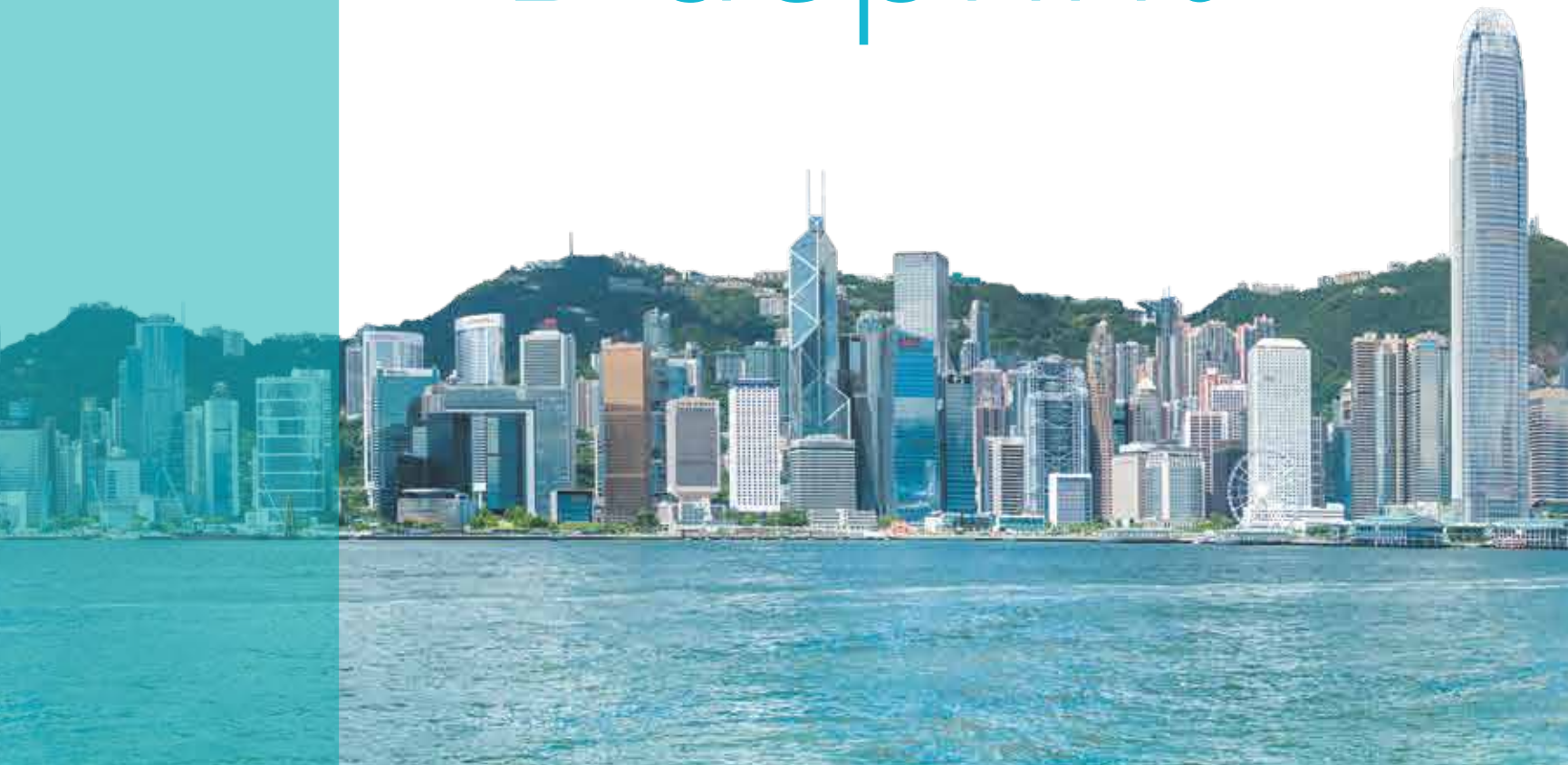
Hong Kong Smart City Blueprint



Foreword

We strive to build Hong Kong into a world class smart city, through adopting the measures set out in this *Smart City Blueprint for Hong Kong*.

Our policy objectives to pursue smart city development are to –

(a) make use of innovation and technology (I&T) to address urban challenges, enhance the effectiveness of city management and improve people's quality of living as well as Hong Kong's sustainability, efficiency and safety;

(b) enhance Hong Kong's attractiveness to global businesses and talents; and

(c) inspire continuous city innovation and sustainable economic development.

We have commissioned a comprehensive consultancy study which has made short-, medium- and long-term recommendations in six major areas, namely: "Smart Mobility", "Smart Living", "Smart Environment", "Smart People", "Smart Government" and "Smart Economy". Having regard to our city challenges, unique local situation and strengths and opportunities ahead, we have mapped out in this document our smart city development plans in the next five years, and beyond.

Smart city is people-centric. It should be built upon the needs of the people and the benefits should be seen and felt by residents and visitors. We will review the effectiveness of our work from time to time, and introduce new measures to bring in more I&T applications to our city.

Innovation and Technology Bureau
December 2017

Vision

Embrace I&T to build a world-famed Smart Hong Kong characterised by a strong economy and high quality of living

Mission

(a) to make people happier, healthier, smarter and more prosperous, and the city greener, cleaner, more livable, sustainable, resilient and competitive;

(b) to enable the business to capitalise on Hong Kong's renowned business-friendly environment to foster innovation, transform the city into a living lab and test bed for development;

(c) to provide better care for the elderly and youth and foster a stronger sense of community. To make the business, people and Government more digitally enabled and technology savvy; and

(d) to consume fewer resources and make Hong Kong more environmental friendly, while maintaining its vibrancy, efficiency and livability.

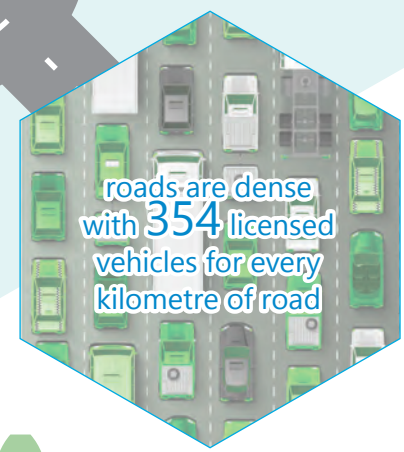

Smart
Mobility

Current Status

over 12.6 million passenger trips on public transport every day with railway being the backbone

- √ mobile check-in desks
- √ self-bag drop
- √ indoor wayfinding
- √ tracking of airside vehicles
- √ smart luggage tag

over 99% of Hong Kong people possess at least one Octopus card for digital payment across public transportation and retail outlets



roads are dense with 354 licensed vehicles for every kilometre of road

Strategy and Initiatives

Intelligent Transport System and Traffic Management

- Integrate existing applications (HKeTransport, HKeRouting and eTraffic News) into an all-in-one mobile app by 2018
- Develop the installation of "in-vehicle units" (IVUs) for allowing motorists to receive real-time traffic information and paying tunnel fees by remote means through the IVUs, without toll booths in the light of the feasibility study to be completed by 2018
- Complete the installation of about 1 200 traffic detectors in all strategic roads to provide real-time traffic information by 2020
- In light of the results of the feasibility study, engage the public to develop a detailed Electronic Road Pricing (ERP) Pilot Scheme in Central and its adjacent areas and its implementation strategy in 2019

- Introduce pilot intelligent traffic signal systems with sensors for pedestrians and vehicles at road junctions starting from 2021

- Adopt an automatic tolling system without toll booths for the new Tseung Kwan O – Lam Tin Tunnel in the light of findings of field trials and subject to the approval of the Legislative Council on the necessary legislative amendments by 2021
- Facilitate trials of autonomous vehicles in West Kowloon Cultural District and other areas as appropriate
- Facilitate public transport operators' plans in introducing new electronic payment systems for public transport fare collection, having regard to the systems' reliability, user friendliness and efficiency
- Encourage public transport operators to open up their data
- Pilot the use of technology to deter improper use of loading and unloading bays and illegal parking from 2018
- Explore the use of crowd management system at Kai Tak Sports Park by the management authority to facilitate the monitoring of people and vehicle flows during major events

Public Transport Interchanges (PTIs)/Bus Stops and Parking

- Release real-time information of franchised buses through mobile devices by 2018 and information display panels at government PTIs and 1 300 covered bus stops by 2020
- Install new on-street parking meters to support multiple payment systems (including remote payment through mobile applications) starting from 2019-20 with provision of real-time parking vacancy information
- Encourage owners or operators of existing public car parks to provide real-time parking vacancy information using technology solutions to facilitate drivers to find parking spaces; and examine practicable measures to require new public car parks to provide real-time parking vacancy information

Environmental Friendliness in Transport

- Establish "bicycle-friendly" new towns and new development areas and improve existing cycle tracks and cycle parking facilities in new towns in phases, with the first phase of improvement works to be completed by 2018
- Take forward "Walk in HK" and encourage people to walk more by launching a series of initiatives under four themes which include
  - (i) "Make it smart" by providing user-friendly information on walking routes
  - (ii) "Make it connected" by enhancing pedestrian networks
  - (iii) "Make it enjoyable" by making walking a pleasant experience
  - (iv) "Make it safe" by providing a safe and quality pedestrian environment

  Specific measures include providing covers on certain walkways connecting to public transport facilities, commencing a study on enhancing pedestrian connectivity between Wan Chai and Sheung Wan, selecting two areas in Hong Kong for pilot study to test out innovative measures for a comfortable walking environment, etc.

- Progressively expand walking path information on Causeway Bay and Kowloon East on government mobile apps to other districts
- Take forward the "Universal Accessibility Programme" to retrofit barrier free access to existing public walkways, as well as those walkways which fulfil certain criteria
- Take forward new railway projects under the Railway Development Strategy 2014 in an orderly manner for the next stage of railway development, which will translate into environmental benefits by reducing roadside air pollutants and greenhouse gases
- Pilot use of green technologies in local ferry operation

Smart Airport

- Explore the provision of seamless travel experience by using facial biometrics technology including at check-in, boarding pass checkpoint and boarding
- Provide hassle-free travel experience for passengers by expanding mobile check-in services to off-airport locations, such as theme parks, hotels, convention centres, cruise terminal, etc., and providing baggage pick up services
- Facilitate the use of driverless vehicles in designated places, such as the restricted areas in the airport

Goals and Next Steps

Upon implementation of the above, people will be able to –

- enjoy more environmental friendly transport modes, including use of cleaner fuel in vessels to improve air quality and address other environmental concerns
- plan their journeys more efficiently with real-time traffic information
- enjoy better traffic planning and management through enhanced use of data analytics
- enjoy easy and efficient travel with smart airport
- enjoy a pedestrian-friendly environment

Looking Ahead

We will continue to explore and formulate initiatives to –

- alleviate traffic congestion and tackle other traffic management and enforcement issues through wider use of technology
- facilitate the achievement of technology advancement and industry development in vehicle-to-everything (V2X) and autonomous vehicles (AV) and ultimately introduction of AV with integrated Internet access
- enhance walkability and pedestrian wayfinding system

Smart Living

Current Status

Wi-Fi.HK

over 20 000 free Wi-Fi hotspots

mobile subscriber penetration rate 242.5%

household broadband penetration rate 92.5%

2016-17

Accident Emergency

2.23 million attendances

Specialist Outpatient

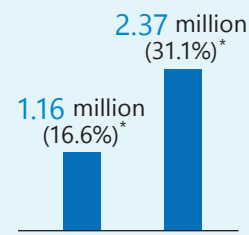
7.6 million attendances

Primary Care

6.42 million attendances

Electronic Health Record Sharing System was launched in March 2016

population aged 65+



*of total population

Strategy and Initiatives

Wi-Fi Connected City

- Continue to increase the number of free hotspots under the "Wi-Fi.HK" scheme to provide free public Wi-Fi service

Digital Payment

- Develop a Faster Payment System (FPS) by 2018 which supports the use of mobile phone numbers or email addresses for payments anytime and anywhere
- Facilitate a common QR code standard through the industry group established to promote the wider use of mobile retail payments and bring greater convenience to customers and merchants

eID

- Provide all residents, by 2020, a free electronic identity (eID) which is a single digital identity for authentication when conducting government and commercial transactions online
- Introduce Banking Made Easy initiative by 2019 to minimise regulatory frictions in customers' digital experience, including remote on-boarding, online finance and online wealth management

Support for the Elderly and Persons with Disabilities

- Launch a $1 billion funding scheme in 2018 to support trial use and procurement of technology products by elderly and rehabilitation service units

Support for Healthcare

- Set up a Big Data Analytics Platform by the Hospital Authority for facilitating healthcare-related research in 2019, and start adopting a smart hospital approach, including the use of automatic system interface with vital sign devices or hospital navigation applications for piloting in new hospital projects by 2020
- Commission the Stage Two Electronic Health Record Sharing System in phases by 2022, which will support a broader scope of data sharing, consider the development of a Patient Portal and sharing restriction features to facilitate patients' active management of their health, and enhance core functionalities and security/privacy protection

Goals and Next Steps

Upon implementation of the above, people will be able to –

- more conveniently access free public Wi-Fi service
- enjoy convenient mobile payments anytime and anywhere
- access e-services and conduct e-transactions more conveniently and extensively with a single eID for e-government services and commercial services
- adopt more technology applications to support the elderly
- enjoy healthcare services supported by new technology applications

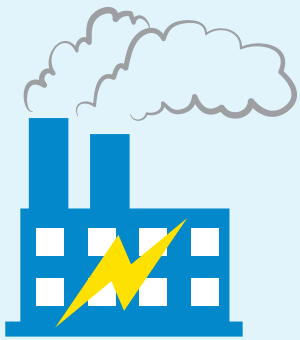
Looking Ahead

We will continue to explore and formulate initiatives to –

- promote wider use of mobile payments and bring greater convenience to customers and merchants
- promote healthy living and ageing in different settings, including hospitals, care homes and ultimately in the community

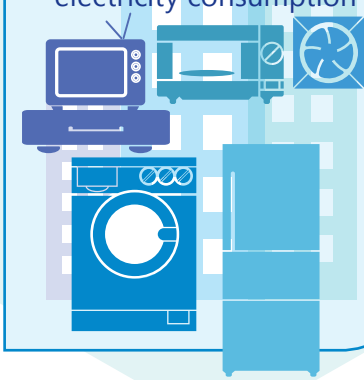
Smart Environment

Current Status



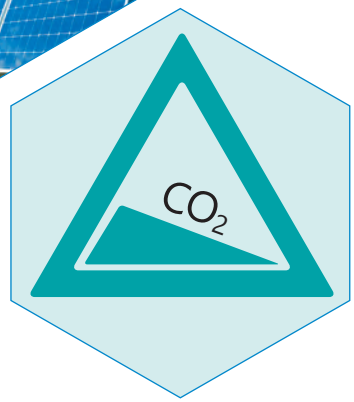
2015
67% of carbon emission is from electricity generation

2015
buildings account for about 90% of electricity consumption



2015
2.03 million tonnes municipal solid waste recovered

Strategy and Initiatives



Climate Action Plan 2030+

- Reduce our carbon intensity by between 65% and 70% by 2030 compared with the 2005 level
- Phase down coal-fired electricity generation gradually and replace with natural gas and non-fossil fuel sources. Coal as a proportion of the fuel mix will be reduced from 47% as of 2016 down to about 25% in 2020
- Apply renewable energy on a wider and larger scale based on mature and commercially available technologies with the public sector taking the lead
- Further promote energy efficiency and conservation in the community with particular focus on buildings
- Implement other measures to achieve carbon emission reduction by phases

Green and Intelligent Buildings, and Energy Efficiency

- Promote retro-commissioning and building-based smart/IT technologies
- Install LED lamps in public lighting systems progressively under the LED Public Lighting Replacement Programme of the Highways Department starting from 2017-18 and encourage retrofitting LED lighting for existing government buildings
- Continue to include requirements, such as green building design, provision of smart water meter system, electric vehicle charging facility and real-time parking vacancy information for new land sale sites in Kowloon East, with a view to developing a green and smart community

Waste Management

- Reduce waste by implementing a charging scheme for municipal solid waste by end 2019 at the earliest

Pollution Monitoring

- Use remote sensing devices to monitor air pollution, cleanliness of streets and public places, usage of litter and recycling bins

Goals and Next Steps

Upon implementation of the above, people will be able to –

- enjoy better indoor and outdoor air quality
- live in greener buildings with various smart and energy saving features
- use technology applications in efficient power consumption and energy conservation
- reduce daily waste at home and workplace

Looking Ahead

We will continue to explore and formulate initiatives to –

- adopt new green technologies when they become commercially available
- create a low carbon, more sustainable environment for the people
- optimise use of city resources, including waste reduction, reuse and recycling

Smart People

Current Status

15 years' free kindergarten, primary and secondary education

60% of senior secondary students studied one or more STEM-related elective subjects in 2016/17

8 public universities funded by the University Grants Committee (UGC)

99 817 students studying UGC-funded programmes,

46 737 (47%) of them studied STEM-related programmes in 2016/17

Strategy and Initiatives

Nurturing Young Talent

- Organise intensive training programmes on science, technology, engineering and mathematics (STEM) education for curriculum leaders of primary and secondary schools from the 2017/18 to 2019/20 school years to enhance their capacity in holistic planning and implementation of the updated curricula and STEM-related activities
- Provide enhanced information technology (IT) training to secondary school students outside normal school curriculum
- Enhance research and development (R&D) capability through collaboration with renowned institutions in other jurisdictions
- Encourage industry to hire STEM graduates for R&D through the "Postdoctoral Hub" programme and enhanced Internship Programme
- Attract and retain more I&T professionals, especially in biotechnology, data science, artificial intelligence, robotics and cyber security. Launch a fast-track I&T talent admission scheme in 2018

Innovation and Entrepreneurial Culture

- Provide financial and non-financial support to young entrepreneurs and start-ups to build a stronger I&T culture
- Expand incubation programmes at Science Park and Cyberport Smart-Space
- Attract Venture Capital Fund to support entrepreneurship
- Strengthen training on innovation and application of technology for civil servants in 2018
- Establish MTR Academy and Hong Kong International Aviation Academy to train up professional expertise

Goals and Next Steps

Upon implementation of the above, Hong Kong will be able to –

- have more students selecting STEM as their education and professional careers
- have a local supply of data scientists and other technology practitioners in need
- have more successful entrepreneurs in their new ventures

Looking Ahead

We will continue to explore and formulate initiatives to –

- nurture a highly adaptive population to embrace changes in technology
- build a knowledge-based society to support future development of I&T

Smart Government

Current Status

Public Sector Information Portal
over 3 100 unique datasets,
1 000 application programming interfaces (APIs)

2017-18
government information and communications technology (ICT) expenditure estimate
HK$8.9 billion

Hong Kong has a first class telecommunications network, with fixed/mobile broadband speeds and penetration rates among the highest in the world, and a high level of worldwide interconnectivity

GovHK
香港政府一站通
226 e-Services

enacted in 2000, the Electronic Transactions Ordinance accords electronic signatures the same legal status as paper-based signatures

Strategy and Initiatives

Open Data

- Open up more public and private sector data in digital forms to facilitate research and innovation via the government one-stop Public Sector Information Portal (data.gov.hk), starting with the health, transport and education sectors from 2018
- Promote using open data for smart city innovations

Smart City Infrastructure

- Fifth generation (5G) mobile networks are the catalyst for smart city development, offering ultra-high speed and high capacity, supporting device-to-device ultra reliable/low latency communications, and enabling massive machine-to-machine communications for better implementation of Internet of Things (IoT). Hong Kong is all geared up for the commercial launch of 5G services and applications in 2020
- Adopt eID common login by 2020 and enhance e-services user experience with the help of artificial intelligence, chatbot and big data analytics

- Implement the multi-functional smart lampposts pilot scheme starting from 2019 to facilitate collection of real-time city data to enhance city management and other public services
- Build a new big data analytics platform by 2020 which will enable real-time data transmission and sharing among government departments
- Adopt public cloud services with enhanced security features for government departments to deliver efficient and agile e-services by 2019
- Revamp the government cloud infrastructure platform by 2020 to enable digital government services delivery through collaboration and partnership among government departments, IT service providers and other third party entities
- Enhance the Government's cyber security capability to address new security risks, facilitate collaboration among stakeholders to promote awareness and incident response capability in the community

Adoption of Technology

- Support adoption of technology by government departments to improve public services through dedicated funding
- Adopt Building Information Modelling (BIM) for major government capital works projects starting from 2018 and develop Common Spatial Data Infrastructure (CSDI) by 2023 to facilitate sharing of geo-spatial data across government departments and government-to-business (G2B) applications, including the launch of CSDI portal, 3D digital map, electronic submission hub for building plans
- Explore the development of smart city facilities, such as smart lampposts, smart rubbish and recyclables collection bins where appropriate

Goals and Next Steps

Upon implementation of the above, people will be able to –

- enjoy a much broader scope of user-friendly and more responsive public services delivered digitally
- build more innovative applications and services using open data
- enjoy higher efficiency and innovation based on BIM and CSDI

Looking Ahead

We will continue to explore and formulate initiatives to –

- encourage open data in public and private sectors
- improve public services through adoption of technology under a data-driven approach
- review legislation and regulations to support innovation

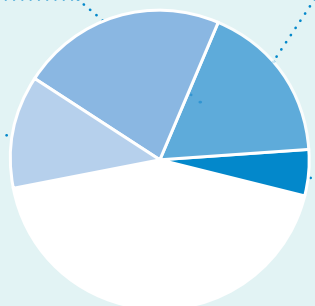
Smart Economy

Current Status

- GDP in 2016: HK$2,491 billion
- GDP per capita in 2016: HK$339,530
- GDP in 2015 for top four industries:

Trading and logistics
HK$517.4 billion (22.3%)

Financial services
HK$409.9 billion (17.6%)



Professional services and other producer services
HK$287.2 billion (12.3%)

Tourism
HK$116.4 billion (5.0%)

Credit cards

- in 2015, each Hong Kong citizen had on average 2.6 credit cards
- 1.7 million (HK$1.7 billion) daily transactions

- regulators have introduced regulatory sandboxes or licence to qualified corporations to try out Fintech innovations

Internet Banking

- 12 million accounts
- over HK$7 trillion monthly transactions

Strategy and Initiatives

Promoting Sharing Economy

- Review existing legislation and regulations so as to remove outdated provisions which impede I&T development

Strengthen the current pillars by leveraging I&T

- Fintech
  - Promote Fintech initiatives and explore distributed ledger technology applications in different areas, including trade financing and cross-boundary transactions
  - Facilitate the introduction of virtual banking as another model of service delivery
  - Formulate by 2018 a framework to facilitate the development and wider adoption of API by the banking sector, thereby stimulating innovations and improving financial services through collaboration between banks and technology firms
- Smart Tourism
  - Provide tourist facilitation services through smart technologies by 2018 at the Hong Kong International Airport, the West Kowloon Station of the Guangzhou-Shenzhen-Hong Kong Express Rail Link and the Hong Kong Boundary Crossing Facilities of Hong Kong-Zhuhai-Macao Bridge
  - Enrich tourists' experiences in Hong Kong through adoption of smart features using ICT and virtual images by 2018
  - Enhance tourist experience through smart airport, Wi-Fi Connected City initiative and smart lampposts
  - Encourage the tourism trade to leverage on innovative technology to assist in managing visitor flow, providing more personalised tourist services, marketing and promotion, etc. for enhancing its competitiveness

Develop new economic pillars

- Promote R&D and re-industrialisation
  - Plan for the setting up of key technology collaborative platforms and bring in internationally-renowned universities, research institutes and I&T companies
  - Provide enhanced tax deduction for qualifying expenditure incurred by enterprises on R&D in 2018-19 to incentivise companies to increase investment in technological R&D
  - Review Government's procurement arrangements by 2018 to include I&T as well as design thinking as tender requirements to encourage local technological innovation
  - Build Data Technology Hub and Advanced Manufacturing Centre by 2020 and 2022 respectively in Tseung Kwan O
  - Collaborate with Shenzhen to develop an Innovation and Technology Park at Lok Ma Chau Loop for I&T enterprises, universities and research institutions from Hong Kong, overseas and the Mainland. Strive to make available the first developable land in 2021-22 or earlier

Goals and Next Steps

Upon implementation of the above, Hong Kong will be able to –

- position itself as a viable and attractive location to fully develop innovative business ideas
- become a preferred location for consideration of technology investment
- be perceived as an innovative and technologically advanced tourist destination

Looking Ahead

We will continue to explore and formulate initiatives to –

- enhance the overall business climate, particularly in areas of the technology-driven economy like Fintech and re-industrialisation
- further develop our I&T ecosystem to attract more start-ups and investors from other jurisdictions
- attract more leading talents and investments to enhance our city's economic vibrancy

Public-Private Partnership

Smart city calls for close collaboration among the public sector, private sector, academia and citizens over the whole cycle of implementation: from identification of city challenges, formulation of policy and strategy, research and development, conceptualisation of potential projects, feasibility assessment, proof of concept through pilot projects to city-wide implementation. Public-private partnership (PPP) is one of the popular implementation models in other jurisdictions for smart city development. We will consider appropriate implementation model, including PPP, for individual smart city initiatives.

Smart Region Living Lab

New technology solutions can be tested in a special environment before their wider adoption in the city. The initiatives include:

- Hong Kong Science Park and the Chinese University of Hong Kong will accelerate the adoption of new technology and enhance collaboration and knowledge sharing of solutions and projects in the region
- Hong Kong Monetary Authority, Securities and Futures Commission and Insurance Authority have rolled out joint sandboxes to facilitate Fintech innovation
- Autonomous vehicle would be tested in the restricted areas of the Hong Kong International Airport and other suitable locations
- Pilot in the Kowloon East as a test bed for smart city solutions

Governance

The high-level, inter-departmental ***Steering Committee on Innovation and Technology*** chaired by the Chief Executive has been set up to steer development of I&T and smart city projects, review legislation and regulations to support business innovation, drive the opening up of government data to facilitate research and innovation, allocate resources to bureaux and departments for applying technology and implementing smart city initiatives, and review the outcome and effectiveness of smart city initiatives and steer the way forward.

A dedicated ***Smart City Office*** will be set up under the Innovation and Technology Bureau to coordinate smart city projects across different government departments and agencies in the public and private sector and monitor project progress and effectiveness. The Office of the Government Chief Information Officer will assist to provide technical support to bureaux and departments.

Smart Hong Kong: Embarking a New Journey

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Paper from responsible sources
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