

Chapter 6

Innovation and Technology

Hong Kong attracts top research institutions with its strong research capability, robust intellectual property protection regime, world-class technological infrastructure and close cooperation with the Mainland. The city is forging ahead to embrace the innovation and technology era through a comprehensive innovation and technology development agenda and a smart city blueprint.

The Innovation and Technology Bureau provides dedicated policy support for the development of innovation and technology (I&T) in Hong Kong. The bureau is supported by the Innovation and Technology Commission and the Office of the Government Chief Information Officer.

The Innovation and Technology Commission promotes and supports applied research and development (R&D), and technology transfer and applications. It also promotes internationally accepted standards and conformity assessment services to underpin technological development and international trade in Hong Kong.

The Office of the Government Chief Information Officer provides information technology (IT) services, governance and support within the government, and promotes the wider adoption of IT in the community. It also seeks to develop a vibrant industry in information and communications technology (ICT), promoting high-tier data centres, smart city development and cyber security awareness in Hong Kong.

Infrastructure

Hong Kong Science and Technology Parks Corporation

The Hong Kong Science and Technology Parks Corporation (HKSTPC) provides one-stop infrastructural support to technology-based companies. It manages the 22-hectare Science Park in Sha Tin. The development of the Science Park was fully completed in 2016, providing 330,000 square metres of gross floor area for applied R&D in biomedical technology, electronics, green technology, information and telecommunications technology, and material and precision engineering. As at end-2017, it was home to about 650 companies. The Science Park is undertaking a \$4.4 billion stage 1 expansion programme to increase the gross floor area by 20 per cent to 400,000 sq m by 2020.

The corporation also manages three industrial estates in Tai Po, Yuen Long and Tseung Kwan O, which together provide 217 hectares of serviced land for I&T setups.

Cyberport

As the city's ICT flagship infrastructure, Cyberport aims to foster the growth of digital technology enterprises and strengthen the overall development of the ICT ecosystem by providing basic infrastructure and technical know-how. It houses and supports about 1,000 local, Mainland and overseas ICT companies across 94,700 sq m of office area in four grade A office buildings, of which 12 per cent is used for Smart-Space co-working space and workstations. Dedicated programmes are organised to support ICT start-ups, including incubation programmes and the provision of early-stage venture capital funding.

Hong Kong Productivity Council

The Hong Kong Productivity Council aims to enhance business productivity and competitiveness among local enterprises and help them move up the value ladder by adopting technologies and high value-added manufacturing processes. It focuses on four areas of the manufacturing and service industries in Hong Kong and the Mainland, namely manufacturing technologies, information technologies, environmental technologies and management systems.

Research and Development Centres

The government has five R&D centres to drive and coordinate applied R&D, and promote the commercialisation of R&D results and technology transfer. They are:

- the Automotive Parts and Accessory Systems R&D Centre,
- the Hong Kong Applied Science and Technology Research Institute,
- the Hong Kong Research Institute of Textiles and Apparel,
- the Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies, and
- the Nano and Advanced Materials Institute.

Universities

Six universities are designated local public research institutions, namely the City University of Hong Kong, Hong Kong Baptist University, Chinese University of Hong Kong, Hong Kong Polytechnic University, Hong Kong University of Science and Technology and University of Hong Kong. The government allocates up to \$4 million annually to each of these universities to fund the work of their Technology Transfer Offices.

Hong Kong Council for Testing and Certification

The Hong Kong Council for Testing and Certification advises the government on the overall development strategy of the testing and certification industry. It recommends measures to

promote testing and certification services, and to support the industry in terms of manpower, capital, technology and land.

The Mainland is continuing to open up its testing and certification market to Hong Kong through the Mainland and Hong Kong Closer Economic Partnership Arrangement. New liberalisation measures about testing and certification were introduced under the Agreement on Economic and Technical Cooperation, signed in June, and the Implementation Guide of the Agreement on Trade in Services, promulgated in September. By end-2017, the Hong Kong Accreditation Service had accredited 11 laboratories to conduct tests required by the China Compulsory Certification System.

Hong Kong Accreditation Service

The accreditation service operates according to international standards and is active in international and regional accreditation communities. As at end-2017, it had 99 mutual recognition arrangements partners in 98 economies. Through these arrangements, the results of tests, calibrations, certifications and inspections provided by its accredited organisations are recognised globally, thus facilitating cross-border business.

Standards and Calibration Laboratory

The Standards and Calibration Laboratory is the HKSAR's official custodian of physical measurement reference standards and provides a calibration service traceable to the International System of Units. It represents the HKSAR as a signatory to the Mutual Recognition Arrangement of the International Committee for Weights and Measures. As such, calibration certificates issued by the laboratory are recognised internationally.

Product Standards Information Bureau

The Product Standards Information Bureau provides sales of standards and offers free technical advice on standards-related matters. It represents the HKSAR on regional and international standardisation bodies and acts as the city's Enquiry and Notification Point under the World Trade Organisation Agreement on Technical Barriers to Trade.

Innovation and Technology Development

In the October Policy Address, the government announced it would promote I&T development in eight major areas, namely increasing resources for R&D, pooling technology talent, providing funding investments, providing technological research infrastructure, reviewing legislation and regulations, opening up government data, leading changes to procurement arrangements and promoting popular science education.

To promote I&T in Hong Kong expeditiously and efficiently, the Chief Executive is chairing a high-level, inter-departmental Steering Committee on Innovation and Technology to examine and steer measures under the eight major I&T areas as well as smart city initiatives. Most of the principal officials are standing members of the committee.

In 2017, top-notch I&T institutions continued to establish operations in Hong Kong. The Massachusetts Institute of Technology (MIT) Hong Kong Innovation Node opened its base at

the Productivity Council in September to provide students and researchers from MIT, local universities and enterprises with technology and entrepreneurial education and training. In the same month, the Guangzhou Institute of Biomedicine and Health under the Chinese Academy of Sciences set up a stem cell and regenerative medicine research centre at the Science Park.

Research and Development

The government's goal is to double gross domestic expenditure on R&D as a percentage of Gross Domestic Product to 1.5 per cent, equivalent to about \$45 billion a year, by 2022; and to gradually reverse the ratio of public-sector to private-sector expenditure on R&D from being government-led to one of public-private participation.

To encourage enterprises to conduct more research activities, the government will introduce enhanced tax deduction for local R&D expenditure. The first \$2 million of qualifying R&D expenditure will be eligible for a 300 per cent tax deduction, with 200 per cent for the remaining balance. Subject to the progress of the necessary legislative amendments, the initiative is expected to be implemented in the third quarter of 2018.

In addition to these new measures, the Innovation and Technology Fund (ITF) supports applied R&D that upgrades technology and promotes innovation in manufacturing and services. As at end-2017, the fund had committed more than \$13 billion to supporting about 7,000 projects undertaken by research institutions and the industry, of which over 3,300 were R&D projects with total funding exceeding \$9.6 billion. Research funding also comes from the University Grants Committee and Research Grants Council, which provided \$5.28 billion in 2016-17.

Start-ups

Hong Kong has one of the fastest-growing start-up ecosystems. The city recorded a 16 per cent increase in the number of start-up companies, from 1,926 in 2016 to 2,229 in 2017, and operated about 6,240 workstations, according to an InvestHK survey.

In September, the government launched a \$2 billion Innovation and Technology Venture Fund to encourage private venture capital funds to invest in local I&T start-ups. The government will co-invest with venture capital funds on an investment ratio of about 1:2.

Incubation programmes are also available to provide rental subsidies as well as marketing, financial and technical support to start-ups in their initial years, and to help them open up markets. The HKSTPC offers a Corporate Venture Fund, while Cyberport runs a Creative Micro Fund and the Cyberport Macro Fund, which invests in its start-up community by providing early-stage venture capital funding.

Under the Space Sharing Scheme for Youth, Cyberport will operate a SmartSpace co-working space of around 20,000 square feet in Tsuen Wan, offering entrepreneurial training and support services to help young entrepreneurs carry out innovation activities. The co-working space is expected to house about 140 start-ups.

Nurturing Talent

Talent is crucial for developing I&T. To nurture and bring together technology talent, the government will launch a Technology Talent Scheme, which offers a Postdoctoral Hub programme to provide organisations undertaking ITF projects as well as incubatees and tenant companies of the HKSTPC and Cyberport with funding to engage postdoctoral talent for R&D work. The scheme also subsidises local enterprises on a matching basis to train their staff in advanced technologies.

At undergraduate and postgraduate level, an Internship Programme under the ITF supports organisations to recruit graduates from local universities as interns to help in R&D projects funded by the ITF or undertaken by incubatees and small and medium enterprises that are HKSTPC or Cyberport tenants. More than 3,000 internships have been approved, involving a total funding of some \$650 million. The monthly allowances were increased in 2017 to \$16,000 for graduates with a bachelor's degree and \$19,000 for those with a master's or higher degree. The programme was extended to all I&T tenants of the HKSTPC and Cyberport in December.

Smart City Development

The government is committed to building Hong Kong into a world-class smart city, by making use of I&T to address urban challenges, enhance city management and improve people's quality of living. Following a consultancy study and two-month public consultation, the Smart City Blueprint for Hong Kong was published in December, outlining the government's vision and setting out the development plans under six major areas, namely 'Smart Mobility', 'Smart Living', 'Smart Environment', 'Smart People', 'Smart Government' and 'Smart Economy', for the next five years.

In 2017, the government continued to expand free public Wi-Fi coverage under the Wi-Fi Connected City Programme. A subsidy scheme was launched in March to fund non-profit-making organisations to provide free Wi-Fi at their youth service centres and study rooms. The government also carried out a pilot public-private collaboration arrangement by opening up government venues for service providers to provide free public Wi-Fi.

Re-industrialisation

Re-industrialisation, the development of high value-added industries or manufacturing processes, is a new area of economic growth for Hong Kong. It encompasses robotics, smart city and healthy ageing as strategic development areas.

In October, the Productivity Council established an Inno Space to nurture a start-up culture in Hong Kong and support re-industrialisation. The Inno Space provides workspace and technical support to help start-up entrepreneurs, students and graduates develop their innovative ideas into industrial designs, which may then be translated into products through prototyping. The Productivity Council also offers one-stop solutions, particularly to the manufacturing and related service industries, to encourage technology adoption and promote innovation and sustainable development. It also facilitates industrial upgrading and helps enterprises adopt high value-added production.

To support re-industrialisation and promote smart production, the HKSTPC is developing two pilot projects at the Tseung Kwan O Industrial Estate, namely an Advanced Manufacturing Centre and a Data Technology Hub. Furthermore, to meet the long-term needs of the I&T industry, the government identified a 56-hectare site near the Liantang/Heung Yuen Wai Boundary Control Point for the development of a science park and an industrial estate. A preliminary planning study by the HKSTPC is under way to examine the suitability of the site.

Use of I&T in Government, Business and Community

The government's data.gov.hk portal provides free public-sector information in machine-readable format to encourage use of the information to develop innovative applications that benefit the community and support the development of a knowledge-based economy. There are over 3,200 distinct data sets in 18 categories, including population, weather, environment, transport, housing, food, health and employment. In 2017, more than 1,000 application programming interfaces were provided on the portal to help software developers create applications and services.

Application forms for various government services are being digitised to allow for convenient online submissions. As at end-2017, more than 1,400 forms frequently used by the public could be completed and submitted electronically.

The government attaches great importance to information security and cyber security. The Government Computer Emergency Response Team Hong Kong, working with the police and the Hong Kong Computer Emergency Response Team Coordination Centre, monitors the overall cyber security situation in Hong Kong closely. It also helps operators of critical infrastructure, companies, schools and individuals handle information security, security threats and cyber incidents.

Data centres are important technology infrastructure. They support the development of various business sectors in adopting new technology areas such as cloud computing, big data and artificial intelligence, thus promoting the growth of high value-added economic activities in finance, logistics and e-commerce. Many multinational corporations operate data centres in Hong Kong. The following measures aim to boost the development of data centres:

- **Use of industrial buildings and industrial lots for data centres** – Two concessionary measures allow the conversion of industrial buildings into data centres and the redevelopment of industrial lots for high-tier data centres. As at end-December, the government had approved 23 applications to use industrial building premises as data centres and one application to redevelop an industrial lot.
- **Support services** – The Data Centre Facilitation Unit under the Office of the Government Chief Information Officer provides support and inter-departmental coordination for enterprises interested in setting up data centres.

In April, the annual signature Internet Economy Summit was organised to discuss the future development and strategies of the internet-driven economy, while the Hong Kong ICT Awards was held jointly with the local industry to recognise outstanding inventions and applications.

The annual InnoTech Month, held from September to December, promotes an I&T culture among industry stakeholders and the public through the InnoCarnival, roadshows, InnoTech workshops and seminars, stage performances and other activities. Notable projects from the five R&D centres were showcased at the China Hi-Tech Fair in Shenzhen in November and the Hong Kong Trade Development Council's SmartBiz Expo in December. The Innovation and Technology Scholarship Award Scheme, organised jointly with the academia and non-governmental organisations, aims to enhance local undergraduates' interest in I&T and encourage them to pursue related careers.

To tackle social issues using I&T, the government set up a \$500 million Innovation and Technology Fund for Better Living in May to support I&T projects that would benefit the public or specific groups, such as the elderly or disabled.

Digital inclusion measures to help needy groups include an outreach programme that encourages more elderly people and people with dementia to use ICT in their daily lives.

Cooperation with Mainland

In January, the HKSAR Government and the Shenzhen Municipal People's Government signed the Memorandum of Understanding on Jointly Developing the Lok Ma Chau Loop by Hong Kong and Shenzhen. Both sides agreed to jointly develop the loop into the Hong Kong-Shenzhen Innovation and Technology Park, which would become a key base for scientific research and host relevant higher education, cultural, creative and other complementary facilities.

The Hong Kong-Shenzhen Innovation and Technology Park Limited, a wholly owned subsidiary company of the HKSTPC, was established in October to take charge of the construction, operations, maintenance and management of the park.

In July, the National Development and Reform Commission, the People's Government of Guangdong Province, the HKSAR Government and the Macao SAR Government signed the Framework Agreement on Deepening Guangdong-Hong Kong-Macao Co-operation in the Development of the Bay Area. It set out key areas of cooperation in the bay area, including building a global technology and innovation hub.

The government provides \$5 million every year to each of the 16 Partner State Key Laboratories and six Hong Kong Branches of Chinese National Engineering Research Centres, all of which are recognised by the Ministry of Science and Technology for their strong R&D capabilities and leading positions in their areas of expertise. Partner State Key Laboratories established in or prior to 2010 underwent the first round of reassessment during the year.

In November, the Mainland-Hong Kong Science and Technology Cooperation Committee, a high-level steering committee set up by the Ministry of Science and Technology and the Innovation and Technology Bureau, agreed at its annual meeting to invite applications recommending Hong Kong experts for admission to the National Science and Technology Programmes Expert Database, and to consider taking forward a selection exercise for Hong Kong laboratories to be approved as Partner State Key Laboratories.

In November, the HKSTPC was recognised as a State-level Scientific and Technological Enterprise Incubator by the Ministry of Science and Technology for its efforts in providing incubation and support services to I&T start-ups.

The Cyberport Creative Micro Fund Cross-Boundary Programme brings young talent in Hong Kong, Guangdong and Shenzhen together to develop digital innovations. The programme helps local tertiary students acquire Mainland experience while encouraging exchange of innovative ideas. Cyberport provides \$100,000 as seed funding for each selected project to turn innovative ideas into prototypes.

The HKSAR and Guangdong governments run a Guangdong-Hong Kong Technology Cooperation Funding Scheme to encourage collaboration by their universities, research institutions and technology enterprises. In 2017, the ITF supported 17 projects under this scheme with about \$26 million, of which \$21 million was for 15 projects the ITF funded jointly with Guangdong or Shenzhen.

Websites

Cyberport: www.cyberport.com.hk

Cyber Security Information Portal: www.cybersecurity.hk

Government Computer Emergency Response Team Hong Kong: www.govcert.gov.hk

GovHK one-stop portal: www.gov.hk

Hong Kong Applied Science and Technology Research Institute: www.astri.org

Hong Kong Automotive Parts and Accessory Systems R&D Centre: www.apas.hk

Hong Kong ICT Awards: www.hkictawards.hk

Hong Kong Productivity Council: www.hkpc.org

Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies: www.lscm.hk

Hong Kong Research Institute of Textiles and Apparel: www.hkrita.com

Hong Kong Science and Technology Parks Corporation: www.hkstp.org

Information Security Portal: www.infosec.gov.hk

Innovation and Technology Bureau: www.itb.gov.hk

Innovation and Technology Commission: www.itc.gov.hk

Internet Economy Summit: www.ieconomysummit.hk

Nano and Advanced Materials Institute: www.nami.org.hk

Office of Government Chief Information Officer: www.ogcio.gov.hk

Public-Sector Information Portal: data.gov.hk

Smart City Blueprint for Hong Kong: smartcity.gov.hk