



Hong Kong Science and Technology Parks Corporation

Study on Development of Digital Infrastructures in Hong Kong

Executive Summary





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1. Executive Summary

1.1. Background

The “Outline of the 14 Five-Year Plan for National Economic and Social Development of the People’s Republic of China and the Long-Range Objectives Through the Year 2035” (“The National 14th FYP”), promulgated in March 2021, clearly placed an emphasis on, amongst other national development objectives, accelerating the digitisation development and building a “Digital China” through nurturing and developing a Digital Economy and government as well as promoting digital transformation of traditional industries.

The Digital Economy, in general, comprises 1) digital goods and services (“core” definition) and 2) non-digital products enhanced by digital means (“broad” definition). The Digital Economy is very prominent in Mainland China’s economy especially in cities like Beijing, Shanghai and Shenzhen where the GDP contribution associated with Digital Economy were 40.4%, >50.0% and 30.6% respectively in 2021. The Digital Economy is also considered a key driver in expediting the agglomeration of the Hong Kong and Shenzhen economies and boosting Hong Kong’s status as an international Innovation and Technology (“I&T”) and Intellectual Property (“IP”) hub under the guidance of the National 14th FYP.

Digital Infrastructure is one of the key foundations to enable the advancement of Digital Economy. Apart from Mainland China, many jurisdictions such as Singapore, United Arab Emirates and the United Kingdom are also accelerating their investments in Digital infrastructure so as to achieve their respective developmental goals in the Digital Economy. To facilitate the city to effectively grasp the immense opportunities and potential presented by the era of Digital Economy, it is of utter importance for Hong Kong to develop a future roadmap and strategy for developing a robust and flexible Digital Infrastructure.

PricewaterhouseCoopers Advisory Services Limited (“PwC”, “We” or “the Consultant”) was engaged by the Hong Kong Science and Technology Parks Corporation (“HKSTPC”) (“the Client”), which has supported the Federation of Hong Kong Industries (“FHKI”), to assess the market landscape of the Digital Infrastructure in Hong Kong and to formulate recommendations on the implementation approach for the development of Digital Infrastructure in Hong Kong (“the Study”).

1.2. Considerations for Hong Kong in I&T under the National 14th Five Year Plan, Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area and Northern Metropolis Development Strategy (“NMDS”)

1.2.1. National 14th Five Year Plan and Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area (“Outline Development Plan”)

The National 14th FYP has clearly set out Hong Kong’s role in the overall development of the country. The National 14th FYP provides opportunities for Hong Kong to develop further its strengths while supplementing China’s long-term developmental needs. The National 14th FYP has unequivocally promulgates the country’s support for Hong Kong as it strengthens its status as an international I&T Hub and IP Hub. Coupled with Hong Kong's world-class primary research capabilities and the Government's continuous policy support, the I&T industry is poised to become one of the key growth drivers in the future.

In addition, the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area, published in February 2019, positions Hong Kong as an important support pillar in the opening up of Mainland China and international economic cooperation. Moreover, the Outline Development Plan clearly supports Hong Kong to develop its I&T industries and nurture emerging industries.

Leveraging on its strengths in Research and Development (“R&D”) and status as an international finance centre, Hong Kong can pool together innovation resources from the Greater Bay Area (“GBA”) and the world to promote the further development of R&D and I&T activities. This will help enhance the competitiveness of Hong Kong and further boost the “go global and attract foreign investment” (「走出去」和「引進來」) strategy to support the development of the GBA, and in turn Mainland China.

1.2.2. Northern Metropolis Development Strategy

In the 2021 Policy Address, the Chief Executive has announced the Northern Metropolis Development Strategy (“NMDS”). The Northern Metropolis is an ambitious plan to transform the northern part of Hong Kong into a lively and attractive metropolitan area. By leveraging the strengths of integration with Shenzhen, the Northern Metropolis will develop into the second engine of economic growth for Hong Kong in the period ahead. The Northern Metropolis can also promote closer, deeper and more thorough cooperation in the Guangdong-Hong Kong-Macao Greater Bay Area, and pave the way for Hong Kong to leverage its unique role and better integrate into the country’s overall development. This will enable Hong Kong to embody its designated roles as underlined in the National 14th FYP, especially as an international I&T hub.

1.3. Definition of Digital Economy and Digital Infrastructure and the current status in Hong Kong

1.3.1. Definition of Digital Economy and Digital Infrastructure

While there is no single authoritative definition on Digital Economy and its meaning can be highly dependent on the context and situation, the Consultant has made reference to relevant international practices, guidelines and standards, and for the purpose of the Study, defines Digital Economy to comprise the following FOUR components:

- 1. Basic Infrastructure** – including, but not limited to, power supply, water supply, gas supply, roads, ports and land;
- 2. Hard Digital Infrastructure** – including, but not limited to, network, device and server / storage;
- 3. Soft Digital Infrastructure** – including, but not limited to, protocol, AI platform, cybersecurity, cloud services and personal identity; and
- 4. End users** – including, but not limited to, public users, business users and individuals.

Based on such definition and structure of Digital Economy, Digital Infrastructure is further defined to include both hard and soft digital infrastructures. In fact, soft and hard digital infrastructures serve as the cornerstone of all digital activities within any Digital Economy and are interdependent to each other. It takes both of them to work together seamlessly to ensure a smooth and efficient functioning of the Digital Economy as a whole.

In brief, the Digital Infrastructure provides the means of connectivity and communication, storage and collection of data for all participants in the Digital Economy including products and services providers and users. Without a robust and flexible Digital Infrastructure, digital products and services providers would not be able to serve end-users as well as analyse user behaviour so that high value-added products and services can be developed.

With the Government's commitment to promote the development of the Digital Economy, there is a pressing need for the Government to address the existing gaps in Hong Kong's Digital Economy value chain. This necessitates a comprehensive review on the adequacy and readiness of Hong Kong's existing Digital Infrastructure to support the development of Hong Kong's vibrant Digital Economy.

As discussed and agreed with the Clients, the Study mainly focuses on hard Digital Infrastructure. However, realising the importance of the soft Digital Infrastructure, the Consultant will also touch on topics such

as Web 3.0, protocol and others so as to offer comprehensive solutions and recommendations to the Clients and the Government. For simplicity, the term “Digital Infrastructure” in the ensuing paragraphs of this Executive Summary refers to “Hard Digital Infrastructure” (unless otherwise specified).

1.3.2. Current status of Digital Economy in Hong Kong

Globally, in the last ten years, digital transformation and related Information and Communications Technology (“ICT”) services have developed as the new emerging sectors that boost the I&T development and economic growth. The exponential increase in investment on digital technologies globally has a profound impact on the operating and business landscape for all sectors. In which, many organisations have digitalised their operational workflow and processes to enhance productivity as well as to provide better experience and improve convenience for customers.

Since the COVID-19 pandemic, digital technology has become an integral enabler for business resilience and continuity in traditional industries, which would have, otherwise, not invested in digitalising their business at such a rapid pace. In the past 15 years, the growth rate of GDP contribution from economic activities associated with Digital Economy was 2.5 times faster than that of the Global GDP¹.

As for Hong Kong, at present the Census and Statistics Department of Hong Kong (“C&SD”) does not compile any comprehensive official statistics about the gross value-added and employment contributions arising from Hong Kong’s Digital Economy. However, jurisdictions such as Mainland China, the United Kingdom and the United States, have annual statistical figures on the size of their respective Digital Economies. It is observed that the direct GDP contribution of economic activities associated with the Digital Economy in these jurisdictions ranges between 5% and 10%, and indicated a growing trend over the last 10 years.

While Hong Kong was ranked 2nd globally in the World Digital Competitiveness Ranking 2021, the city ranked the 6th, 14th and 17th respectively in the three sub-factors of talent, scientific concentration and IT integration². The IMD’s ranking criteria also indicated that Hong Kong’s business agility, IT integration and scientific concentration are indeed lower than regional counterparts, such as Singapore and Korea. Based on these indicators, it is not unreasonable to argue that the size of Digital Economy in Hong Kong in terms of the gross value-added contribution should be smaller than that in the benchmarked

¹ Research by Callsign reveals first ever economic value to building digital trust of US \$4000 GDP per capita
Retrieved from: <https://www.prnewswire.com/news-releases/research-by-callsign-reveals-first-ever-economic-value-to-building-digital-trust-of-us-3000-gdp-per-capita-301606479.html#:~:text=Given%20that%20the%20digital%20economy,GDP%20would%20be%20%24108.9%20trillion>

² World Digital Competitiveness Ranking 2021, IMD
Retrieved from: <https://imd.cld.bz/Digital-Ranking-Report-2021/274/>

counterparts, which could reach as high as 10%, though, as mentioned above, such official statistics are not directly available from the Census and Statistics Department to confirm or disconfirm such argument. Indeed, the Consultant is of the view that regardless of the actual economic contribution of Digital Economy in Hong Kong, it is always a virtue for any economy, including Hong Kong, to have a better understanding of its strengths and weaknesses, and room for improvement on development of a sustainable Digital Infrastructure.

1.3.3. Current status of Digital Infrastructure in Hong Kong

Infrastructure, PwC conducted 30 stakeholder consultations and received 60 surveys from key digital infrastructure operators and service providers, as well as end-users, on their comprehensive view on the current status of Digital Infrastructure in Hong Kong.

The following table summarises the current status of Digital Infrastructure in Hong Kong.

Table 1-1 – Summary on the current status of digital infrastructure in Hong Kong

Hard Infrastructure	Digital Strengths	Key Challenges
Network	<ul style="list-style-type: none"> • Hong Kong’s fixed broadband services cover 98% of Hong Kong’s residential households with a local fiber penetration of 82.6% across Hong Kong; • Hong Kong’s 5G network coverage exceeds 95% of Hong Kong’s 18 districts with over 90% of the population able to access 5G connectivity; and • Hong Kong has 12 submarine cables connecting to Asia, Africa, Europe, EMEA and the United States providing global connectivity and data-flow. 	<ul style="list-style-type: none"> • Hong Kong’s 5G infrastructure is limited to mostly providing 4G++ network services as substantive upgrades are not cost-effective; • Mobile operators have encountered difficulties in coordinating with multiple government bureaux and departments to install 5G cell sites in rural areas in Hong Kong to address service coverage and reliability issues; and • The cost of developing and servicing fibre optics in urban and new development areas have increase significantly due to complex excavation alongside critical infrastructure.
Storage	<ul style="list-style-type: none"> • Hong Kong’s tier 3 and 4 data centre supply are located in Tseung Kwan O, Kwai Chung & Tsuen Wan and Shatin forming Hong Kong’s data centre resiliency; 	<ul style="list-style-type: none"> • Hong Kong does not have a single governmental office responsible for promoting data centre development and to facilitate potential investors to develop in Hong Kong; • The building codes for industrial buildings are not optimised for data centre development in Hong Kong;

	<ul style="list-style-type: none"> • Hong Kong’s tier 3 and 4 data centres normally serve BFSI users, enterprise users, cloud services providers, network service providers, content streaming platforms, healthcare users, Government and other end users; and • Hong Kong’s geographic proximity to Mainland China could open up the possibility for local data centres to purchase its renewable energy and lead the region in ESG centric data centres. 	<ul style="list-style-type: none"> • There is insufficient sub-station infrastructure around Hong Kong to support the total megawatt capacity of Hong Kong’s data centre; • There is a shortage of land for data centre development in Hong Kong to further promote and support the I&T industry in Hong Kong and suggested the Government to offer more ‘greenfield’ land parcels; and • Hong Kong does not have high performance computing centres and AI data centres, due to the limited demand and ‘hefty’ cost associated, where the Government should invest to facilitate the development of digital products and services.
<p>Device</p>	<ul style="list-style-type: none"> • Hong Kong’s IoT market is relative immature but the property management sector, manufacturing sector and logistics sector has adopted IoT devices as pilots to their operations. 	<ul style="list-style-type: none"> • Industry stakeholders have expressed that it would be beneficial if the Government could facilitate the collection of data from the following industries/sectors: <ul style="list-style-type: none"> • Transportation; • Consumer electronics and automotive; • Fleet monitoring; • Traffic-related data; • Logistics; • Public infrastructure; • Weather;

		<ul style="list-style-type: none"> • Building Services; • Energy consumption; • Manpower work space data; • Safety data; • Quality assurance and control data; • Government services; and • Healthcare
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Soft Infrastructure	Digital Strengths	Key Challenges
Protocol	<ul style="list-style-type: none"> • The FPS payment system is one of the most successful Government-driven protocol as it clearly defined the data standard, requirements to participate and a feasible commercial model to facilitate capital transfers across Hong Kong; and • The Government’s newly developed ‘iAMSmart’ e-KYC protocol and technology has facilitated a number of mobile service operators to verify their customers’ identities. 	<ul style="list-style-type: none"> • Hong Kong’s digital infrastructure operators and providers hold a ‘rich’ database of end-user data which has been underutilized due to legislative restrictions and data fragmentation; and • There is a need for a Government-driven centralised data sharing platform to help unlock the unrealised value of data in Hong Kong and create value-added data insights for commercial use.

Web 3.0	<ul style="list-style-type: none">• The global Web3.0 market size is measured at around US\$ 3.2 billion in 2021 and is expected to grow at a CAGR of 43.7% to some US\$ 81.5 billion by 2030; and• Hong Kong has several “selling points” for attracting different Web 3.0 platforms and specialists to establish presence including but not limited to, 1) low corporate tax rates, 2) international financing capabilities for fund raising, 3) established legal dispute procedures. 4) easy access to neighbouring cities in Mainland China, and 5) state of the art facilities as proposed under the NMDS; and• Hong Kong could potentially to become an international hub of Web 3.0 applications and developments bringing a new source of economic growth.	<ul style="list-style-type: none">• Web 3.0 is in its early development stage in Hong Kong;• No conducive policies to attract the Web 3.0 businesses and transactions to set foot in the city and clear governance structure in view of Web 3.0 and digital assets property rights; and• The full commercialisation of Web 3.0 may take some time to realise.
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1.4. International case studies and benchmarking

1.4.1. Selected Jurisdictions

PwC selected several jurisdictions to review their development of digital economies and strategies for Digital Infrastructures and to draw certain takeaways for Hong Kong. These jurisdictions include:

- Mainland China (CN)³ as a whole, as well as three individual cities - Beijing (BJ), Shanghai (SH) and Shenzhen (SZ);
- South Korea (SK);
- United Arab Emirates (UAE); and
- United Kingdom (UK).

The benchmarking research on these jurisdictions covers the following areas:

1. The roadmap and framework for developing Digital Economy;
2. The status and progress made of Digital Infrastructure;
3. The extent of digitalisation in economic sectors; and
4. Economic contribution from the digital industry.

1.4.2. Overview of the Benchmarking

Table 1-2 shows an overview of our findings of the selected jurisdictions, covering their development of Digital Economy and Digital Infrastructures.

With the accelerated adoption of digital products and services, the selected jurisdictions have placed a strategic emphasis on developing their Digital Economy driven by data, digitalised services and Digital Infrastructure. Specifically, these jurisdictions have focused their investments on Digital Infrastructure and digital enabling services that allow them to achieve their strategic goals and visions.

Currently, Mainland China is one of the most advanced/developed digital economies in the world with one of the largest and most advanced network infrastructures globally. For instance, as of early March 2022, the number of 5G base stations in Mainland China reached 1.43 million, with over 500 million of 5G subscribers. With the support of a robust Digital Infrastructure, Mainland China has also accelerated the integration of big data, cloud computing, and Artificial Intelligence (AI).

³ PwC has also taken a closer look at the CN's 1st tier cities including Beijing, Shanghai and Shenzhen in order to draw a more direct comparison for this study in terms of development of Digital Economy and infrastructure.

























By 2025, Mainland China will account for nearly 30% of the world's total data volume, with the widest variety of data types worldwide⁴.

Additionally, during the COVID-19 pandemic, Mainland China's digital ecosystems, from AI enabled chatbots to telemedicine services, enabled many brick-and-mortar companies to continue their businesses and helped alleviate supply chain bottlenecks.



























The 1st tier cities in Mainland China, such as Beijing, Shanghai and Shenzhen, are focusing on the development of IoT application and adoption in traditional industry sectors. These 1st tier cities have placed emphasis on the provision of data centre services to serve the specific needs of Digital Economy such as cloud computing, big data, AI and blockchain. For example, China's data centre industry achieved a market value of RMB 27 billion and a Compound Annual Growth Rate ("CAGR") of around 20% between 2016 and 2020 with relevant supporting policies.

⁴ Understanding China's Digital Economy: Policies, Opportunities, and Challenges, China Briefing
Retrieved from: <https://www.china-briefing.com/news/understanding-chinas-digital-economy-policies-opportunities-and-challenges/>

Table 1-2 – Overview of the selected jurisdictions for benchmarking

Jurisdiction	Digital Economy Contribution ⁵	Strategic Focus	Investment Focus	Sector Focus	Development of Digital Infrastructure		
					Network	Device	Server/ Storage
 United Kingdom	4.6% GVA ⁶ (2019)	Target to become a data-driven economy with digitalised public service and champion international flow of data			Current 5G coverage: 12.0%; 95% 4G coverage by 2022, access to 5G by 2027	Accelerate IoT adoption in 5 key sectors – Healthcare, Transport, Building, Agriculture and Energy	Focus on sustainable development of data centres and edge computing systems
 United Arab Emirates	9.7% GDP ⁷ (2020)	Aims to become a world leader in Artificial Intelligence by 2030+			Current 5G coverage: 80%; 100% 5G coverage by 2025 and has developed a roadmap for 6G in 2021	IoT strategy focused for retail, hospitality, manufacturing, healthcare, transport and energy.	First quantum computing is developed in 2021. HPC is also being deployed for public use
 Singapore	8.0% GVA ⁸ (2017)	Accelerates digital transformation , develops a collaborative ecosystem and industrialises digital technologies			Current 5G coverage: ~50%; 100% 5G coverage by 2025 with 6G development in parallel	Reinforce IoT ecosystem in the areas of economical, societal and security	Develop quantum computing capabilities; Migrate 70% of gov. systems to commercial cloud
 South Korea	5.1% GDP ⁹ (2014-19)	3 major deals for economy transformation: • Digital New Deal • Green new Deal • Human New Deal			Current 5G coverage: 28.1%; target ~45% 5G coverage by 2022	Focus on the use of IoT , with sector focus in transportation and healthcare	Support R&D in quantum computing and focus to develop the world's 5th-largest amount of processing power by 2030
 Mainland China	7.8% GDP (39.8% from wider industries of Digital Economy) ¹⁰ (2020)	Upgrades Digital Infrastructure with focus on Network, IoT coverage and cloud-network integration			Current 5G coverage: 36.8%; 5G coverage 98% of county-level urban areas, and 80% of townships and towns	Accelerate IoT adoption for traditional industries e.g., Agriculture and Manufacturing	Focus on quantum cloud platforms , green and high performing data centres
Mainland China 1 st Tier Cities							
 Shanghai	13% GDP (>50% from wider industries of Digital Economy) ¹¹ (2020)	Enhances Artificial Intelligence & IoT ("AIoT") infrastructure , establishes a data-driven system for city planning and develops Digital Infrastructure for public services			100% 5G coverage in 8 core districts e.g., Huangpu and Pudong; Focus on network development and has the highest download speeds in Mainland	Emphasises the development of the IoT industry , applying AI and IoT to automotive, city planning & security and agriculture	Building sustainable, green and reliable and high-performance data centres for applications in e.g., academic and city planning simulations
 Beijing	22.1% GDP (>40.4 % from wider industries of Digital Economy) ¹² (2020)	Upgrades Digital Infrastructure e.g., 5G & 6G and data centres and drives digital transformation in traditional industries			>90% 5G coverage within the 5 ring roads; Develops 5G networks with a target to reach 63,000 5G base stations by 2025	Focus on the development of IoT and smart robots in manufacturing and public services sector	Data centre industry with market value of 27 bn RMB and CAGR of ~20% in 2016-2020; HPC facilities and services, that are publicly funded, e.g., Peking University are also available for public and private sectors' usage
 Shenzhen	~30.5% GDP ¹³ (2020)	Builds global leading Digital Infrastructure in particular network and computing power, and accelerates the development of smart city & government			Targets to reach >97% of 5G coverage by the end of 2022	Gathering data from IoT devices to create a digital twin for analysis and predictive maintenance in the real estate industry	Set up the National Shenzhen Supercomputing Shenzhen Centre with a research focus on Biotech, Weather, Medicines, engineering and others

Legend

 Cloud computing	 Blockchain coding/development	 Artificial intelligence	 5G/6G Networks	 Software & digital services	 IoT technologies	 Data policy	 Digital identity
 Super-computing	 Big Data	 Metaverse	 AR/VR technologies				
 Public services	 Transportation & Logistics	 Retail	 Tourism	 Healthcare	 Financial Services	 Energy	 Media
 City Planning	 Education	 Agriculture	 Manufacturing	 Telecom	 Environmental		

⁵ Figures for the column “Digital Economy Contribution” for each selected jurisdiction are largely affected by the definition of Digital Economy and methodology of calculating the contribution from the Digital Economy

Source:

⁶ Figure released by Office for National Statistics of UK Government in 2019: <https://www.ons.gov.uk/economy/economicoutputandproductivity/output/methodologies/ukdigitaleconomyresearch2019>

⁷ Figure released by The United Arab Emirates Government in 2020: <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/digital-economy-strategy>

⁸ Figure released by Infocomm Media Development Authority of Singapore Government in 2017: <https://www.smartnation.gov.sg/files/abt-smart-nation/SGD%20Framework%20For%20Action.pdf>

⁹ Figure released on CAPTURING THE DIGITAL ECONOMY A PROPOSED MEASUREMENT FRAMEWORK AND ITS APPLICATIONS by the Asian Development Bank in 2021 <https://www.adb.org/sites/default/files/publication/722366/capturing-digital-economy-measurement-framework.pdf>

¹⁰ Figure released by The State Council of the People’s Republic of China : http://www.gov.cn/xinwen/2022-07/08/content_5700094.htm#:~:text=%E6%A0%B9%E6%8D%AE%E4%B8%AD%E5%9B%BD%E4%BF%A1%E6%81%AF%E9%80%9A%E4%BF%A1%E7%A0%94%E7%A9%B6.%E7%A8%B3%E5%9B%BA%E3%80%81%E6%94%AF%E6%92%91%E4%BD%9C%E7%94%A8%E6%9B%B4%E5%8A%A0%E6%98%8E%E6%98%BE%E3%80%82 & http://www.gov.cn/xinwen/2022-01/20/content_5669415.htm

¹¹ Figure released by China Academy of Information and Communications Technology (CAICT) in 2021: <http://www.caict.ac.cn/kxyj/qwfb/bps/202104/PO20210424737615413306.pdf>

¹² Figure released by The Chinese Central Government’s Official Web Portal in 2022: http://www.gov.cn/xinwen/2022-04/17/content_5685623.htm

¹³ Figure released by General Office of Shenzhen Municipal People’s Government in 2021: http://www.sz.gov.cn/en_szgov/news/infocus/pda/news/content/post_9086927.html

1.5. Recommendations on Digital Infrastructure and Digital Economy development in Hong Kong

PwC assessed the findings from the industry stakeholder consultations, mass online surveys and benchmarking with other jurisdictions, and identified a set of recommendations for the development of both hard and soft Digital Infrastructures and Digital Economy in Hong Kong. Our recommendations for each key pillar of Digital Infrastructure are structured into short term (under three years), medium term (three - five years) and long term (five years and beyond) action points.

Table 1-3 summaries the recommendations to the Government.

Table 1-3 – Summary of our recommendations to the Government in short, medium and long terms

Hard Digital Infrastructure	Short Term Actions (Under three years)	Medium Term Actions (Three – five years)	Long Term Actions (Five years and beyond)
Network	<ul style="list-style-type: none"> • Increase 5G coverage especially in rural areas of Hong Kong • Set up a centralised coordination and implementation office to open up governmental facilities for network providers to install necessary infrastructures • Update the existing Buildings Ordinance to include mandatory provisions for fixed and mobile networks 	<ul style="list-style-type: none"> • Negotiate with neighboring Asia Pacific countries to construct submarine fiber optic cable to increase network bandwidth • Establish guidelines, service model and implementation plan for provision of service conduit/trunks for network cables installations (and other utilities) in new development areas in Hong Kong 	<ul style="list-style-type: none"> • Consider developing common network infrastructure to speed up mobile network development; and • Construct and provide service conduit/trunks for network cables installations (and other utilities) in new development areas in Hong Kong as shared services for telecom operators.

Hard Digital Infrastructure	Short Term Actions (Under three years)	Medium Term Actions (Three – five years)	Long Term Actions (Five years and beyond)
Servers / Storage	<ul style="list-style-type: none"> Review and update the Buildings Ordinance and other relevant ordinances to facilitate data centre development consolidate the relevant authorities and policies locally in a single official unit to eliminate land supply issues and policy contracts faced by data centre operators Coordinate land supply strategy for data centres with essential infrastructure such as high voltage substations, service conduits and others. Develop advanced data centres (Tier 3 and above) with high physical provisions and advanced soft infrastructures (such as cyber-security and cloud computing). 	<ul style="list-style-type: none"> Formulate a “North-South” tier 4 data centre development strategy 	<ul style="list-style-type: none"> Explore new approaches to developing data centre in Hong Kong such as using caverns as potential development sites
Devices	N/A	<ul style="list-style-type: none"> Establish IoT / smart devices use cases in Hong Kong by installing 1) smart cameras/sensors and 2) expand multifunctional smart lamp posts programme in Hong Kong Share the data collected with the public to unlock the wider market in Hong Kong Installing IoT / smart devices in governmental buildings to demonstrate the possibility of translating energy and resources savings into carbon credits for trading in the long run 	

Soft Digital Infrastructure	Short Term Actions (Under three years)	Medium Term Actions (Three – five years)	Long Term Actions (Five years and beyond)
Protocol	<ul style="list-style-type: none"> Government to review regulations in the view of open data / data sharing principles Facilitate the establishment of universal protocol and standards for data sharing in selected industries as a trial 	<ul style="list-style-type: none"> Consider a holistic strategy for establishing a data sharing and exchange platform taking into account the current initiatives such as Public Sector Information (PSI), Common Spatial Data Infrastructure (CSDI) and HKSTP Data Studio 	
Web 3.0 - Governance and Digital Property Rights	<p>The Government should:</p> <ul style="list-style-type: none"> Establish a clear governance structure in view of Web 3.0 and digital assets property rights Outline the permissibility of Web 3.0 activities taken into Hong Kong's and national's context Define the ownership of digital assets especially those generated by AI 		N/A
Web 3.0 – Foundation Company	<ul style="list-style-type: none"> Hong Kong can consider establishing a new legislation similar to the Cayman Islands Foundation Companies Law so that DAOs can establish a physical presence 		N/A

Other Recommendations – Digital Economy	Short Term Actions (Under three years)	Medium Term Actions (Three – five years)	Long Term Actions (Five years and beyond)
Cross Boundary Data Transfer Hub	<ul style="list-style-type: none"> • Work with the GBA governments to: <ul style="list-style-type: none"> ○ Determine a “white-list” for data transfer between Hong Kong and GBA as a trial to demonstrate feasibility of cross-boundary data transfer and identify areas for improvement ○ Consider establishing a trusted data hub in Hong Kong for cross-boundary data sharing with robust governance arrangements on data sharing to ensure its effectiveness ○ Establish relevant standards on aspects such as encryption, privacy safeguards, data ethics, etc. ○ Review the appropriateness and sufficiency of laws and regulations in the digital domain in the light of trends such as data sovereignty, use of AI and other emerging technology ○ Establish an assurance regime in which a framework is established for a trusted third party to conduct independent and objective review for users of the data hub. 		N/A
Measuring Economic Contribution of Digital Economy	<ul style="list-style-type: none"> • The Government is recommended to measure and monitor the economic contribution of Digital Economy in Hong Kong in terms of its value added and employment. These include but are not limited to collecting and compiling regular data on: <ul style="list-style-type: none"> ○ Revenue generated from e-commerce sales ○ Expenditure on electronic products and services ○ Proportion of full-time employees engaged in digital technology-related work 		N/A

Other Recommendations – Digital Economy	Short Term Actions (Under three years)	Medium Term Actions (Three – five years)	Long Term Actions (Five years and beyond)
Consideration for Post-Quantum Cyber Security	<ul style="list-style-type: none"> Identify critical infrastructure components that rely on encryption as a safeguard, and determine the life-span and retention attributes for data and digital assets that are key to the functioning of our society (e.g., medical records, financial services systems) Launch industry-wide awareness programme, and consider the roadmap for Quantum-resistant technology selection and upgrade initiatives Provide funding and support to research and innovations in this field, as well as talent acquisition and development Initiate suitable pilot programmes to support the development of an overall response strategy 		N/A