encourage community involvement as may raise awareness of environmental and urban planning problems, design and decision-making issues when combined with a community involvement program (ESRI, 2001; Yigitcanlar, 2009). In real life application, the city of Curitiba in Brazil introduced a connected public-transport system via the 3G mobile-broadband network for more efficient fuel usage and a corresponding reduction in CO2 emissions. Nairobi hosted multi-functional sensors to monitor and improve water supply with an innovative ICT-based governance model to increase transparency through real-time information sharing between the water service provider and slum communities. Different countries in Africa, Asia, Latin America and Europe are using Minecraft for improving community participation, civic engagement and citizen action in urban planning. Developing countries like Bangladesh, India widely used ICTs

measures as remote sensing and geographic information systems for risk assessment of multiple hazards and enabled the development of various scenarios and contingency plans (Bueti, and Faulkner, 2018; C40 Cities, 2015).

The total energy footprint and consequently the carbon footprint has already started to decrease with high reduction potential in future in OECD countries with high ICT use as smart service solutions, smart work, smart grid, smart building solutions, smart travel and transport solutions (Malmodin, 2015; UN-Habitat and Ericsson, 2014; Urban et. al., 2014). Hong Kong's Climate Action Plan 2030+ is an example of utilizing ICT based solution for environmental decision making and combating climate change. The Hong Kong Government has adopted and proposed cutting edge innovation and technology in combating climate change as well as efficient environmental management e.g. optimizing implementation of renewable energy as natural gas-powered local electricity generation to reduce carbon emissions, energy-efficient buildings and infrastructure, smart technologies for efficient use of energy, water as a multi-pronged approach of both software and hardware measures to promote water conservation taken by Water Supplies Department (WSD) and smart technology for better traffic management as an environmentally friendly vehicle (Das, 2020b; Environment Bureau, Hong Kong, 2017).

Concluding Remark & Way Forward

Modern urban planning has a rich and long history dated back from the early 19th century. Meanwhile, the drastic development of information and technologies in the last three decades has brought significant changes in the conventional urban planning process. A breakthrough in ICT, as well as improvement in the transportation network, has generated a new form of cities by distorting spatial orders and bringing the distant global cities closer. All these issues have urged for a new framework for urban planning through proper integration of ICT and AI in the urban planning process. As the city is a very complex and dynamic system with continually changing characters facilitated by adopting new technologies and socio-economic condition, the desired output of the increasingly capable planning system is perhaps even more important than ever to consider. Hence, flexible planning schemes should be adopted for future city planning initiatives to encounter the challenges facing urban planning as ICT becomes an embedded feature of the planning system and the profession with equivalent emphasis on the planning process itself and final output that was evident in conventional planning intervention.

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Viewpoints

Viewpoints

Time for a Rethink: Recalibrating our Planning Approach

Peter Cookson Smith

Dr Peter Cookson Smith is the founder of URBIS Limited and is a Past President of the HKIP, and the HKIUD. He is a Past Professor of Architecture at HKU and an Adjunct Professor at CUHK. He has been an appointed member on a number of Government Commissions and Committees and is the author and illustrator of six books on planning and urban design.

The date of my first arrival in Hong Kong was ninth of September 1976. It marked a certain watershed in modern Chinese history, not so much for my inauspicious arrival to carry out a project for my London–based firm, but because while I was sitting on a plane over Southern China, Mao Tse-Tung who had held absolute power over events in China, had passed away in Beijing. It was in fact the turbulence of the Mao years that had brought many Chinese immigrants and refugees to Hong Kong, and had indirectly created the reason for my arrival. As I drove from Kai Tak into the city, the passage was marked by long queues of people outside various branches of the Bank of China, waiting to sign books of condolence. It was perhaps an early reminder that while Hong Kong was full of recent immigrants, the soul of the city belonged to China, with many mutual interests to protect, even if the metaphorical bamboo curtain was reinforced along the entire land border for several years thereafter with barbed wire.

Several months after completing the project I left the firm and set up what at the time was the territory's first dedicated planning consultancy, URBIS. At the time this might have been considered a rather optimistic step – there was no Planning Department – only a Town Planning Unit discreetly located in a corner of the Public Works Department, nor was there any planning education in Hong Kong which was established as CUSUP several years later at HKU. Upwards of one million people were living in some form of temporary accommodation, but had high expectations of future betterment, so planning at the time was something of mission.

The initial stuttering housing programme was revitalised through an ambitious new town programme, and the first proposal we made to Government resulted in our appointment as consultants for Tai Po, with the NT Development Department as a client. This project involved planning of the town and its immediate hinterland including its 70 constituent villages, through to detailed urban design and landscape implementation, employing specialist resources that at the time we had to bring in from the UK.

The past however forms just a short introduction to the present. In the intervening years since 1977 URBIS has carried out several thousand planning and implementation projects in Hong Kong, Mainland China and other parts of Asia, while the city itself has almost doubled its population along with a challenging change in its political status.

The transition to a Special Administrative Region under a Basic Law, moving forward to a somewhat indeterminate position in 2047, was never going to be easy. Planning itself is all about directing development towards the future, and in Hong Kong this can be problematic. The Basic Law itself continues to be a constant source of contestation as to its interpretation. However leaving aside politics, I have been forcibly struck over the past few years, in discussing aspects of planning and urban design in Hong Kong with all manner of business, community groups, professional bodies and students, by a frustration, right across the board, at the physical state of the city. In fact less than favourable comparisons are frequently made to the enormous planning, urban

regeneration and design strides we can observe in many Mainland cities.

At the time of writing, COVID-19 continues to wreak havoc with social and employment patterns, adding a high degree of urgency in responding to a range of both immediate and impending conditions. If we are to get Hong Kong not just back on track but moving in the right direction, this is a time to examine some of the 'problematics' to which planning needs to subscribe for the future good of the SAR. This basically comes down to what sort of city we want and the priorities we set. The term City is derived from the root word for civilisation, meaning 'befitting a citizen', and in general cities are the result of people's persistent pursuit of a more liveable environment – a term that frequently appears in most Government planning briefs but often with little to suggest what this means and implies in practice. However any design model for a liveable, smart and resilient City must focus on the long-term well-being of its citizens, and policies must be sensible, they must be well thought out, and they must be both clear and acceptable to stakeholders.

The three central tenets from Government's HK2030Plus Report are to create capacity for sustainable growth; to embrace economic challenges and opportunities; and to enhance liveability. But if we look at things strategically, then moving towards a liveable and sustainable future has to embody a number of interrelated components that collectively involve one overriding goal – urban betterment.

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So let us look at ten issues (and there are arguably quite a few more) which directly or otherwise need to be addressed holistically - that is to say from all perspectives. As planners we have an important role to play in this, so if these comments, which are purely personal ones, generate some discussion, so much the better.

1. The Laissez-faire system

There is a need to transcend Hong Kong's much lauded 'free' economic system of speculative accumulation, narrow economic focus, powerful development interests, and the concept of the city fabric as simply a matrix of opportunity and financial gain. What this had led to in practice is increasing inequality and polarisation of society, and a city where in many respects private interests too often outweigh public ones. As we have seen in Hong Kong over the past year there is, below the surface, a discontentment that can be ignited and become volatile very easily with a strong emotional charge. This might be bewildering for a supposedly wealthy community, and one which until a few months ago enjoyed virtually full employment. However public trust will only come through confidence that the SAR is moving towards 2047 through political will, community support, social cohesion and overall betterment.

Hong Kong's insistent equation of a 'free market' system supposedly to ensure a good quality of life for its population has proved, to say the least, questionable. It was adopted many years ago by a colonial government, as the easiest model, given the territory's lack of resources. This continues to impact city planning in ways that reflect zoning and other land management documentation but also in other ways are more intangible, and relate not merely to the physicality of the end result, but to economic and social outcomes. A recent Hong Kong Inequality Report using Census and Statistics figures stated that the Gini coefficient is the highest since the city began keeping records 45 years ago. The wealthiest households now earn 44 times that of the poorest families. Hong Kong has headed the 'World Competitive league' for 21 years in a row, but is somewhere around 71st on quality of life. And this should be telling

us something that should really be obvious. As early as September 2018 an Oxfam report demonstrated that "the city's economic and social divide was entering a danger zone, with enmity and resentment". Only a few months after this Hong Kong was experiencing street riots.

In the light of very large and worthy monetary injections from Government to protect employment during the onset of COVID-19 we need to examine and evaluate a system where over 50 percent of Government income comes from land sales. We need to examine what the ramifications of this are for planning and society as a whole, and what needs to be done to make the city a better and healthier one.

2. Housing Need

There is a need to examine 'need' holistically from every angle for the overall good of our compact city, rather than merely from one perspective which has, while being a pertinent issue, been overstated. Housing supply targets must clearly reflect actual demand, and there is most certainly a need to comply with the United Nations declaration that everyone has the right to a standard of living adequate for health and well-being. This indicates a need to consider per capita living space, but not to overestimate demand. There are many facets to this and a critical issue here is how we inter-relate and sustain this within a 'liveable city'. We need to widen this discussion because we do have some gaps and mismatches in our policy approach. Two important aspects are household size and projected population growth:

Household Size

Government has for more than 60 years provided public rental housing, subsidised through considerably discounted rental levels. This was unarguably necessary to cope with massive levels of immigration from the 1960s until the 1990s. There is still a housing need to fulfil, but its efficiency and cost-effectiveness need review from a number of aspects (see Point 6), and it is also difficult to deal with as tenants move up the income ladder. In the 10 years to 31 March 2017, the stock of PRH flats increased by 91,548 (13.5%) from 677,804 to 769,352, but the "authorised population" in those units only increased by 106,573 (5.4%), from 1,987,900 to 2,094,473. So each additional unit has housed on average just 1.16 people. The average PRH household size has dropped from 2.93 to 2.72. In fact it has continually decreased from an average of 5.5 persons when we first planned Tai Po. The largest growth is in single person households, caused through both high divorce rates and an aging population.

Population Growth

Housing need and occupancy have much to do with demographics. Population growth through natural means i.e. the difference between births and deaths, is around 0.4 percent generating only 14,000 persons per annum. In fact the population only grew by around 0.5 million between 2001 and 2015, and less since then. It is projected in HK2030 that deaths will exceed births by 2027. The fertility rate of 1.13 is the fourth lowest in the world. Between 20,000 and 25,000 people emigrate annually, and we might well see a predicted increase in the immediate future. Almost the entire net annual increase in population up to 2019 was through the 55,000 people who settled in Hong Kong under the "one-way permit" scheme, but this number has since decreased to around half, well before the onset of COVID-19, and is quite likely to decrease further. In fact the Hong Kong population has been relatively static from 2015, and HK2030 projects that from 2027 deaths will outpace births.

Census and Statistics Department project a peak population of 8.22m in 2043 from around 7.4m today – an annual growth of 32,000 a year – so for the next 25 years they are projecting precisely today's figure of annual growth. Prof Frederick Ho from the Department of Statistics and Actuarial Science, HKU, has also projected a

maximum population of only 8.27 million in 2046 but after that a constantly declining rate to 7.72 million in 2066 (Paper dated Nov 2018). In fact if the current one-way permit figures decrease even further as a result of events over the past twelve months, it suggests a peak population in 2047 of around 8 million or perhaps even less. On top of this Hong Kong's Welfare Minister announced in June 2020 that 230,000 Hong Kong people had applied for residence permits in the Mainland.

Then there are those who are at present very inadequately housed. There are around 210,000 people living in sub-divided units – that is to say 92,700 rooms subdivided from 27,100 flats, many of which have been converted with little regard for building and safety rules, and where 1 in 3 have less than 5 sq.m of space per person. These figures clearly indicate where the focus and priority of immediate housing initiatives should be directed, but also suggest that if these people are adequately rehoused there will be a further 27,100 flats available.

Much has been made as to the waiting list for public housing. However a significant component of this can be put down to changes in eligibility criteria and the considerable rise in private property prices over the past ten years. The Quota and Points System that was introduced in 2005 for non-elderly single-person applicants has led to a major rise in applications particularly from young people who cannot see any way to afford a private flat. However simple eligibility does not necessarily equate with need. The conclusion therefore is that we require an on-going public housing supply but this needs to be more sensibly and imaginatively rationalised, and one that equates quantity with quality and affordability.

3. Land Supply

Government has identified a number of committed and planned projects for new development, with designated population projections. We have the NDAs at Kwu Tung North, Fanling North and Hung Shui Kiu, providing for a total population of 394,000; Yuen Long South Development 88,000; Kam Tin South 37,490; Tung Chung Extension 144,400; and sites within the urban area, notably Kowloon East 134,000.

If we divide this total projected population of around 800,000 by the present average household size this gives us a requirement for around 275,000 units, which is certainly enough to be getting on with, and in all likelihood would be sufficient to serve an extremely high proportion of anticipated needs up to 2047, if not all actual requirements. It must of course also be equated with other projected land use demands.

The approach taken by the Task Force on Land Supply identifies 'opportunity areas' rather than a holistic approach which brings together informed projections of actual need, and cost-effective means of medium term supply. Of the 18 land supply options presented by the Task Force, half were described as conceptual or 'controversial'. A number of these are less than feasible, at least in the short-term, while several others appear less than desirable to large sections of the community on a number of counts. Let us also be frank about the use of 'Greenfield Sites'. These sites offer only limited development capacity, and will require detailed impact analysis. On every measure of sensible analysis and consideration of 'liveability' in society they should therefore be retained in their existing form. To be frank an attempt to concrete over even part of one of the territory's most prestigious resources, the HK Golf Club, for a relatively small number of public housing units would make Hong Kong not Asia's World City as mysteriously proclaimed, but Asia's World Laughing Stock.

From what has already been stated there has to be a strong questionmark over the proven need for an East Lantau Metropolis (ELM), while even its affordability is open to question given current financial commitments by government. This would involve high environmental and ecological cost, irreversible despoliation of the Western

harbour, and massive investment in reclamation, infrastructure and other capital works. To term this as a 'sustainable' solution to land supply needs strong justification, as does its proposed secondary role as CBD3. It is in fact quite possible to encompass a "Lantau Tomorrow" vision without the Kau Yi Chau Artificial Islands and potential future reclamation on East Lantau. While the overall price tag has been put at a minimum of 624 billion dollars, including 256 billion dollars associated with Kau Yi Chau, the latter if deemed to be actually necessary can easily be de-linked from other proposed development to simply include the Lung Kwu Tan reclamation, the Sunny Bay Reclamation and Tuen Mun West Development that includes the River Trade Terminal. To plan by edict rather than holistic consideration of all relevant factors flies in the face of proper strategic planning.

If we want to take a more adventurous position there are 19 large military sites that are occupied by the People's Liberation Army stationed in Hong Kong, which might be seen as excessive. Tsing Shan near Tuen Mun accommodates 80 percent of the 2,700 ha of PLA managed areas i.e. 2,200 ha. All of this is eminently developable land and technically owned by Government with the minimum of obstruction. Article 13 of the Garrison Law states that if military land is no longer needed for military purposes it shall be turned over without compensation to Hong Kong. If it was to be accepted by Beijing that the extremely large Tsing Shan site could be available even in 20 years time, this would itself satisfy the need for a necessary medium-long term land reserve, and would minimise the need for targeted land elsewhere.

We need to ensure that decisions on land supply are based on properly projected need, achievement of its most beneficial and effective use, environmental protection and overall public interests.

4. Protection of the Natural Environment

There is a need to address the proliferation of 'brownfield' sites. Much of this consists of privately owned agricultural land often rented to polluting businesses while many non-indigenous villagers continue to live in 'temporary' settlements. There are some 1,300 ha of brownfield sites on short-term leases, with 180 ha already located in NDA development plans. Some businesses unquestionably make an economic contribution to Hong Kong, such as storage, vehicle repairs, scrapyards and recycling workshops, which require analysis and potential rationalisation.

Rationalising land use in the New Territories raises problems that require clear objectives aligned with policy goals, and action oriented solutions. Red tape has prolonged the land rezoning process amidst issues of land clearance and resumption. A recent Audit Commission identified the depressing fact that half a million people are living in housing not connected to public sewerage facilities, 70,000 village houses are using unlicensed septic tanks and around 84,000 squatter homes discharge sewage directly into water bodies. And private developers own literally millions of square feet around all this, and around precious environmental resources such as Wetlands. Annual typhoon damage reminds us of just how many tin shacks we still have in Hong Kong, whether we call them unauthorised, non-recognised or Old Schedule.

This should not be acceptable in what is projected as a "World City".

Rationalising land use in the NT raises problems that require clear objectives aligned with policy goals, and action oriented solutions. Red tape has prolongued the land rezoning process amidst issues of land clearance and resumption.

5. Effective Land Use Control

A central issue is the already high development density. Our population density over the entire territory averages 6,700 persons per sq. km. If only built areas which account for 24 percent of land are taken into account, the density averages 27,330 persons per sq. km and that in itself represents one of our essential problems when it comes to liveability. Compare this to 11,100 in Singapore (40% of Hong Kong built up population density), 7,000 in Shenzhen (25%) or 1,800 in New York (7%).

Our Country Parks and associated ecological protection areas take up 43 percent of the SAR's total land area leaving only around 600 sq. km for any other form of development. The parks represent a remarkable natural and predominantly mountainous asset that are rightfully preserved. This restricts new development to the relatively flat areas outside urban and new town concentrations, where demand is most concentrated. While Country Parks could be designed to offer more in terms of recreational and visitor amenities they are not, even in their 'fringe' areas, suitable as housing sites.

So if we extract built-up and protected areas from the SAR's total land area this should leave around 250 sq. km of unobstructed land! Well of course it does not – it leaves an amalgam of unplanned village 'Small House' expansion and non-recognised settlement, together with hundreds of millions of square feet owned by private interests, often compromising both environmental assets and opportunities. The Liber Research Community recently mapped 42,000 NT Small Houses, and found that almost 10,000 involved illegal trading of Small House rights to developers ….. and we must remember that this compounds a wasteful and environmentally disastrous situation in the NT that has floundered along for 40 years.

In 1983 we completed an extensive study – the first of Government's Regional Development Investigations, that was carried out with engineering consultants, including extensive Base Strategy studies directed at the NWNT. It included detailed proposals for properly planned village development as 'extension envelopes' around the core layouts, with coordinated access and services, and with consolidated designs. It was at the time sanctioned by Government but never implemented. The result of this has been an abuse of the Small House Policy, wasteful use of land among the 642 'recognised' villages and massively compromised environment assets that meet neither strategic planning objectives nor sustainable ones. To ignore the ramifications of this while compromising the SAR's environmental and landscape assets, is not merely undesirable but counter-productive. A High Court ruling on 08.04.2019 upheld the right to build three-storey houses but ruled that this was constitutional only for private land and should not apply to land granted by, or exchanged with, the government, as this would be unlawful. The government has earmarked around 900 ha of land, and subject to an appeal against this ruling much of this could be released for other purposes. We need to deal sensibly with this issue, for the overall benefit of the community.

6. An Equitable Housing Approach

Hong Kong's current housing stock is around 2,827,000 while the number of households is approximately 2,579,000. This does not mean that we have 250,000 surplus housing units for distribution, but does indicate the nature of the problem. It is that housing, since 2008 during a time when bank deposits have experienced very low yields, has become a primary form of investment with prices rising at an average of 11-12 percent per annum. The post-virus economic situation might well have an impact on this, although low interest rates are likely to mitigate against major falls.

A recent survey has calculated that private home prices have a cost rating of around 19 times median household income, and it is projected that micro units will account for 45 percent of private

housing supply in 2020. But let us be clear - we will not make private housing more affordable by simply building more housing. Over some 40 years there has been no correlation between housing supply and prices, primarily because Government has continued to sell housing sites at the highest possible price so flat size calculated by private developers must obviously accord with market affordability, hence the preponderance of micro-units of 15-30 sq. m in recent times with prices approaching 10m dollars. This is taking us in a wrong direction, and we need a solution other than building an even greater percentage of public rental housing to compensate for unaffordability of private stock.

A recent survey has calculated that private home prices have a cost rating of around 19 times median household income, and it is projected that micro units will account for 45 percent of private housing supply in 2020.

Around 46% of HK housing stock consists of public housing units, including 0.78 million PRH units with an almost negligible vacancy rate, for which the average rental is HK$1,526 a month. However there are large numbers of households who earn too much to secure a public flat but too little to afford private ones. We do need some form of subsidised flat provision, but we have to make sure it works properly. Taking everything into account the current situation has polarised the already divisive differences in society between the 'haves' and the 'have-nots', where one in five people live below the poverty line.

So we are in a bind – public housing should not be the ultimate social goal. The domination of public housing that cannot circulate and is in fact exploited by many (whose household incomes and assets are well over the prescribed limit) is detrimental to social cohesion and inclusiveness. The obvious way round this is to provide social housing only for those who can demonstrate genuine need, but to commensurately increase the rate of home ownership.

Richard Wong, Professor in Political Economy at HKU, has continually raised the issue of the cost of public rental units. This argument for adopting something along the lines of the Singapore model has been recently reinforced by research carried out by the Our Hong Kong Foundation. The sale of one HOS unit used to support the development of two public rental units – now it is only one. A more win-win situation would be to unlock the values of public land occupied by public rental, HOS and tenant purchase schemes. First, sell new housing units as ownership units to eligible families – the key being facilitated financing rather than price discounts but with a government guarantee as in the present HOS situation, with low down-payments and risk-free interest rates. The unpaid land values could be financed as low-interest loans by government. Units could then be sold on the open market subject to full repayment of the outstanding debt owed to government.

What are our closest neighbours doing? Well, Shenzhen that for 30 years has followed the Hong Kong housing model, announced in 2019 that it is adopting the Singapore model which has one of the world's highest rates of home ownership at almost 90 per cent, with purchase tied into the Central Provident Fund. Why in Shenzhen? Because like Hong Kong home prices have soared as people are simply using housing as asset gains, and Shenzhen is losing skilled workers. Shenzhen with an economic output surpassing Hong Kong is wealthy enough to pioneer a new direction in social housing, and it does not, unlike Hong Kong, rely on massive revenue from land sales.

Under the Tenant's Purchase Scheme introduced in 1998, 140,298 public rental units have been sold to existing tenants. If this was to be introduced to all the 220 public rental estates the average sales could be increased by more than 50,000 a year. Existing HOS sales are massively over-subscribed under existing discount thresholds, indicating that they are not unaffordable. If this is the case there is seemingly little need for market distorting subsidies.

7. The Greater Bay Area Factor

Is there a scenario that might save us from concreting over yet more of the SAR? However ambiguous the Greater Bay Area (GBA) Strategy is at present, the National 13th 5-Year Plan has expressed support for the role Hong Kong can play in the development of the Bay Area through major cooperation platforms. In fact the physical, economic and social future of Hong Kong is irrevocably linked to that of the GBA. While there might currently be some ambivalence within the community in regard to this, the GBA essentially contributes a hinterland for a Greater 'Metropolitan' Hong Kong that will almost certainly provide both affordable housing and other opportunities for the coming generation. It unarguably represents the economic engine of Southern China that will shortly be able to access cross-border financial products and a partial relaxation of capital controls for residents in nine cities in Guangdong together with the Hong Kong and Macau SARs.

The global economic landscape is changing, and Hong Kong must adopt to new realities. If we assume that there will be greater economic collaboration between the Hong Kong SAR and the GBA then there will be a need to capitalise on greater cross-boundary synergies, such as salary tax breaks available for Hong Kong businesses moving to the Bay Area. In late August 2018 Beijing announced that half a million Hong Kong people would be granted resident's permits and ID cards granting them access to a wide range of social and public services across the boundary. While fine details relating to work and resident status remain, we need to encourage a better knowledge and perception of the GBA, particularly among young people.

An enormous amount of infrastructure development has taken place on the mainland side, particularly in road and rail construction, with a number of new and expanding development nodes. With the opening of the High Speed Rail and the Macau/Zhuhai link we can see a far more connected Bay Area on top of our already porous boundary – potentially a powerhouse of growth and investment, including new technology that Hong Kong should be contributing to rather than seeking to compete with. This will help link the 11 cities in the PRD into a Megapolitan Development Corridor of more than 60 million people in 300,000 sq. km, – and projections are for this to at least double over the next 25-30 years. Together with new road and bridge links this has substantially shortened travel distances between Hong Kong and many other parts of the GBA. It is also worth noting in passing that the high-speed rail has involved the acquisition of 226 ha of precious government land in the New Territories, and Hong Kong should seek to benefit from this.

Whatever the political inhibitions new opportunities for regional growth will be available, and this might translate into 'overspill' housing for HK residents, or for example through joint development of such uses as higher education, hospitals or retirement facilities. The result would be to take the pressure off Hong Kong, in terms of perpetually having to conjure up more land and urban renewal programmes to exploit development or redevelopment values.

8. The Harbourfront

The harbour represents the very image of the City. This must also incorporate a strategy to implement urban design objectives for the benefit of local users, visitors and tourists, to exploit Hong Kong's greatest physical asset for the maximum recreational benefit of everyone. In 1989 I directed the first planning and urban design study for the Central and Wan Chai foreshore over two years to meet Government objectives for an active harbourfront. We followed this by a study which set urban design parameters for all sites for this area including the 'Site 3' connection between Statue Square and the harbourfront. But the proposed undulating harbourfront profile, the water basins, active interfaces with cafes, festival markets and maritime moorings have long disappeared from the plans, in part reflecting

the impositions of the Protection of the Harbour Ordinance.

As I sat on the Harbourfront Commission for almost 10 years, it is worth recalling that this was set up to meet pretty much the objectives established by the Town Planning Board for almost 80 km of the Central Harbourfront. This included the need for a vibrant harbourfront with recreational resources and activities on both land and water, and proactive enhancement of the harbourfront areas to brand its identity as a symbol of urban design excellence. We have, since the inception of the Commission, seen slow progress. The way forward needs to be through joint public-private and community initiatives, along the lines of the TST promenade, the adjoining Salisbury Garden revitalisation with commercial thresholds and interfaces, and the relationship between building edges and a variety of spaces that work successfully elsewhere. Empty spaces, and equally featureless promenades scarcely meet either set objectives or the opportunities presented, and a partial solution at the very least suggests more robust partnership arrangements to create a sequence of 'destination points' around the harbour. This should take into account the considerable recreational potential of at least part of several typhoon shelters around the harbour, including Yau Ma Tei, Kwun Tong, and Chai Wan, together with associated amenities around their edges. A key urban design challenge along the very prominent Central/Wanchai harbourfront will be the forthcoming Site 3, that links core Central with the harbourfront. It is a crucially important site that should in future meet both public expectations and the design potential inherent in this location.

9. A Realignment of Urban Renewal to Regeneration

A combination of forward thinking on urban design for the public realm of the city is necessary, rather than an almost sole emphasis on redevelopment. The public realm itself continues to decline precipitously, in part because there is no single body or authority that acts on its behalf. The result is a neglect that has produced a poverty of attention to urban liveability, with constant compromises to development intensification and increases in traffic.

A regenerative approach should be orchestrated either under the auspices of government or the URA, and be aimed at actually improving the city and the public realm, not solely to expedite redevelopment to maximum pre-set densities with little if any public gain. The main emphasis itself needs to be re-aligned from 'renewal' to regeneration, bringing it into line with other First World cities. Hong Kong has, over the past 30 years, lost most of its characteristic old buildings which gave the city its character and contrast, and contributed to both its identity and its collective memory. Two initiatives in the last ten years, PMQ and Tai Kwun have been worthwhile investments although perhaps these operational models could both be tweaked a little to underscore their potential as colourful and dynamic urban destinations.

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Our approach must now reflect an amalgam of measures necessary, in varying degrees and at various scales, to resolve a range of problems in the public domain and ensure its liveability. The Hong Kong SAR has large monetary reserves, and while several hundred billion dollars is now earmarked for Post-COVID-19 relief, a lasting legacy must also be investment in the city for the benefit of local people and visitors alike. We cannot simply base a tourism model on high end shopping by Mainland visitors. New attractions are important but it is the quality of the city fabric itself from which its identity and attraction must be derived.

10. A Smart City Agenda

We need to look closely at a means to better the urban area itself i.e. where most people work and where visitors spend most of their time. 'Smart' is not simply about use of information technology - it requires a strong environmental focus that brings together initiatives with liveability, sustainability and resilience at their core. Most 'first world' cities are planning along these lines in looking to the future. Large parts of the older urban area, laid out more than a century ago have, over the past 30-40 years, been substantially redeveloped in situ, and have been subject to much increased densities, massive increases in traffic incursion and narrow fenced-in pavements, which have translated into a considerably compromised public realm. The complexity of city space, coupled with progressively high land values, indicates that improvements need to be carried out in an adaptive way to provide for continuity of urban character rather than predetermined totalising solutions that bulldoze it away.

Over the past ten years there has been a 40 percent increase in private vehicle licences that has had a colossal impact on urban comfort and walkability, and diminishes the image of the city and its public realm. And this in a compact city with excellent and cost effective public transport. The CBD itself is swamped by through traffic which largely relegates pedestrian movement to elevated private malls. This leads to urban pollution, illegal parking and the inefficiency of bus movements, at a time when many cities are investing in a future with autonomous and clean modes of transport.

Epilogue

The final question raised by Edward Glaeser in Triumph of the City was "why do so many smart people enact so many foolish urban policies". Urban performance in the 21st century no longer depends purely on physical capital but on social and knowledge capital, so the Liveable City, the Sustainable City and the Smart City are not mutually exclusive. There is a need to equate smart living, smart mobility and smart environmental networks with smart governance, through an overall objective to achieve an improved quality of life.

Hong Kong must look to the future and seriously address responsiveness to the challenges of growing urbanisation, eco-awareness, urban efficiency, equitability and resilience. Outline Zoning Plans are essentially urban management tools, but in combination with the Buildings Ordinance they act to expediently define plot ratio, maximise site coverage, and therefore building density and redevelopment value, which technically offers few real opportunities for improvement of the public realm. There are in fact no ready means to upgrade or reshape street space, which when I first came to Hong Kong was known as the 'living room' of the city. This suggests a need for municipally based partnerships which address problems of common interest, and equates with an overall objective to achieve as high a quality of life as possible for citizens. For this we need city performance indicators, which are dependent on social infrastructure as well as capital gains.

We are in need of a genuine 'green' transition to correct many of the weaknesses and deficiencies exposed by COVID-19. In the wake of these dark times there are going to be some challenging situations ahead, and various problems to be overcome. As planners we are in a position to take up an urgent challenge – that of ensuring physical betterment of the SAR through a more liveable and healthy environment for the many rather than the few.


SWEETHEART FRUIT

Walk Back to Planning

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Introduction

Human anatomy reveals the delicate link between walking and body structure. With no vital organ to protect, there are 30 bones in each leg as compared to only 24 ribs to protect our heart, lung, liver and spleen. Our legs account for about 30% of the total body bones. (Canale, 2007 & Coldman, 2008) The longest and biggest muscle sartorius and gluteus maximus, together with the longest and strong bone femur all reside in our legs. (Talyor, 1999 & Swierzewski, 2015)

Human is essentially a walking creature. Unlike air-borne or water-borne animals, human relies on walking to negotiate terrain; to evade danger and predators; find food and shelter; search companions to socialise and prosper – the very fundamental of human civilisation.

The following three sections is a short tour about walking, covering the essence of walking with town planning, followed by a quick glance at the state of Hong Kong before venturing into steps for shaping a walkable city.

Amble By Historical Route

Walking is, in simple term, movement from a point to another, a form of travel. Invention and commercialisation of different modes of mechanical transport in the past century, noticeably private car and airplane, have transformed our perception of travel. In the age of private car or self-driven vehicle, should walking often be associated with the past, be rightfully replaced on the planning agenda? Are town planners lingering on the fading trace of nostalgia or the grain of perseverance and pragmatism?

People may have diverging aspirations for their cities arising from different historical or cultural backgrounds, however, certain fundamentals such as convenience, health, safety, liveability, sustainability and equality are common attributes cherished by communities around the world.

Medieval city was an instrument for the production and exchange of goods and services where opposing needs interacted. (Saalman, 1968) Since then, cities have been built to enable people to move around in meeting their needs including navigating through natural or man-made features. Not surprising, the design elements identified in the famous book 'Image of the City' have strong connotation to people walking around the city. (Lynch, 1960) Equally, the garden city (Howard, 1965) and neighbourhood development design furthered the functional concept by prescribing a convenient walking distance of about 500m, or a range between 1/4 to 1/2 miles (about 400m to 800m) for different functions or services. (ScottBall, 2012) Walkable city is the belief and advocated by town planners, not to reminiscence, but to perhaps shape multi-function cities fulfilling both physical and psychological needs of people.

Walking is the foundation for a convenient and efficient city. Walking is undoubtedly the most natural, common and direct form of movement from one place to another for human since infancy. People with no major disabilities can initiate such movement any time, unaided, at will and with pace as desired. Cities have long been built to meet the needs of people amongst which living, working, recreation and circulation are at the core. (Le Corbusier, 1942) Create convenience to people was a key feature in the garden city and neighbourhood community design which was

embedded in many subsequent town planning and design principles. Travel goes with time and distance. Greater convenience means less travel time, or able to contemplate more within a given time. That's how efficiency emerges. With the freedom, flexibility and independence of walking, obviously the ability to connect key functions and services through walking is the uncontested benchmark for a convenient and efficient city.

Walking is the corner stone for a healthy and liveable city. Other than the medical sector, town planner perhaps should be the most health aware profession. The earliest town planning legislations stipulating sanitary, building and facilities fitting were laid down in the Public Health Act of 1848 & 1875 in the United Kingdom to combat diabolical urban living conditions. Marriage between public health and town planning has remained since then. As defined by the World Health Organization, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. (WHO, 1948) Studies worldwide have shown walking, a moderate exercise, can reduce the risk of cardio-vascular diseases, osteoporosis, obesity and respiratory problems. On city planning, the physical and psychological health benefits such as better relaxation, decreased level of fear and anger, positive effects on blood pressure and heart rate, and lower rate of asthma associated with walking, parks and greenery have been increasingly demonstrated. (Frumkin, 2003, Giles, 2006, NCEH, 2007 & Barnett, 2016) Continuing the tradition of town planning, walking as a form of exercise and a mode of travel can directly contribute to the well-being of people for a healthy and liveable city.

Walking is the driver for a compact and sustainable city. Professor McHarg was one of the first to make a connection between planning and design and the science of ecology. (McHarg, 1969 & Ndubisi, 2002) Urbanisation changes the environment by impacting upon natural habitat, resources, climate and biodiversity. Regulating urbanisation especially urban sprawl is vital in conserving natural landscape and the planet. The Intergovernmental Panel on Climate Change has highlighted the importance of risk management and decision making in relation to sustainable development in the wake of climate change. (IPCC, 2020) It is blatantly apparent that compact and sustainable city planning is no longer desirable, rather it is overwhelmingly a necessity. Compact city is characterised with high density mixed land uses development, semi-autonomous communities of self-supporting in daily needs with well-connected public realm, and most significantly, development arranged around centres within walking distance. (UTF, 1999) Walking is the unfailing connection for compact and sustainable development to combat climate changes and urban sprawl for this and the coming generations.

Walking is the portrait of an equitable and safe city. All able persons can walk freely, it is in sharp contrast to driving. Gaps exist between those who drive and those unable to drive, or do not have access to private vehicles for economic, social and physical reasons. Projecting its own space, car is a personal commodity; it separates its users from the outside world. Car centred planning is effectively discriminating against those having no access to private car, curtailing freedom of choice and contributing to social division by hampering direct access to social and community facilities which are essential to vulnerable and underprivileged groups. Streets should promote walking (Jacob 1961), however, city is divided as car has completely upset the form of the city. (Kahn, 2003) A walkable environment can bring people out into the open for their daily lives and visit social and community facilities. Walking can more effectively promote social conversation and interaction between different community, age and ethnic groups, and forms the impetus for initiating social integration, building community cohesion and creating harmonious city. A highly visible social behaviour with little entrance barrier, walking incubates social, business and leisure opportunities through connecting people and activities and portrays the image of a free,

equitable and safe city.

Walking is a catalyst for a rewarding and fulfilling life. The significance of walking can best be concluded in a single line, 'life takes place on foot.' (Gehl, 2008) Apart from the occasional moments to distil interweaved thoughts on their own, people need and wish to interact and socialise with others, to share and be recognised, in conducting their daily routines. Afterall, human is not solitary animal. By facilitating social interaction and bonding with physical environment along the daily walking trips of citizens, the richness of their living and being can be vastly enhanced for a more fulfilling existence. The significance of such critical yet subtle element is reflected, in no small ways, through the stress and discomfort pounded on people from the recent lockdown and restrictions imposed in the wake of the Covid-19 pandemic. Refocusing on walking is, therefore, a chance to create a more people-oriented city in which people can rediscover their identity and bearing.

Pace Around The City

Is Hong Kong walkable? How willing do Hong Kong people walk? In an international research on walking among 14 cities in 10 countries on 5 continents, Hong Kong people ranked 4th in terms of walking, spending about 45 mins trudging around every day. Residents in Wellington in New Zealand came first with about 50 mins daily walking time. (Cerin, 2016) There are a number of underlining factors embedded in our town planning and development philosophy that encourage people to walk and make Hong Kong walkable.

Hong Kong is a high-density compact city. High rise and mixed used buildings skirting against rolling ridgeline is perhaps the most enchanting image of Hong Kong. Different land uses are often clustered and integrated within developments. Road space, an indicator of urban sprawl, accounts for about 11% of the designated land use zoning under statutory town plans for all the urban and new town areas or 4.1% of the total area of the territory. (Planning Department, 2019) Building of mixed uses is a common sight in Hong Kong where locals and visitors alike transcending between different levels for their daily rituals in search of goods, foods and services. Integrated land-use with transport facilities is a key principle in planning Hong Kong for the basic well-being of its citizens. Railway stations are transport interchange as well as land-use nodes combined with office, residential and commercial uses where people can directly access through walking, often with a reference distance of 500m.

A safe and walkable city is of paramount importance to locals and visitors. Supported by an efficient public transport system, Hong Kong is known for its well established and maintained road and pedestrian systems with clear signal, sight and separation for the safety of drivers and pedestrians, but is it the end or the beginning? For days and nights, local streets are frequented with an array of nationalities and ethnic groups under a vibrant, harmonious and inclusive ambience. Other than over 65 million annual tourists (Tourism Commission, 2019), more than 360,000 persons from Philippines and Indonesia are currently residing in Hong Kong followed by about 34,000 Indians, 23,000 American, over 10,000 each from Britain and Australia, and many from other Asia countries. (Census and Statistic Department, 2016 & SCMP, 2016) With low crime rate, all these nationals mingle with the locals in contributing to the interesting culture colours and enchanting lives that make streets of the city attractive as unique. Harmony and multi-racial scenes invite people to socialise by walking the streets freely which in turn made safer by the presence of all walks of life, the shaping of a cosmopolitan. As a unique cityscape of Hong Kong, every weekend tens of thousands of Indonesian and Filipino transform some of the local streets to the surprises and admiration of the world.

Connectivity dictates walking. Effective pedestrian connection enables people to negotiate

obstacle, tackle terrain and withstand weather by providing convenient and comfort walking environment. With compact and integrated land-use and transport planning, multi-level pedestrian connections underground, on-ground and above ground with the aid of mechanical connections at intervals are common features around Hong Kong noticeably in the business districts, large scale developments and transport nodes. Multiple levels and multiple point entries layout may have become a form of vernacular design in large development, connection at street level outside are less than encouraging. Should connectivity be confined to business districts with movement of people as the sole consideration? Unfortunately, to this day, many still see pedestrian as a residual part of vehicular traffic often with emphasis chronically rests with the priority of vehicles and convenience of drivers. Narrow pedestrian paths partially occupied by roadside metal railing and partly littered with traffic signs for vehicles, have become training ground for gladiators. Roadside parking is still spreading like tumours, and the drive to increase private car parking spaces indiscriminately within redevelopment of urban sites are alarming. Pedestrian is relentlessly displaced from street level to elevated footbridge or subway for the sake of pedestrian-traffic separation. At signalised crossings, green cycles for pedestrian are such compressed that even those fit and able find the gap difficult to bridge. Many staggered crossings lack suitable design and holding space not only causing frustration to pedestrians but also subject them to the physical onslaught as well as health risks from passing vehicles and emissions. Surely, such imbalance has to be redressed in some ways for a sustainable international city.

Stroll Into The Future

Can Hong Kong become a more pedestrian friendly and walkable city? As academics continue the search for an agreeable definition for walkability continues, as a working reference for planning practitioners, walkability perhaps can be taken as the extent to which the built environment supports and encourage walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable time and effort, and offering visual interests in journeys throughout the network. (Southworth, 2015) While we may be contended with the connection and general walking environment of our streets, there are perhaps four stages worth revisiting to further walkability planning in Hong Kong.

Firstly, planners should take greater ownership and initiative in pedestrian or walkability planning. If town planners are to promote better living environment and improve public realm for the health, safety and well-being of the public, walkability is no doubt within the remit of town planning as seen from the above. As a snapshot, different organisations have started various traffic engineering based pedestrian studies, while welcoming such move, there is a need to include vital town planning and pedestrian angles in such process beyond engineering considerations. Planners need to reclaim ownership and advocate a more holistic people-oriented pedestrian regime for the benefit of the community, and to address the overdue imbalance in the allocation and use of, essentially, public space. The irony is the constant scenes of people spilled onto carriageways from pedestrian paths, yet there are endless proposals to widen traffic lanes and junctions at the expense of pedestrian width. With the concept of social distancing emerging from the outbreak of Covid-19 and possible future pandemic or other diseases triggered by climate change, planners should confront the current pedestrian standards, and contemplate possible alternative pedestrian routes or, at least,

With the concept of social distancing emerging from the outbreak of Covid-19 and possible future pandemic or other diseases triggered by climate change, planners should confront the current pedestrian standards, and contemplate possible alternative pedestrian routes or, at least, foster a hierarchy of connections in planning for a healthy and resilient city.

foster a hierarchy of connections in planning for a healthy and resilient city. In a nutshell, pedestrian or walkability must have its own right instead of being the after thoughts of vehicular transport in the 21st century for an international city like Hong Kong.

Secondly, walkability is a pressing planning issue. Some may think that given the high standards and well-maintained pedestrian streets laid down from the past, walkability is not really an issue in Hong Kong. The city has well set pedestrian network in the Central Business District and adjoining transport nodes such as railway stations, nonetheless, walkability should neither be limited solely for the working population nor at selected commercial cum transport nodes. The Hong Kong 2030+ report has highlighted that our population is ageing quickly. The population aged 65 or over is projected to rise significantly from about 15% in 2014 to about 35% by 2064, and the population of old-old (aged 85 or above) will rise from 2.2% to 10.1% within the same period. (DevB/PlanD, 2016) Statistics indicated that in 2016, the territorial average for person aged 65 or above is 15.5%, and Wong Tai Sin and Kwun Tong are the two districts with the highest percentage of elderly aged 65 or above which were 17.6% and 17.1%. (HKSAR, 2017) Along with ageing population, there is a rapid ageing building stocks. It is estimated that there will be about 326,000 private housing units aged 70 or above in 2046, about 300 times of the stock of the same age in 2015. (DevB/PlanD, 2016) With a significant number of elderly or new users negotiating streets and paths including many with an array of walking aids in the not distant future, and buildings in many parts of our older districts are ripped for redevelopment, there may be a rapid dwindling window for planners to review the setting of streets, walkability and building lines to guide redevelopment before the opportunity is closed for, perhaps, another half a century.

Thirdly, develop a planners' tool for walkability assessment. Having the right tool is of paramount importance, were planners not taught to survey, analyse and plan back in school? At present, pedestrian review is based on the Level of Service (LOS) assessment which has noticeable inadequacy and shortcoming. In prevailing planning context, walkability must evolve beyond capacity or flow to embrace convenience, connectivity, comfort, and environmental fabric towards citizens as well as sustainability of the city. Contradictions are identified between LOS assessment which emphasizes personal space and those which advocate safety and comfort. (Lo, 2009) It is not the aim to analyse all deficiencies of LOS here, but in simple term, various pedestrian needs and planning elements are not represented in the method currently used. To meet public aspiration, a systematic, structured and people-oriented approach is needed and there are increasing calls for an integrated approach with multiple criteria of environmental features in assessing walkability. (Forsyth, 2015 and Daorrzapf, 2019) It may take some time for a new methodology to evolve, given the unique urban fabric of Hong Kong, system advocated from overseas may not fully reflect the needs of our compact city, for example, safety in overseas countries may often refer to the crime rates of different districts or cities, would refinement needed in the Hong Kong context? To advance planning for pedestrian, there is no reason why planning and environmental factors such as visual amenity, openness, comfort and connectivity cannot be included in walkability assessment. Acknowledging both the science and art of town planners, assessment can embrace different aspects through qualitative and quantitative evaluations. Perhaps it is time for local practitioners and researches to join hands in leveraging various 3D/4D technologies and analytical techniques to establish a tool covering relevant local criteria for town planners. The truth is, the best craftsman has and needs his own chisel?

Finally, the planning profession has to adapt to a fast-evolving social landscape. Public realm is often the arena for planners to contest as well as the avenue to interact with different

sectors of the community. With better education, heightened awareness on environmental issues and the proliferation of information technologies especially social media tools, the public especially younger generations and concern groups, has been increasingly vocal on planning and environmental issues. In welcoming wider public participation in town planning matters, these new players have also profoundly changed the social and political landscape in which planners profess. As an international trend swirling towards cities and countries, there is a well-recognised decline of trust in professions and in public institutions. (Naim, 2013) Arguably, it is not for planners to buck the trend, however, building trust and creditability could not be fault in planning work. Can a more systematic and structured method in analysing our urban environment be the first step for an informed and evidence-based dialogue thus setting the momentum for building trust. Practicing planners have increasing been pressed to explain their professional views and rationale, in particular those working in the public sector, such trend is unavoidable, inevitable and irreversible. In fact, in a recent town planning judicial review, the court has made, in no unclear terms, that there is a general duty for an administrative body to give reason, unless there is a proper justification for not doing so. (HCAL Nos. 26/2012 & 27/2012) Structure or evidence-based analytics not only can enhance the quality, openness and transparency of planning work but also foster a knowledge-based profession in furthering creditability. The profession has to advance along with changes.

The four steps outlined would not be the solution to make our city walkable, instead the above may be a prelude to further discussion among professionals and researchers, both young and younger ones to take rightful ownership, be aware of the urgency, shape a suitable planning tool, and adapt to evolving landscape associated with walkability. Planners can decide to walk towards the walkability debate as band of brothers or recede into the branching path.

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Hong Kong and Singapore are often dubbed as twin cities with many things in common. In demographic terms, both cities are becoming a hyper-aged society[1], expecting to be hit by the "silver tsunami" in the near future. In the mid-2010s, about 1 In 6 people in Hong Kong was aged 65 or above , while the ratio was about 1 in 8 in Singapore. In 2030, about 1 in 3 people in Hong Kong would fall within the population cohort of 65 or above[2], and 1 in 4 in Singapore.

Recognizing the need to plan for a hyper-aged society, the External Affairs Committee (EAC) of the Hong Kong Institute of Planners (HKIP) has put a focus on this theme and organized a Technical Tour to Singapore on 14 and 15 November 2019 with a view to obtaining insights from our Singaporean counterparts. We visited the Urban Redevelopment Authority (URA) of Singapore and had sharing sessions with the URA Academy, Planning Policies Department and Digital Planning Lab. We toured the Age-friendly City Urban Lab Exhibition launched by the Strategic Research Department of URA as well as the Housing Development Board (HDB)'s pilot elderly housing project at Kampung Admiralty to find out how Singapore planners tackled the ageing issues. We also spent an evening with the Singapore Institute of Planners (SIP) to promote collaboration between SIP and HKIP. The HKIP delegation comprised eight participants, led by Ms Rebecca Wong and Mr Lawrence Chau, the Convenor of EAC and our President respectively. I wish to take this opportunity to share the highlights of our visit with all members, especially those who are involved or interested in planning for the elderly.

I am most impressed by Singapore's holistic approach in dealing with the ageing issues. Recognizing the changing housing, social and healthcare needs of a hyper-aged society, Singapore is vigorously taking on board an "Action Plan for Successful Ageing" formulated by the Ministerial Committee on Ageing and the relevant stakeholders[3] upon engaging the public from all walks of life. The Action Plan covers a wide spectrum including lifelong employability, health and wellness, senior learning, senior volunteerism, community befriending, inter-generational harmony, aged care, active ageing and assisted living, transport, and research on ageing. It advocates an "ageing in place" policy to keep the seniors healthy, active and safe and to provide them with access to quality and affordable care by establishing senior-friendly housing and township.

Some notable initiatives include HDB's Proximity Housing Grant which encourages families to live close to each other; Three-Generation (3Gen) flats which encourage members of multi-generation families to live together for mutual care and support; the Senior Priority Scheme which lets eligible seniors buy 2-room Flexi flats in the same estate or near their married children; and the "Enhancement for Active Seniors" (EASE) package[4] which provides up to 95% subsidy for

[1] A hyper-aged society is defined as one with 21% or more of its population aged 65 years old or above, while an ageing and aged society has an elderly cohort of 7% to 14% and 14% to 21% respectively.
[2] In Hong Kong, the elderly population aged 65 or above (excluding foreign domestic helpers) was about 15.4% of the population in 2014.
[3] The "Action Plan for Successful Ageing" is jointly developed by government agencies, voluntary welfare and non-profit organizations, academia, businesses, community and union leaders, with feedback received from public consultation.

A panel displayed at the Age-friendly City Urban Lab Exhibition

Meeting with the SIP's Representatives

senior-friendly home retrofits. The Land and Transport Authority (LTA) has created "Silver Zones" with senior-friendly road areas[5] in those areas with a high concentration of seniors, in addition to the provision of safer and senior-friendly public spaces and transport with the adoption of universal design and barrier-free access. The National Parks Board (NParks) is also proactively implementing an active ageing plan through enhancement of park network and provision of senior-friendly therapeutic gardens. The Ministry of Health (MOH) is expanding the healthcare capacity by building acute and community hospitals, and shifting from acute and episodic care policy towards care at home and community with a greater focus on home care, preventive and long-term care. The Government is keen on promoting an inclusive society with inter-generational interaction such as the creation of Active Ageing Hubs in the neighbourhood and co-locating eldercare and childcare facilities, and setting aside funds by the National Research Foundation for a National Innovation Challenge on Active and Confident Ageing to catalyze research on ageing. It is clear from the Singaporean experience that the ageing issue must not be handled by any single agency. It requires an Action Plan that could mobilize the entire government machinery as well as all concerned stakeholders to promote successful ageing. For Singapore, the Action Plan is construed as the first step towards making the city-state a Nation for all Ages – an inclusive home for all Singaporeans and an icon for successful ageing in Asia.

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The Kampung Admiralty Model

Kampung Admiralty[6] is considered a showpiece of successful ageing through holistic planning. It is Singapore's prototype integrated public development, combining elderly housing and a mix of social, healthcare, communal and retail facilities in lush greening under one roof – a 11-storey "modern kampung". It is a multi-agency project developed by HDB in partnership with MOH, LTA, NParks, Yishun Health Campus (YHC), National Environment Agency (NEA), and Early Childhood Development Agency (ECDA). It features about 100 studio elderly apartments crafted with universal design principles; a two-

Active Ageing Hub in Kampung Admiralty

[4] EASE is part of HDB's Home Improvement Programme (HIP) which helps elderly residents to install elderly-friendly items in their flats with government subsidies.

[5] "Silver Zones" feature areas with enhanced safety measures such as narrower roads and speed humps to slow down on coming vehicles, two-stage crossings to allow the elderly pedestrians to rest at the halfway mark, and more railings. Statis tics show that accident rates involving senior pedestrians at these zones have significantly gone down.

[6] "Kampung" is a Malay enclave or village. Kampung Admiralty is located near the Admiralty MRT Station in Singapore.

storey medical centre providing specialist outpatient care; an Active Ageing Hub co-located with a childcare centre; dining and retail outlets; a hawker centre; Community Plaza; and Community Farm. The provision of a variety of inclusive spaces fosters community interaction and involvement. In the show flat of Kampung Admiralty, there are various senior-friendly design and facilities to help the seniors live independently. For example, an easy to manage clothes-drying system; light switches which are placed low enough for the seniors in wheelchairs to reach; and an emergency alert system and safer stoves to minimize fire hazards. The Community Park is particularly attractive to me. It is sensibly designed with raised planters of varying heights to allow seniors on wheelchairs to interact with the plants. It helps the seniors feel connected to nature, and the therapeutic horticulture experience in the active and restorative spaces have proven to promote wellness. The close proximity to healthcare, social, commercial and other amenities support inter-generational bonding and promote active ageing in place. The development is not only very popular in Singapore, but also won the 2018 Building of the Year at the World Architectural Festival, which was considered the Oscars of the architectural world. It is admired for how the substantial public realm benefits it enabled through the synthesis of people, density, greenery, wellness and liveability.

The work of the Digital Planning Lab of URA is also worth mentioning, especially how planners have made use of geospatial analysis to inform planning decisions. For example, town demographic analysis has categorized planning areas according to the percentage of elderly residents, viz. Youngster Haven, Grey Tide, Silver Tsunami, and Youthful Remix[7], which in turn helps facilitate more targeted rejuvenation strategies and guide plans for future housing and amenities. Gap analysis tools have been developed to identify areas of potential mismatch in the demand and supply of eldercare and healthcare services, and EZLink[8] data are being used to analyze the spatial-temporal information about seniors' mobility and activities to enable better planning. In the smart era, Hong Kong could consider making better use of the big data to facilitate planning for our forthcoming hyper-aged society.

During the visit, I lived in a hotel near URA's Headquarters and HDB's housing complex Pinnacle at Duxton. Duxton Plain Park, a green spine converted from an old railway line, was located just in front of the housing estate. Early in the morning, I met many smiling elderly residents enjoying their morning exercises. I could witness their graceful and active lifestyles, and keep pondering what Hong Kong has done and can do in promoting a healthy and happy hyper-aged society. I think holistic planning is the key.

The seniors enjoying their morning exercises at Duxton Plain Park

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[7] "Youngster Haven" comprises the outlying areas with less elderly than national average. "Grey Tide" is mainly the Central Region with more elderly than the national average, but relatively stable. "Silver Tsunami" is located at the fringe of the Central Region with more elderly than the national average, and becoming even older. "Youthful Remix" is the rejuvenating area with more elderly than the national average, but getting younger.

[8] EZ-Link cards in Singapore are similar to the Octopus cards used in Hong Kong, commonly for public transit use on the MRT, LRT and buses.

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Opportunities Unearthed – Underground Space Development at Kowloon Park

Planning Department, HKSAR Government
Civil Engineering and Development Department, HKSAR Government
AECOM Asia Company Limited

Hong Kong has a long history of using underground (UG) spaces for public and commercial facilities. Amid the high-rise and dense urban setting in Tsim Sha Tsui (TST), where surface land is in shortage, the centrally located Kowloon Park provides an opportunity for exploring the UG space development potential with a view to enhancing Kowloon Park, improving walkability, meeting needs of the district and creating synergy with the surrounding development clusters.

The proposed Kowloon Park Conceptual Scheme aims to create a multi-level and multi-functional UG space at suitable locations of the park to capitalise on the "single site, multiple use" model for public enjoyment through the provision of diversified uses. Its direct, safe, all-weather and universal/barrier-free pedestrian network would integrate laterally with the surrounding areas and vertically with the park surface, as well as the adjoining road and rail-based public transport. This will help achieve spatial integration of the surrounding development clusters with different characteristics. It will also provide an alternative route so as to alleviate street level congestion and improve the overall walking environment and experience.

An integrated and holistic planning and engineering approach is adopted to address different issues in developing the scheme. Opportunity to facelift Kowloon Park is also taken to further enhance its function as a green lung, carbon sink, rest garden and visual relief within our congested city.

Gist of Adjudicators' comments:

- Welcome the idea of proper utilization of UG space and provision of all-weather pedestrian network to alleviate the overcrowded street-level environment and improve pedestrian connectivity in the TST area. The proposed UG space would provide a multi-functional mix of community, retail/F&B and public spaces for commuting, community, leisure and recreational uses, well connected to the existing cultural, leisure and community facilities above ground in the vicinity.

- The new UG pedestrian network would facilitate pedestrian movements between Jordan and TST South as well as between TST East and Canton Road. Connections to the MTR Station would bring people to the area in a more direct, convenient and comfortable manner, thus enhancing the vibrancy and attractiveness of this very important cultural and commercial hub.
- Upon completion, the project would showcase how a good approach to use UG space in a smart and sustainable manner.

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Kai Tak Development Urban Design Guidelines and Manual

Urbis Limited
Civil Engineering and Development Department, HKSAR Government

The objective of the Kai Tak Development (KTD) Urban Design Guidelines and Manual (UDGM) is to set out a design framework and approach that will broadly circumscribe the form arrangement, massing and appearance of development within KTD through a set of recommended urban design parameters predominantly applicable at the pedestrian zone of the selected developments. The principal function of the UDGM is to achieve a coherent and high-quality urban design, of a consistent visual expression, for the entire KTD pedestrian realm.

The design parameters circumscribe a set of control parameters and design approaches that specify a range and quality of treatments to achieve the design vision and quality within the KTD. Two specific strategies have been employed in this regard.

URBAN DESIGN CONTROL PARAMETERS: "Technical design control parameters encompassing illustrated examples" have been prepared for private and Government sites. The urban design recommendations within lease conditions are geared at achieving a coherent urban development of the highest quality.

URBAN DESIGN BEST PRACTICES: To demonstrate best practices for achieving coherent and high-quality urban design and landscaping at the pedestrian zone, the manuals set out and illustrate a series of non-mandatory urban design requirements cases.

To ensure consistency throughout KTD, the urban design recommendations enshrine very specific parameters. The planner's role in this study is to make sure that each set of requirements could be translated into "technical, quantifiable, tangible and enforceable conditions" for incorporation by the Lands Department through land lease and land allocation documents.

Gist of Adjudicators' comments:

- The study provides a useful tool to fill the gap between urban planning and project implementation, through which the original planning intent and concepts embodied in the statutory plan can be properly translated into design features of individual sites.
- The proposed design parameters specify a range of treatments that should be applied to realize the design vision and quality to be achieved in KTD, which can be incorporated in land grant documents to control future development.

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Enhancing the Recreation and Education Potential of Country Parks and Special Areas in Hong Kong

Urbis Limited
Agriculture, Fisheries and Conservation Department, HKSAR Government
Mott MacDonald Hong Kong Limited
Waters Economics

Ever since the establishment of country parks and special areas in 1977, about 44,300 hectares of countryside have been conserved. Not only do these areas provide habitats for diverse animals and plants, but they also serve as venues for countryside recreation and outdoor educational activities for the public.

Making reference to experience in other places and opinions gathered, the study team recommended a series of proposals to enhance the recreation and education potential of the country parks and special areas, while maintaining their conservation functions. These enhancement proposals, if adopted, will only be implemented in a very small percentage of country park area, but will provide more diversified and better facilities and services to the public. Meanwhile, the Government will continue to deploy resources to conserve the natural environment of country parks and provide basic facilities for the public.

The project aims to develop measures to strengthen the functions of country parks and special areas while striking a balance between

nature conservation and promotion of outdoor recreational activities and nature educational programmes, thus contributing to mainstreaming biodiversity and environmental sustainability in our community.

Gist of Adjudicators' comments:

- The planning objective to recommend a string of proposals to enhance the recreation and education potential of the country parks and special areas without jeopardizing their conservations function is applaudable. The enhancement proposals would help promote the public use and enjoyment in selected parts of these environmentally sensitive areas.
- The proposed developments are practicable and sensible, having due regard to ecological sensitivity, site management and visitation levels, findings of feasibility studies, as well as comments from the general public and nearby villagers.
- Presentation quality is high and the messages are clear.

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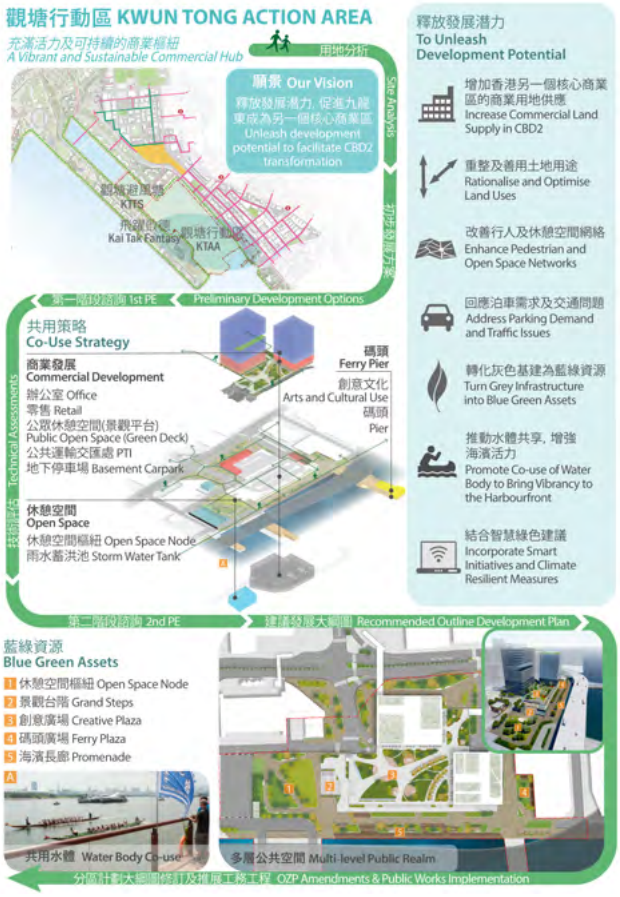
Kwun Tong Action Area – A Vibrant and Sustainable Commercial Hub

Energizing Kowloon East Office, Development Bureau, HKSAR Government
AECOM Asia Company Limited

Kowloon East is transforming into another core business district (CBD2) of Hong Kong. To take forward the policy initiative of relocating the existing government facilities in the Kwun Tong Action Area to expedite the transformation, the "Planning and Engineering Study on Kwun Tong Action Area – Feasibility Study" was commissioned in 2016.

The study area covers the Kwun Tong Action Area, Kwun Tong Typhoon Shelter and part of Kai Tak Approach Channel, comprising a land area of about 4.2 hectares and a water body of about 62.8 hectares. In formulating the Recommended Outline Development Plan, due consideration has been given to the planning and design principles of CBD2, the ideas of the winning design of the Kai Tak Fantasy International Ideas Competition, the Harbour Planning Principles, the Green and Blue Asset System and climate resilient initiatives advocated in Hong Kong 2030+. The project aims to release the development potential by rationalizing the existing government uses, promoting co-use initiatives and incorporating smart initiatives, etc. taking account of comments received from public consultation and the findings of various technical assessments.



Gist of Adjudicators' comments:

- A very comprehensive study with due considerations to various development opportunities and constraints in the area. Through the application of sound planning principles, it has provided practicable and viable solutions to address the issues of concern. The overall development layout, massing and disposition of buildings as well as the multi-level public realm are impressive, creating a pleasant urban fabric in harmony with the waterfront setting and providing good pedestrian connections with the nearby areas.
- The co-use proposals for the water body and sites for public facilities can help resolve the conflicting and competing demands from different users. The proposed art and cultural uses at the Kwun Tong Ferry pier can contribute significantly to the enjoyment and use of the waterfront.
- The presentation is clear and concise, with high quality graphics to illustrate the planning concepts and proposals.

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Masterplanning and Urban Design for the Renewal of Luohu (Buji River Watershed and Luohu Port Area), Shenzhen, China

ARUP International Consultants (Shanghai) Co. Ltd.

The project focuses on Luohu District, which is the first area developed in the city of Shenzhen (SZ) and serves as a very important gateway to Hong Kong (HK). It sets out a strategic planning framework and various design features for the regeneration of Buji River Area and Luohu District, as follows:

(a) Five SZ-HK cooperation public platforms of new economic development to absorb talents and improve consumer experiences;
(b) A "New Triangle" of Sungang, Shuibei and Caopu to foster industrial cooperation;
(c) Buji River restoration to improve the environment of the catchment area;
(d) Vertical transport core system through relocation of existing station hall and China Railway High-speed line to underground, provision of new railway line, implementation of HK and mainland clearance procedures in a new station hall in SZ, as well as extension of railway line from HK side to the new station hall; and
(e) Integration of old and new by creating a theme memorial park and cultural cooperation zone near Luohu Bridge, thus preserving the historical memory and unique urban form of the place.

Gist of Adjudicators' comments:

- A very comprehensive approach to tackle a variety of complicated planning and development issues of the Luohu Port and Buji River Watershed areas, taking into consideration of conservation of natural and man-made heritages, promotion of cultural and business activities, restructuring and revitalisation of the decaying urban fabric and outdated land uses, restoration of Buji River, and making/branding of place.
- The proposed Hub City on SZ side could well be feasible and implementable provided that Government support is forthcoming. It may also form a basis for redefining the functions and land uses of this important boundary area.
- The design initiatives of the proposed Station Core, including the retention of historical memory in a new city and the design concept which allows for penetration of natural lighting into the underground spaces, deserve special commendation.
- Graphic presentations are generally attractive and well prepared.

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1	CHAU CHAM SON	周湛燊
7	PUN KWOK SHING	潘國城
9	TSANG CHING LUN EDWIN	曾正麟
10	YEH GAR ON ANTHONY	葉嘉安
11	TAM PO YIU	譚寶堯
15	AU KIT YING BRENDA	區潔英
17	TANG SIU SING	鄧兆星
28	TANG BO SIN	鄧寶善
29	CHAN KIM ON	陳劍安
30	TAM SIU YING IRIS	譚小瑩
34	CHUNG MAN KIT IVAN	鍾文傑
38	HO SIU FONG BETTY	何小芳
39	LEUNG CHEUK FAI JIMMY	梁焯輝
42	LAI WAI CHUNG LAWRENCE	黎偉聰
43	CHUNG PUI KAI	鍾沛佳
44	TANG YORK MAY AGNES	鄧若薇
45	TAM TZE HOI	譚子愷
46	AU WAI KWONG ELVIS	區偉光
47	YEUNG CHI WAI	楊志威
49	CHAN WAI SHUN	陳偉信
59	LAM WING MAN	林永文
66	PANG CAROLINE Y.	彭浣儀
68	KHONG YON FAI MARINO	鄺潤輝
69	SEDDON KAREN ROSE	薛嘉蓮
72	TO LAP KEE	杜立基
73	WONG SHUN WUN REBECCA	黃舜浣
78	CHAN WAI MAN WILLIAM	陳偉文
79	LING KAR KAN	凌嘉勤
87	PETER COOKSON SMITH	
92	BROWNLEE IAN THOMAS	
93	LEE SHU WING, ERNEST	李樹榮
96	NGAI SIK KEUNG	倪錫強
98	NG CHEUK YEE JOHN	伍灼宜
99	MAK HOI CHEUNG EUNICE	麥凱薔
101	LO YU KWAN, RUPERT	羅如琨
103	YU LAP KEE	余立基
104	CHEUNG YI MEI AMY	張綺薇
105	WONG LAP KI	黃立基
108	CHAU YAT CHEUNG LAWRENCE	周日昌
111	CHAN HOI YUN HELEN	陳凱恩
113	WONG WAI MAN GINA	黃慧敏
114	LEUNG WING KWONG	梁榮光
115	WONG YUEN SHEUNG OPHELIA	黃婉霜
117	CHAN TAT CHOI TED	陳達材
118	PANG LAI FAI, WILLY	彭禮輝
120	LEUNG SHU KI	梁樹基
122	HO YING KWONG	何應光
123	NG YONG, STELLA	黃蓉
127	LAW MING	羅民
128	NG SUK KWAN	吳淑君
130	LAM BO YIN	林寶燕
132	AU HEI FAN	區晞凡
134	AU CHEUNG MING	區長明
137	CHENG WAN YING JOHANNA	鄭韻瑩
138	CHENG TAT CHEONG	鄭達昌
139	YIP OI FONG	葉愛芳
142	BLACK, PHILLIP DOUGLAS	寶力勤
146	CHAN PAK HAY, SIMON	陳栢熙
147	LAM SAU HA	林秀霞
148	LAM TAK KEUNG	林德強
149	LAW TAT PONG	羅達邦
151	TANG MAN HUNG, ROGER	鄧文雄
152	WU MING YEE AMY	胡明儀
154	CHU HA FAN	朱霞芬
156	MACDONALD ALAN FORBES	
157	CHAN HAU YIN MARGARET	陳巧賢
158	NG KIM WAI	吳劍偉
160	HUI CHI MING LAWRENCE	許自明
162	KAN KWOK CHEE JOSHUA	簡國治
164	CHIU SUNG PAK EDMOND	趙崇柏
165	TAM YIN PING DONNA	譚燕萍
166	LAU CHI TING	劉志庭
167	LUK KWOK ON	陸國安
169	YUEN SHING YIP KEPLER	袁承業
170	YIU CHIN, STEVE	姚展
172	TANG TSUI YEE, CAROLINE	鄧翠儀
174	HUI CHAK HUNG DICKSON	許澤鴻
175	YIU KUK HUNG, PORTIA	饒菊紅
179	WONG CHUN KWOK	黃鎮國
180	HO CHI WING	何智榮
181	WONG WAI YIN, PATRICK	黃偉賢
182	SIU WAI YIN, FLORENCE	蕭瑋賢

186	LI MAN WAI KENNETH JOHN	李民威
188	YOUNG PUI YIN, EDWIN	楊沛然
189	LO SUI YAN PHILIP	盧瑞炘
190	NG WING FAI STANLEY	吳永輝
193	LEONG YEE TAK YVONNE	梁懿德
195	HARRAD BERNARD WILLIAM	
200	LEUNG PUI CHU	梁佩珠
201	LEUNG YIP HUNG RAYMOND	梁業鴻
203	FUNG MO YEUNG PATRICK	馮武揚
205	CHEUNG CHO LAM	張祖霖
206	NG KWOK LEUNG, STEVEN	吳國良
208	TSE PUI KEUNG	謝佩強
210	SUN CHE YUNG DEREK	孫知用
213	CHEUNG CHI KEUNG SIMON	張志強
214	LAI PIK HUNG	賴碧紅
215	TSANG WING KEUNG	曾永強
216	AU YU LUN	區裕倫
217	CHAN WAI YI	陳慧儀
218	TANG WING KEUNG	鄧永強
219	LAM LIT KWAN	藍列群
221	LAM YUK CHING	林玉清
224	CHAO TAK SUM TERENCE	巢德森
225	WONG YUK SUM	黃旭森
226	LAW CHUN PONG	羅振邦
227	WU YUK HA	胡玉霞
228	CHEUNG YUK YI ALICE	張玉儀
230	WONG MAN KAN	王民勤
232	CHEUNG SIMON	張業文
233	YEUNG WING SHAN THERESA	楊詠珊
235	YAM YA MAY LILY	任雅薇
236	TAM KIT I	譚潔儀
237	WONG CHIU SHEUNG	黃超常
238	CHOW WAI LING	周惠玲
243	AU CHIN PANG	歐展鵬
244	TSANG CINDY ANNE LEE	曾思蒂
245	AU CHI WAI DAVID	區志偉
247	POON KAI LOK	潘啟樂
248	CHAN KING KONG THERON	陳勁剛
250	TONG PO WONG EMILY	唐寶煌
251	SO YUET SIN	蘇月仙
252	SO OI TSZ, TERESA	蘇愛慈
253	NG WAI MAN	吳慧敏
255	MOK KWOK CHUNG DICKSON	莫國忠
256	WONG YUK LING	黃玉玲
258	KWAN YEE FAI, MIKE	關以輝
259	SZE LAI HUNG	施麗虹
260	LAU FUNG YEE	劉鳳兒
264	CHU WING HEI, ALVIN	朱永熙
266	TSANG WAI MAN, VIVIAN	曾慧雯
267	LAM KWOK CHUN	林國春
268	WONG WAI YEE MICHELLE	汪慧兒
269	CHAN SHUK WAH ANNIE	陳淑華
270	LEUNG KWOK MAN LAUTREC	梁國民
273	LAI SHIN KWAN FLORA	黎倩君
274	LO YUK MAN JOSEPHINE	盧玉敏
275	LEE WAI YING JOANNA	李慧瑩
276	YANG CHING	楊倩
278	TSANG HUNG SHEEBA	曾紅
280	LO WING YEE	盧穎儀
281	LEE SIN YEE CINDY	李倩儀
282	YUEN MAN SIN	阮文倩
287	LAM MAN YING, JOSEPHINE	林敏瑩
288	LUNG YAN CHEUNG HELEN	龍欣翔
291	CHOW MAN HONG	周文康
292	CHAN KWUN HANG COWAY	陳冠恆
294	CHAN KOK YUN	陳國欣
295	LIU CHUNG GAY, SHARON	廖頌基
296	LAU KIT YING	劉潔瑩
297	NG KA WAH	吳家華
299	LAM MEI YEE	林美儀
300	CHAU YIN MAI, LISA	周燕薇
302	LEE THOMAS	李建華
304	CHANG MING LAI REGINA	張明麗
306	LAU TAK FRANCIS	劉德
308	LEE KIN KI	李建基
309	CHAN LAI CHEUNG	陳禮璋
310	KAN KA MAN	簡嘉敏
314	LUK SIU CHUEN	陸紹傳
315	LUK YIN SHEUNG VERONICA	陸迎霜
316	NG HIU MING HERMAN	吳曉鳴
317	LEE KA KAY	李家琪
319	SIU KA LAY, GRACE	蕭嘉莉
320	IP WAI YI, ALISON	葉慧儀
321	YEUNG SHUI LING	楊瑞玲
322	HUI PUI YEE, PEARL	許貝兒
323	FOK CHI WAI, DAVID	霍志偉
324	WONG PUI SAI, KITTY	黃沛茜
325	MAK CHUNG HANG	麥仲恆
326	FU YEE MING	傅義明
327	CHAN SUET YING, CARMEN	陳雪盈
328	CHEUK CHING PING JACQUELINE	卓靜萍
329	TANG PO KWAN ANNY	鄧保君
330	POON HO WAN	潘浩雲
331	YUNG HUNG TAN, NELSON	翁胸坦

332	LAU KAR KAY, ALAN	劉家麒
333	WONG HEI YIN JULIAN	黃曦然
334	YU PUI SZE CANETTI	余佩詩
335	CHAN TIN YEUNG JOSEPH	陳天揚
336	LI KA SING CHARLES	李嘉聲
337	LEE CHUN KIT	李俊傑
339	HO KON CHUNG	何幹忠
340	NG SZE NGA GLADYS	吳詩雅
341	AU PUI YU	區佩瑜
342	LEE MO YI	李霧儀
343	LO SING WUN	盧星桓
344	CHAN PAK KAN	陳伯勤
345	LO OI LING CHRISTINA	盧愛玲
346	LEE KAI WING, RAYMOND	李啓榮
347	LAU SAU YEE	劉秀儀
349	LEUNG ZIN HANG EBBY	梁善姮
350	CHAN HONG LEI	陳康妮
351	SIU YIK HO STEVEN	蕭亦豪
352	TANG KING YAN SUNNY	鄧敬恩
353	LO JANICE BRYANNE WING YIN	盧穎妍
354	CHENG KA MAN, CLEMENT	鄭加文
355	LOK HOM NING	樂晗寧
356	IP PAN WAI	葉斌緯
357	CHEUNG HO WING	張浩榮
358	AU-YEUNG WAN MAN	歐陽允文
359	CHAN WING KIT, KENNY	陳榮傑
360	FUNG KA WUN, EDITH	馮嘉媛
361	KAN CHEUNG HENG	簡昌恆
362	POON FU KIT, BENSON	潘富傑
363	WHITMAN KIRA LOREN	
364	CHAN MOU YIN, CYNTHIA	陳慕然
365	HUNG TING WAI, DAVID	洪定維
366	LEONG KA HO	梁嘉豪
367	CHEUNG HOI YEE	張凱怡
369	HO WING HEI, NANCY	何穎曦
370	WONG CHUNG YING	黃忠瑩
371	YIP SIU KWAN, SANDRA	葉兆筠
372	LAM TSZ KWAN	林芷筠
373	LAW HO HEI	羅晧希
374	CHIU SUNG NGAI, ADRIAN	趙崇毅
375	CHEUNG MAN YEE	張敏兒
376	MAK TSZ WAI	麥芷蕙
377	CHAN DISTINCTION	陳江瑋
378	LAU CHI KING, VINCENT	劉子敬
379	WONG PO KIT	黃保傑
380	TO YUEN GWUN	杜元鈞
381	TANG WAI LAP	鄧偉立
382	AU YEUNG KWAN	歐陽坤
383	LAU SZE HONG	劉思航
384	MO CUI YU, CHARLENE	莫翠瑜
385	FUNG WING HANG, MATHEW	馮穎洢
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390	WONG CHO TING	黃楚婷
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394	WAI CHE HONG	韋志康
395	PANG YIU FAI	彭耀暉
396	CHAN CHI HANG, RONALD	陳智恆

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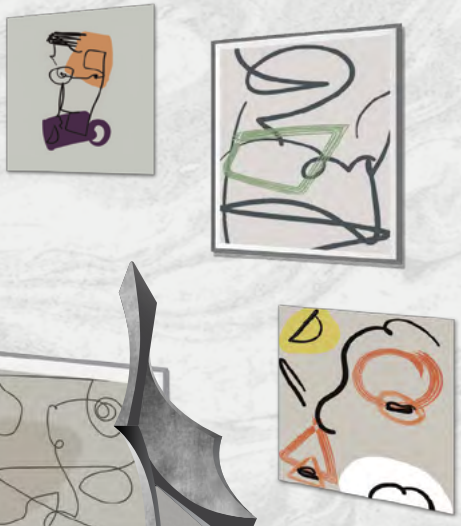

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