Smart and Sustainable City Framework with Smart Cultural Precinct as Case Study

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Abstract   The Smart and Sustainable City Framework (SSCF) redefines the idea of 'Smart City' to having "Smart Thinking, Planning and Design" as fundamental for smart and sustainable city development. The framework focuses on the core values of "Smart People, Smart Place, and Smart Planet" that helps shape the city through innovative solutions with technology embedded as an enabler to create a more liveable, walkable, resilient and happy cities for all. Six elements of the Smart and Sustainable City Framework are discussed, which consists of "Smart Living", "Smart Environment", "Smart Mobility", "Smart Infrastructure", "Smart Governance", and Smart Economy".

Smart Cultural Precinct (SCP) with the Cultural Triangle at its core in Central, Hong Kong will be used as a case study to demonstrate the use of the SSCF, together with recommendations for Hong Kong and suggestions for the broader application of the SSCF to help shape better cities.

Keywords: Area Based Cultural Heritage Conservation, Smart Cultural Precinct with Cultural

1. Introduction

Smart City represents the vision of the future urban development (Song et al, 2017). Many cities worldwide have adopted such principles. Often the concept comes with the digitization of services including the use of information and communication technologies to monitor, assess, disseminate and manage cities. Smart city aims to create a productive, efficient and growing city while making the best use of the existing resources.

Although there are many different definitions, frameworks and approaches regarding the components of Smart City, they mostly focus on technology as the key driver. Without emphasizing the importance of good planning and design to create great places for people while safeguarding the environment, technology alone cannot create cities that are truly smart and sustainable. Therefore, a comprehensive Smart and Sustainable City Framework (SSCF) has been developed by the Institute for Sustainable Urbanisation (ISU) and UDP International to emphasise the importance of smart thinking, planning and design with a focus on people, place and planet.

2. Smart and Sustainable City Framework

SSCF rethinks the idea of Smart City involving Smart Thinking, Planning and Design as the fundamental concepts. Smart Thinking includes the initial ideas, thoughts, visions and processes of developing smart and sustainable cities with different stakeholders working together to make
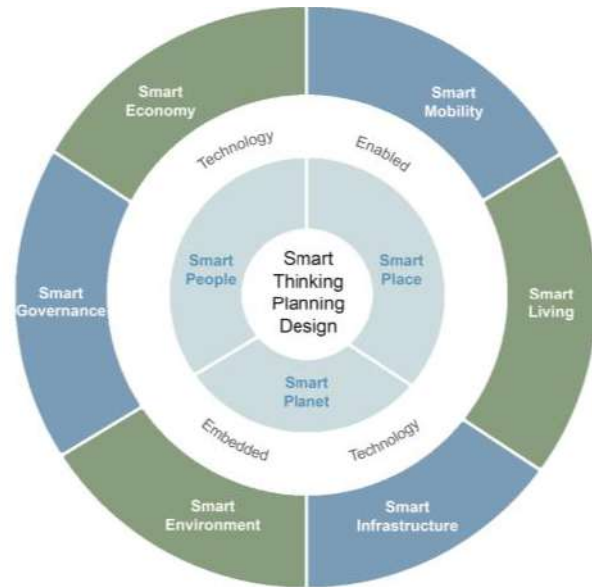

Figure 1: SSCF Wheel (ISU & UDP International, 2019)

sound decisions to implement and manage the city. It reflects the principles and values of people and communities with a vision to create smart and sustainable cities in the future. Technology is important as an enabler and should be treated as a tool, so the fundamental premise of planning and designing the city well will not be lost (Govada et al, 2017a).

With Smart Thinking as the foundation of Smart City, the core values of Smart People, Place and Planet will help shape the city through the use of innovative solutions to build a walkable, liveable, affordable and resilient city for everyone to enjoy. The concept of Smart People refers to citizens having a Smart Thinking mindset and behaviour as it has direct influence on the development of a smart and sustainable

city. A Smart Place means that city is planned, designed, and built for the human scale and has considered Smart Thinking and Smart People in the planning and design process. Smart Planet refers to the harmonious and resilient relationship between the natural environment and the built environment, in which adverse impact of development is limited and mitigated as far as possible.

The SSCF emphasizes the importance of incorporating People, Place and Planet as the fundamental core values of a smart and sustainable city. It is a more holistic and comprehensive approach than focusing solely on technological advancement in creating new and transforming existing cities to be smart and sustainable. With the core values in place and technology as an enabler, six smart and sustainable city elements should be considered, which include Smart Living, Smart Mobility, Smart Infrastructure, Smart Environment, Smart Governance and Smart Economy.

2.1 Smart Living

Smart Living focuses on all aspects of human life affecting one's happiness and health considering people first, as a top priority. Access to affordable housing and decent living environment with high quality public space for all is fundamental for Smart Living. In addition, offering education, employment and leisure opportunities for all combined with community and health care facilities are key while promoting heritage, art and culture to improve the quality of life of people.

Smart Living aims to offer an active and healthy lifestyle with social cohesion, equity and equality to encourage people become more responsible, collaborative, compassionate and spiritual by connecting mind, body and soul as well as treating everyone equally. Resources including education and healthcare should be available and accessible not only for the current but also for future generations. Moreover, a safe and secure environment both during the day and at night is essential for people to feel comfortable living in, working and experiencing the city.

2.2 Smart Environment

Smart Environment concerns resource efficiency and the sustainable city development with the built environment sensitive consideration of the natural environment. A smart environment should aim to provide plentiful public open space with smart resource management, ecological protection and biodiversity (Govada et al, 2019). People have social interactions, leisure, recreation, and entertainment activities in open space, facilitating a diverse and cohesive society, ensuring physical, social, psychological well-being and mental health which is essential for people and beneficial for the community as well.

Smart Environment encourages sustainable built environment beyond green building design and sustainable neighbourhoods. Negative environmental impacts should be reduced for better quality of life by using energy efficient technologies and sustainable materials to manage water, waste and electricity effectively. The

government should implement and monitor environment protection in close collaboration with society and various stakeholders to raise the awareness of the importance and benefit of sustainable policies and regulations to ensure that the built environment is protected and in harmony with the natural environment.

2.3 Smart Mobility

Smart Mobility aims to promote the efficient and sustainable movement of people and goods locally, regionally and internationally with sustainable modes of transport such as public transit, walking and cycling. Multi-modal public transit should be primary to address the mobility needs to support the large number of people movement within the urban environment, supported by clean non-motorised transit (NMT) options as the basis for last mile connectivity. Moreover, public transportation integrate with information and communications technology (ICT) services to provide traffic and transport information including schedules, routing and real time tracking is essential. Smart Mobility aims to reduce the use of private vehicles through multi-modal transport options as the most inefficient traveling mode. Cities should promote the zero-carbon emission such as electric vehicles for cars, taxis and buses, or even driverless cars to reduce the negative impacts of motorized transport. The roadside Green House Gases emission will be further reduced while the walking environment for pedestrians will be greatly enhanced as a result.

To integrate the different elements in Smart Mobility, SSCF with a central focus on mass transit and NMT is fundamental. Transit and Pedestrian Oriented Development (TPOD) should become the development model for the future to ensure smart and sustainable cities.

2.4 Smart Infrastructure

Smart Infrastructure provides for high quality infrastructure including the physical and non-physical elements. Physical infrastructure refers to road network, utilities, public realm and sensors, while non-physical infrastructure refers to the ICT. Physical and non-physical infrastructure should be integrated and inter-connected, which enables communication and data transfer for efficient resource management. For example, the use of smart grid and sensors to monitor the usage of public utilities facilitates smart resource management for water, energy and waste.

Moreover, the use of smart application and Internet of Things (IoT) provides transparent data management for all parties including the public, the government and businesses through the internet and various smartphone applications. In addition, all infrastructures should be resilient to disasters and emergencies, so the city can react promptly and has sufficient level of security to deal with cyber-attacks. Citizen engagement education, awareness and preparedness for resiliency are key for a smart and sustainable city.

2.5 Smart Governance

Smart Governance requires strong leadership and commitment to ensure good governance with an agreed common city vision and proper decision making process supported by the political will, administrative skill and resources to implement. Public sector should offer proper services and work together with multiple stakeholders' engagement including private sector, civil society, professional, academia, NGOs and community to make sound decision-making processes to achieve the common city vision and ensure smart and sustainable city development. Smart Governance is achieved with proper, transparent and inclusive management that ensures information is accessible to all sections of society.

Sustainable policies should be implemented efficiently and effectively in order to inspire the positive improvement and ensure impartial policy implementation. E-governance is an important tool for government to strengthen community engagement, public participation and public welfare (Govada et al, 2017b). It ensures that all citizens can enjoy adequate and appropriate public services with high quality efficiency, in person engagement through workshops and forums with face to face interaction, which allow government decisions to be more transparent to all citizens with integrated and accessible information, thereby enhancing the efficiency of public services.

2.6 Smart Economy

Smart Economy refers to a diverse economy that is open and transparent including multi-sectorial, flexible market opportunities for business and employment, as well as promoting entrepreneurship, innovation and higher productivity through local, regional and global collaborations. These characteristics reflect a strong local, regional and global competitiveness within a well-connected economy.

Smart Economy promotes an effective and efficient business environment for the entrepreneurs and encourages innovation in the industry. It also ensures a stable skilled labour force with rich resources and ability to transform the city as well as enhance the livelihood of its citizens while promoting a healthy lifestyle. It is essential that government should be locally proactive and innovative with locally sensitive with regionally and globally connected policies in order to enhance and maintain the attractiveness and competitiveness in the regional and global economic environment.

3. Smart Cultural Precinct

The Smart Cultural Precinct (SCP) is a comprehensive conservation and revitalisation concept initially proposed by UDP International and more recently involving bottom-up public engagement activities together with the ISU and in collaboration with YWCA to create a great place in Central and enhance the heritage and cultural conservation and support the government's "Conserving Central" Initiative.

At the core of SCP is the Cultural Triangle formed by the three historic landmarks, Police

Figure 2: Cultural Triangle (ISU & UDP International, 2019)

Married Quarters (PMQ), Central Police Station (CPS) and Central Market (CM) in Central. All three landmarks are part of Government's conservation policy promoting adaptive reuse of buildings of cultural significance with compatible uses. PMQ was successfully completed in 2014 and is considered a landmark for creative industries (PMQ, 2018), and CPS, also known as Tai Kwun, was completed in 2018 and is now a popular centre for Heritage and Arts (Tai Kwun, 2018). CM is currently under renovation and will be completed by 2021/2022, which will be transformed into a landmark for market

and leisure activities including affordable and unique retail for everyone to enjoy (Central Market, 2018). Currently the three buildings are functioning in isolation, which limits heritage conservation at a building scale and does not capitalise the full potential of revitalising the district as a whole. SCP will help further strengthen the Cultural Triangle and the linkages between these three building(s) and also integrates the area in between, including Pak Tze Lane, Yu Lok Lane, Graham Street Market, and Wing Lok Lane to form a cultural precinct. Existing connections such as the Mid-Levels Esca-

lator, Staunton Street and Hollywood Road will be key pedestrian linkages of the cultural precinct. SCP aspires to be a catalyst to re-energise and transform Central into one of Hong Kong's most vibrant areas filled with culture and local character.(Figure 2)

3.1 Preserving the Cultural Heritage

Aside from the three key buildings, Central District is unique with its combination of the old and new developments juxtaposed right next to each other within the district. Moreover, the district is a vibrant place full of heritage, culture and creativity with many art galleries and street art including art works, paintings and graffiti within the area, drawing both local and international visitors. The cultural precinct area has been a distinct and major component contributing to Central's vibrant characteristic contributing to the unique image and identity of Hong Kong.

Rebranding PMQ, Tai Kwun and CM as the Cultural Triangle at the core of SCP will bring together all the important sites together along with the Mid-level Escalator, H6 Conet, and Dr Sun Yat-Sen Historical Trail physically and virtually to bring Hong Kong's culture and heritage back to life. The SCP takes on a more holistic approach to develop an area based cultural and heritage conservation plan including streetscape improvement with community and place making initiatives to further enhance and revitalise the district. SCP is a demonstration of Smart Living, creating a walkable cultural precinct to improve the quality of life that is so-

cially inclusive, integrated, smart and sustainable for the enjoyment of the local residents and visitors alike. SCP could become a model for revitalizing other areas such as Sham Shui Po and Yau Ma Tei in Hong Kong and beyond.

3.2 Enhancing the Environment

The SCP envisioned a walkable and pedestrian-friendly environment that showcases the local heritage and culture within the cultural precinct in Central. Currently, many of the streets within the cultural precinct are car-oriented and congested with traffic, which leaves pedestrians with narrow sidewalks and creates an un-pleasant environment that is uncomfortable and un-safe for people to walk. There is also a lack of users and activities within open spaces of the area as they are not properly connected with the pedestrian network. The current environment of the area is very utilitarian and of poor quality in terms of streetscape and open space.

As a result, the three landmark building(s) within the Cultural Triangle together with the streets and open spaces can become integral part of an open space network within SCP. The street activities in the area create a favourable social environment to build a platform for collaborations in various forms between community, businesses, culture and performance. Paved pedestrianised and shared streets along with traffic calming measures as well as wayfinding and signage would help create a more walkable and pedestrian-friendly environment to attract locals and tourists to enjoy the Cultural Triangle and SCP. Staunton Street is proposed to become
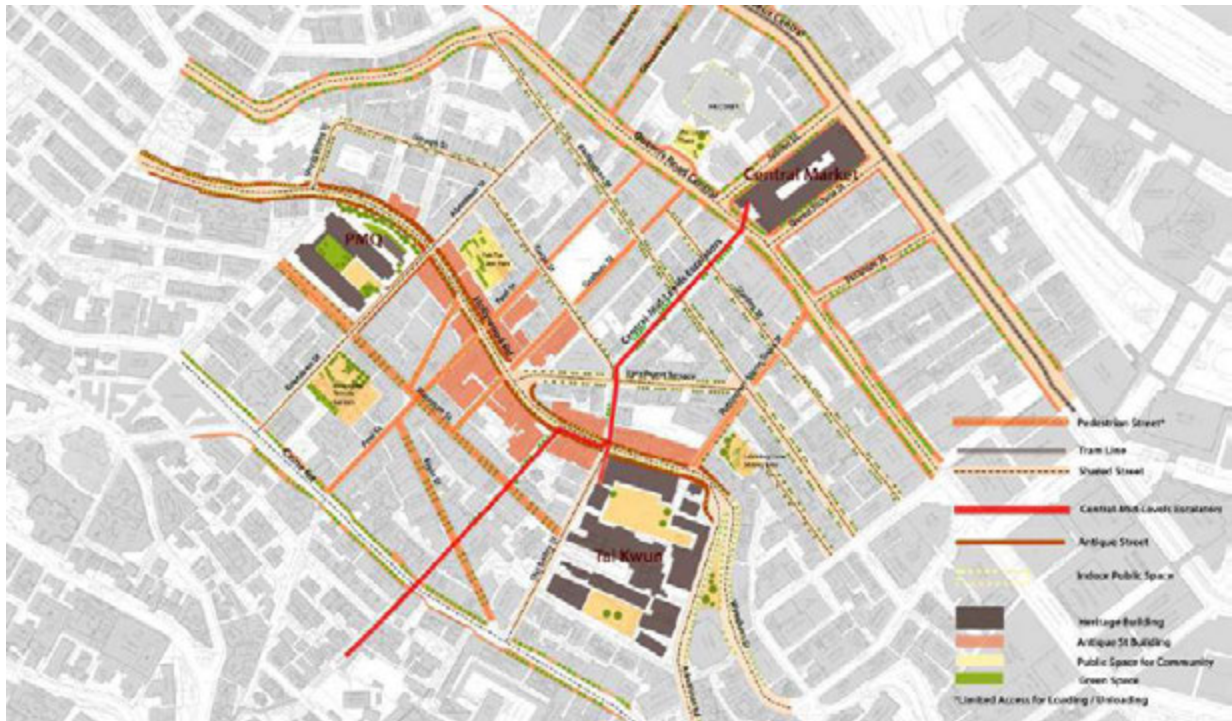
Figure 3: SCP Master Plan (ISU & UDP International, 2019)

Figure 4 & 5: Artist Impression of Hollywood Road (ISU & UDP International, 2019) & Staunton Street (ISU & UDP International, 2019)

a pedestrianised street given its vibrancy and direct linkage between Tai Kwun and PMQ. Hollywood Road is identified to have the potential to become a shared street as a main street in the cultural precinct. Gage Street and Aberdeen Street are also suggested to become shared streets to offer better connectivity for pedestrians and reduce the current vehicle dominant situation to build a safe and pleasant walkable neighborhood. Also, landscaping should be provided as much as possible, for example Queens Road Central can be transformed into a landscaped boulevard. Technical assessments would need to be conducted for the feasibility of the suggested streetscape improvements as well as a mindset change among Hong Kong people to make this vision a reality.

3.3 Improving Walkability

The SCP also aims to overcome the poor walking condition by improving the permeability and legibility of the area. Currently, the Mid-Levels Escalator has demonstrated smart mobil-

ity as a highly effective response to the hilly topography of Central District and provided a walkable, continuous connection with gradual level changes (Cho et al, 2015). It also enhances the permeability and legibility of the area to the needs of the locals and visitors as well as it functions as a tourist attraction. It not only serves as a viewing platform to observe the city life on the various streets that cross within the area, but the Mid-Levels Escalator has also proven successful in organically regenerating the area as a result of the many street level connections.

On the other hand, the revitalisation and adaptive reuse of PMQ, Tai Kwun and CM, have proven to be useful as way-finding cues because of their local character and unique built form. This can be further improved by linking the Cultural Triangle and the area in between and beyond digitally through a public sharing platform, such as an app and/or blog of the precinct to provide information on local heritage,
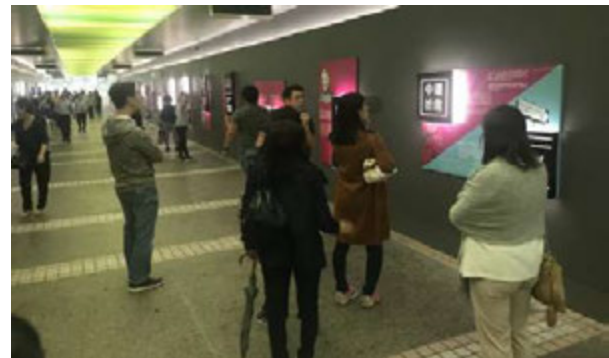

Figure 6 & 7: Mid-Level Escalator (ISU & UDP International, 2019) & Central Market Public Passageway Exhibition (ISU & UDP International, 2019)

Figure 8: Illustration of Possible Navigation App for SCP (ISU & UDP International, 2019)

tourist attractions and shopping area. Users can learn and explore the area while improving the precinct's wayfinding.

The SCP can become a walkable and connected precinct within the Cultural Triangle, the precinct and beyond. This will help create a smart and sustainable precinct that is pedestrian and environmental-friendly for people to live, work, play and learn. It also helps to create a healthy, happy and liveable environment, enhancing people's quality of life and achieving principles in Smart Mobility, Smart Living and Smart Environment.

3.4 Community Engagement

More recently ISU and UDP International worked together with YWCA, with funding support from the Central and Western District Council, to host a series of events and activities in 2019 to educate and raise awareness of SCP and the Cultural Triangle in Central among the local community. The SCP Kick-off Event, Walk and Workshop, Walk and Building Tours, Community and Place Making Event, and Arts and Crafts Workshop as well as the Public Forum on Walkable Cities were very successful in engaging the local community in raising awareness about the cultural heritage and getting positive feedback regarding the cultural precinct in Central.

The walk tours and workshops were held to introduce SCP and gather feedback from the local community by introducing the different aspects of the cultural precinct to allow the public to re-imagine the possibilities of this area in Central. Elderly participants were engaged and shared about the local cultural heritage from their childhood stories and experiences. A number of topics were discussed, including ways to improve the walkability within the cultural precinct by making it more pedestrian-friendly; provide a better linkage between the three building(s) and the area in between physically and digitally to strengthen the Cultural Triangle as the core of the precinct; more cooperation between key stakeholders such as residents, shop owners and renters to emphasize a sense of community within the cultural precinct; promoting local F&B, arts and crafts; promoting other programs, events and activities through social media; realizing SCP at Central to help enhance the overall city image and identity; and becoming a model for other areas in Hong Kong and beyond.

A Community and Place Making Event was held in Lok Hing Lane Temporary Sitting-Out Area on a Saturday afternoon. Using simple decorations such as balloons, mats and bean bags in vivid colors, the sitting-out area was transformed into a lively place that is attractive and welcoming. The Community and Place Making Event aimed to demonstrate the potential of underutilized spaces that can be used as a more engaging and active space for the community and visitors with games, food and music attracting people passing by as well. In addition, a map of SCP was provided to engage participants to find key street features and buildings within the area, thereby initiating discussions and raising awareness of the local culture and heritage within the cultural precinct. The event has successfully attracted the local community, students, tourists, and professionals to experience a different Lok Hing Lane Temporary Sitting-Out Area than they are normally accustomed to. Many of the participants appreciated the change in environment and had expressed interest in making this a regular event in the future.

Figure 9 & 10: Walk Tours and Workshops (ISU & UDP International, 2019)

Figure 11 & 12: Community and Place Making Event (ISU & UDP International, 2019)

The Public Forum and Walkable Cities event presented the Cultural Triangle and SCP vision and shared the various public outreach and community engagement events undertaken by ISU and UDP International together with YWCA. During the event, elderly and young participants performed, shared their experiences and celebrated the cultural heritage in Central and Hong Kong. In addition, the Public Forum became a platform to discuss how to use SCP as a model to promote cultural precincts in other districts in Hong Kong and beyond. A SCP Map illustrating the heritage and culture of the precinct was showcased to the participants for their feedback. All guests and participants received a SCP T-shirt as a souvenir that is designed with hand sketches of the three key landmark buildings showcasing the Cultural Triangle as the core within SCP, the walkable cultural precinct in Central.

Figure 13 & 14: SCP Public Forum (ISU & UDP International, 2019)

Figure 15: SCP Map (ISU & UDP International, 2019)

Figure 16 & 17: ISU UDP & YWCA Team (ISU & UDP International, 2019) & Hong Kong Biennale of Urbanism\Architecture (ISU & UDP International, 2019)

To further engage the community and raise awareness of the concept of SCP, ISU and UDP International have teamed up with AIA Hong Kong along with THEi's support with the students' model of the larger Central area to showcase SCP as an exhibit in the 2019 Hong Kong Biennale of Urbanism\Architecture that is currently underway. Walk tours and workshops are planned to be organized to raise awareness and receive further feedback from a wider audience.

4. Conclusion

The SSCF shows that Smart Cities should not be just technology-driven, but through 'Smart Thinking, Planning and Design' focus on Smart People, Place and Planet smart and sustainable development can be ensured. Key elements such as smart Living, Environment, Mobility, Infrastructure, Governance and Economy can help shape the city through innovative solutions with technology embedded and enabled to create more walkable, liveable and enjoyable places to be in.

Using the SCP with the Cultural Triangle at its core as a case study, we hope to showcase SSCF as a tool to assess cities systematically and strengthen the good qualities; address the weaknesses and shape better cities. SSCF can also be further developed to incorporate different assessment and measuring tools such as rating system and performance indicators. It can be used to assist in policy development as well as planning and design process in the initial planning and design, implementation and evaluation stages. The SSCF can provide a clearer direction on Smart and Sus-tainable City development and help shape better cities that are more inclusive, liveable, walkable, resilient and happy cities for all.

Dr. Sujata Govada's Biography

-CEO and Managing Director, UDP International
-Founding Director, Institute for Sustainable Urbanisation (ISU)
-Adjunct Associate Professor, School of Architecture, Chinese University of Hong Kong
-Global Trustee, Urban Land Institute
-Past President, AIA Hong Kong
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Dr. Sujata S. Govada is an award winning urban designer and town planner with over thirty years of diverse international experience in urban design and planning. Her work has been recognized for innovation and influence in increasing awareness on sustainable development that shapes livable and walkable cities. She has received over 10 major urban design and planning awards for projects including the HBF's Harbour-front Connectivity Study, the Graham Market Area – WCC Alternative Proposal and Designing Hong Kong's Central Waterfront Planning and Urban Design Competition Award Winning Entry, "Central Harbourfront Promenade – "Emerald Necklace", a joint submission with RTKL.

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