Report of the Advisory Committee on Innovation and Technology

Advisory Committee on Innovation and Technology
March 2017

Table of Contents

List of Annexes

CHAPTER 1 – EXECUTIVE SUMMARY

Introduction

1.1 Innovation and technology (I&T) development is among the top policy priorities of this Government. In March 2015, the Chief Executive announced that the Steering Committee on Innovation and Technology (SCIT) would be reorganised into the Advisory Committee on Innovation and Technology (ACIT). ACIT was officially set up on 1 April 2015. Members were drawn mainly from academia, industry and I&T related organisations. ACIT advises the Government on the strategic and developmental enhancements of I&T in Hong Kong, with a focus on making the best use of the advantages of 'One Country' and 'Two Systems' and further strengthening the coordination among the Government, industry, academia and research sector.

1.2 Since its establishment, ACIT has reviewed and considered Government's existing strategies in promoting I&T and the major difficulties in spearheading the effort. It has identified three key areas critical for I&T development which require more in-depth discussions. They are 'infrastructure', 'business' and 'culture and talent'. 'Infrastructure' refers to technological hardware (e.g. Hong Kong Science Park (HKSP), Cyberport and research and development (R&D) centres), communication network, human resource development, and policy directions set out in the National Five-Year Plan. 'Business' carries a broad meaning covering entrepreneurship activities as well as funding. 'Culture and talent' embodies the elements of innovation culture and talent development. Three working groups, namely, the Working Group on Infrastructure (WGI), the Working Group on Business (WGB) and the Working Group on Culture and Talent (WGCT) were subsequently established under ACIT to study these areas and formulate a package of recommendations.

Current Position and Challenges

1.3   Pursuant to the deliberations by working groups on the current position and challenges pertaining to the development of I&T, the findings that warrant Government's attention are summarised below –

(a)   Infrastructure

While the Government has launched a range of policy programmes over the years, which include the development and enhancement of HKSP, Cyberport, five R&D centres and public Wi-Fi [1] services as well as the nurturing of science and technology talent to boost the I&T development, the level of participation and activities has not engendered enough momentum and traction for attracting a critical mass of business investment and talents into the I&T sector.

Nevertheless, it is encouraging to see that the Hong Kong start-up ecosystem has witnessed phenomenal growth over the past few years.   With respect to funding support which is the key driving force in the innovation ecosystem, the WGI noted that more support could be provided.

(b)   Business

The Government has implemented a range of funding programmes to encourage private sector I&T investment which include the R&D Cash Rebate Scheme (CRS), the Technology Start-up Support Scheme for Universities (TSSSU), the Hong Kong Science and Technology Parks Corporation (HKSTPC)'s Corporate Venture Fund (CVF), the Enterprise Support Scheme (ESS) and the Cyberport Creative Micro Fund (CCMF) at the time of preparing this report.   However, local entrepreneurs are known to face a lot of challenges in accessing Series A funding.

---

[1] The term 'public Wi-Fi services' in the context of Hong Kong refers to Wi-Fi services which are accessible by the public, regardless of whether the services are provided by the public sector or by private organisations.

The R&D Centres, HKSTPC and the Cyberport have played an active role in facilitating the development of industry and technology clusters, nurturing young start-up companies and informing both the industry and the higher education sector on technology development and market intelligence.

While a range of supportive programmes have been put in place to develop a 'business' platform for I&T development, there are a number of areas that require more attention and efforts. Comparing to global development, local entrepreneurial efforts are not sufficiently focused for bringing notable impacts and benefits to the society. In nurturing young entrepreneurs, there is not enough training element in existing mentorship programmes. The lack of an R&D intelligence platform has made it hard for investors, entrepreneurs and industry players to search for potential university R&D results for commercialisation opportunity.

(c) *Culture and Talents*

Our school education system is well recognised internationally. The Learning to Learn school curriculum reform implemented since 2001 aims to help students acquire the basic knowledge and concepts in the eight Key Learning Areas (including Science and Technology), develop the generic skills necessary for independent and life-long learning (e.g. creativity, IT skills and problem-solving skills), and nurture positive values and attitudes for whole-person development and life-long learning. Besides, the Government implemented the New Academic Structure in 2009 and replaced the two public examinations in the former system by one, i.e. Hong Kong Diploma of Secondary Education Examination. It has reduced the pressure on students.

At senior secondary level, there are elective subjects for students interested in I&T. Furthermore, since 2015, STEM[2] education has been promoted through relevant Key Learning Areas in the curriculum. At the higher education sector, over 30% of our

---

[2] STEM is an acronym that refers to the academic disciplines of Science, Technology, Engineering and Mathematics collectively.

graduates are from University Grants Committee (UGC)-funded STEM related programmes.

While local universities are counted amongst the very best in the Asia-Pacific region in their teaching and research achievements, when it comes to I&T activities, university's main focus is on academic research rather than knowledge transfer to the industry for commercialisation. The WGI noted that the local school curriculum, which puts great emphasis on examination, may not move forward and develop in tandem with rapid I&T development. More efforts are needed to prepare high school graduates for STEM education at universities, and also equip university graduates with the skills and expertise necessary for future I&T careers.

Besides, while the Government has placed increasing emphasis on talent development, attracting the young generation to consider pursuing I&T as a career, and providing exposure and incentives to them at different stages of their academic and intellectual development through various programmes, the WGI noted that the I&T sector is still facing stiff competition from other industries and economies as it is seen as less favourable for advancement opportunity.

Recommendations

1.4   Taking into account the current situation and challenges and having reviewed the existing I&T programmes, the working groups have drawn up a set of recommendations with relevant performance indicators for ACIT's consideration.

1.5   The basic thrusts of the recommendations are three fold. The first is to build a competitive 'infrastructure' that has an abundance of appropriate talent, an active manufacturing base, catalytic government support, vibrant entrepreneurial activity and adequate funding support. The second is to facilitate the development of a competitive 'business' platform that facilitates the raising of entrepreneurial capital, training of entrepreneurs and mapping of data and information distribution in the

I&T ecosystem. The goal is to speed up the matching of capital and expertise. The third is to develop a culture that encourages innovation, discovery, technology breakthroughs and risk-taking, and to create satisfying and quality I&T jobs in Hong Kong in a bid to groom, re-tool, recruit and retain talents. The recommendations are –

(a) *Providing a stronger steer to the development of I&T by the Government*

The Government should continue to provide a stronger steer to the development of I&T. In the shorter-term, the Office of the Government Chief Information Officer (OGCIO) should continue to spearhead the Wi-Fi.HK initiative. In the medium-term, the Government should provide a high level coordination within the Government to spearhead large-scale I&T initiatives. Other measures to support local I&T development should include the coordination of dissemination of datasets in digital formats, exploring the feasibility of setting aside a dedicated item in the Government's budget for the procurement of I&T products and services and studying possible ways to encourage and enable local I&T companies to participate more actively in government procurement of products and services.

(b) *Building a critical mass of manufacturing activities*

The Government should work with the industry to build a critical mass of manufacturing activities towards smart production, high value adding and technology intensive manufacturing.

(c) *Strengthening the sustainability of the start-up ecology*

Concerted public and private sector efforts should be made to strengthen the sustainability of the start-up ecology. The Government should explore possible ways of encouraging private companies to participate in the provision of incubation or acceleration services. Funding support should be provided for setting up a co-investment scheme to support entrepreneurial activities. To nurture entrepreneurship at a younger age, the

Government should work with the education sector and industry to formulate a plan to cultivate entrepreneurship mindset among Hong Kong students.

(d) ***Exploring development opportunities outside Hong Kong***

The Government should continue to work with the industry to explore development opportunities outside Hong Kong for local I&T sector. Dedicated working groups should be set up under the ACIT to further review the opportunities for Hong Kong after the promulgation of the National 13th Five-Year Plan and to look for development opportunities at Qianhai, Nansha and Hengqin.

(e) ***Strengthening the funding support for university applied R&D activities***

The Government should identify additional means to strengthen the funding support for university applied R&D activities with a view to encouraging universities to engage more actively in applied R&D activities. In the short-term, the Government should encourage universities to solicit endowment fund dedicated to I&T related applied research.

In the medium-term, the Government should explore an alternative and more flexible funding source outside the UGC/Research Grants Council (RGC) and consider providing more funding support for R&D Centres on mid-stream R&D. To expand possible funding sources, the Government should work with the industry to lobby the Mainland to set up an 'I&T Infrastructure Fund' (科技基建基金) in Hong Kong under the 'Silk Road Fund' (絲路基金).

(f) ***Enhancing the fund raising platform***

With the support of the entrepreneurial financing industry, the Government should take actions to explore the setting up of a thematic matching/co-investment fund. Furthermore, the Government should, together with the industry, explore the

feasibility of providing more diversified funding channels to start-ups.

(g) **Strengthening entrepreneurial training**

With the support of the Government, the industry should strengthen entrepreneurial training by providing working mentorship programmes to young talents and entrepreneurial re-tooling training to entrepreneurs. The objectives are to train up young talents with the required skills to excel in I&T related fields and to prepare talents and leaders for an interdisciplinary future.

(h) **Setting up an R&D curating and mapping platform**

The Government should work with the higher education sector and industry to set up an R&D curating and mapping platform whereby a 'Central Index' containing curated R&D information will be developed. The Index will provide information lubricants for investors, entrepreneurs and industry players to search for R&D activities in Hong Kong. It will help lower the search cost.

(i) **Attracting and nurturing talent to work in the I&T sector**

There should be joint public and private sector efforts to attract and nurture talent to work in the I&T sector. In the short-term, quasi-government organisations (quangos) of I&T should arrange more visits for secondary school students to raise students' interest in I&T activities and development. The Government should explore ways of encouraging I&T quangos to set up micro funds for nurturing entrepreneurial spirit among secondary school students as well as rendering more support to schools for participating in joint school science competitions and extra-curricular activities.

In the short- to medium-term, the education sector should groom talent at a young age and enhance school I&T curriculum. Outside the formal education system, talents should be re-tooled

for strengthening their business skills.

In the medium-term, the Government should work with the higher education sector and industry to encourage STEM education and ensure that it is multi-disciplinary for meeting the diverse needs of the industry.   The possibility of increasing the number of student intakes into UGC-funded STEM related programmes should also be explored.

(j)   *Attracting talents outside of Hong Kong to work in the local I&T sector*

The Government should work with the industry as well as the Mainland and overseas counterparts to explore possible measures of attracting talents outside of Hong Kong to work in the local I&T sector by identifying additional or enhanced measures for retaining Mainland/overseas students working in Hong Kong and attracting overseas Hong Kong graduate returnees.   Opportunities under the National 13th Five-year Plan should be leveraged to enrich and deepen the local I&T ecosystem.

The Government should coordinate efforts among government departments, I&T quangos, the higher education sector and the industry to attract renowned Mainland/overseas universities to set up research centres or start-up businesses in Hong Kong.

(k)   *Accelerating knowledge transfer/commercialisation activities*

With the support of the Government, the higher education sector and industry should make joint efforts to accelerate knowledge transfer to the industry for commercialisation.   The possible measures are to identify ways of improving Student-University-Corporate-Government linkage.

The Government and the higher education sector should jointly explore the possibility of providing incentives to encourage university academic staff to conduct applied R&D and form start-up companies to commercialise their inventions.   In the

longer-term, the Government should consider if it is desirable to create a separate 'track' for academics focusing on translational research.

(l) ***Removing public misconception and fostering a vibrant I&T culture***

In the short-term, the Government and other relevant parties should launch more activities to promote success stories on I&T development, etc. in order to make it more relevant to social and economic development.   In the medium-term, the Government should work with the education sector and industry to create an environment conducive to I&T development, by providing more recognition to students on non-examination related achievements as well as encouraging corporate sponsorship of I&T internships, scholarships, etc.

In parallel, the Government should work with the education sector to enhance the school I&T curriculum through promoting 'Popular Science' and 'Netiquette' among students. Furthermore, students should be shown how to accept failures and learn to equip themselves for new challenges.

(m) ***Utilising existing resources to grow the existing 'clusters'***

The Government should step up its efforts in attracting multinational corporations (MNCs) and global research institutions to set up branches/R&D centres in Hong Kong.   In the medium-term, the Government should work with I&T related quangos and organisations to enhance the ecosystem.

With the support of the Government, I&T organisations in both the industry and higher education sector should formulate and implement measures that leverage Hong Kong's unique advantages of being an international city under 'One Country, Two Systems' to attract, recruit, and retain overseas and Mainland talents as well as Hong Kong overseas returnees.

Concluding Remarks

1.6   While performance indicators have been drawn up to measure the effectiveness of each of the above specific recommendation, nine overarching key performance indicators (KPIs) with clear and specific targets to be achieved have also been identified with a view to spearheading concerted efforts in achieving the overall strategic goals of the local I&T ecosystem.   It is crucial that the Government continues to provide the clearest policy steer and implement the necessary measures to engender a thriving I&T ecosystem, and that all stakeholders, including the academia, industrialists, technopreneurs, investors and technologists work together in achieving this common goal.

CHAPTER 2 – INTRODUCTION

Background of ACIT

2.1   Innovation and technology (I&T) are key drivers for social and economic developments.   They help improve our productivity and competitiveness, contribute to sustainable growth of the economy and provide a greater variety of job opportunities for our talented young people.   The Government needs to devote more effort to promote I&T development, lest we would risk losing our competitiveness on the global stage.

2.2   In March 2015, the Chief Executive announced that the SCIT would be reorganised into the ACIT, and appointed the Advisor to the Chief Executive on Innovation and Technology as its Chairman. Established in 2004, the SCIT was responsible for coordinating the formulation and implementation of I&T policies as well as ensuring synergy amongst different elements of the I&T programmes.

2.3   The ACIT was officially set up on 1 April 2015.   Members were drawn mainly from the academia, industry and I&T related organisations. Its membership list is at **Annex 1**.   Since the establishment of the Innovation and Technology Bureau (ITB) in November 2015, the Secretary for Innovation and Technology has assumed chairmanship of the ACIT.   The ACIT advises the Government on the strategic and developmental enhancements of I&T in Hong Kong, with a focus on making the best use of the advantages of 'One Country' and 'Two Systems' and further strengthening the coordination among the Government, industry, academia and research sector.   The terms of reference of the ACIT are at **Annex 2**.

I&T Development in Hong Kong

2.4   Economists in recent years have put the discovery of ideas leading to I&T as the central pillar of economic growth.   New technologies and ideas could create values and therefore propel growth and affect every sector of the economy, from agriculture, elderly service and financial services, to logistics, manufacturing and retail.   The

enhancement of efficiency and cost reduction stemming from I&T have greatly benefited the world population directly or indirectly.   Hong Kong possesses the right infrastructure with a sound legal system, open economy, market friendly regulatory regime, simple tax system, and respect for intellectual property rights, all of which have created an environment conducive to the nurturing of ideas.

2.5   The Government provides a strategic environment for I&T development through five core strategies.   They include providing world-class technology infrastructure for enterprises, research institutions and universities; offering financial support to stakeholders in the industry, academia and research sector to develop and commercialise their R&D results; nurturing talent; strengthening science and technology collaboration with the Mainland and other economies; and fostering a vibrant culture of innovation.

2.6   There are however a number of challenges in developing I&T in Hong Kong, including –

(a) *Decreasing manufacturing activities* – Our economy is driven by the service sector which accounted for about 93% of gross domestic product (GDP) in 2015.   The manufacturing sector contributed only 1.2% of GDP reported for the same period;

(b) *Non-existence of defence activities* – Hong Kong does not have any defence spending which is a major driver of R&D activities in other developed economies, e.g. the United States and Israel;

(c) *Business culture not favourable for R&D* – R&D investment has hitherto been seen by industry as less attractive.   The favourite choices are finance, real estate, tourism, etc.; and

(d) *Relatively short history of promoting I&T* – I&T development requires long-term investment and extensive collaboration among the Government, industry, academia and research sector. In the United States, the rise of Silicon Valley could be traced back to the 1950s.   In Taiwan, the Industrial Technology Research Institute and the Hsinchu Science Park were established in the 1970s and 1980s respectively.

In comparison, Hong Kong is a late starter.   We embarked on the journey to promote I&T after the report submitted by a Commission led by the late Professor Tien Chang-lin in 1999. The Innovation and Technology Commission (ITC) was established in 2000 and has taken over a large part of duties of the then Industry Department.   In the early years, the Innovation and Technology Fund (ITF) was mainly aimed at research conducted by universities, the Applied Science and Technology Research Institute (ASTRI) and the Hong Kong Productivity Council (HKPC).   While the academic standards of universities were generally high, their emphasis then was mainly on basic research and academic publications.   It was not until 2006 that the Government started to give more emphasis on technology transfer and commercialisation, with subsequent establishment of the five R&D Centres to coordinate and undertake applied R&D in selected focus areas.   While there have been some improvements in recent years, for example, the R&D Centres' work has increasingly been recognised and welcomed by the industry, the I&T sector has not expanded sufficiently to enable a competitive ecosystem.

Formation of Working Groups under ACIT

2.7   Since its establishment, the ACIT has reviewed and considered Government's existing strategies in promoting I&T and the major difficulties in spearheading the effort.   It has identified three key areas critical for I&T development which require more in-depth discussions. They are 'infrastructure', 'business' and 'culture and talent'.   Three working groups, namely, the Working Group on Infrastructure (WGI), the Working Group on Business (WGB) and the Working Group on Culture and Talent (WGCT) were subsequently established under the ACIT to study these areas and formulate recommendations.   Their work is detailed in the following chapters.

CHAPTER 3 – WORKING GROUP ON INFRASTRUCTURE

Background

3.1　　The Working Group on Infrastructure (WGI) was established under the ACIT to examine issues and formulate recommendations pertaining to the infrastructure for I&T development in Hong Kong.　In the context of WGI's discussions, the word 'infrastructure' has a broader meaning which includes technological hardware (e.g. HKSP, Cyberport and five R&D Centres), communication network, human resource development, and policy directions set out in the National Five-Year Plan. The terms of reference of the WGI are at **Annex 3**.

3.2　　There were nine members in the WGI, with Mr Wong Ming-yam serving as the convenor.　The full membership list is at **Annex 4**. Three WGI meetings were held between June and November 2015 to discuss and develop recommendations for building the 'infrastructure' that can better serve the ecosystem.

Current Position and Challenges

3.3　　The position of Hong Kong, at the time the WGI meetings were held, is summarised below.

3.4　　According to the International Institute for Management Development (IMD) World Competitiveness Yearbook, Hong Kong has ranked first in technological infrastructure[3] for five consecutive years from 2011 to 2015.

---

[3] Technological infrastructure covers a number of dimensions: information and communications technology, computer, talent, skills, technological cooperation, public and private sector ventures, funding, technological regulation, high tech exports and cyber security. Due to changes in IMD's definition, Hong Kong's ranking in this area dropped from 1st in 2015 to 14th in 2016.

(A) Technological Hardware

Hong Kong Science Park and Industrial Estates

3.5   The Hong Kong Science Park (HKSP), managed by HKSTPC, is our flagship technology infrastructure which provides facilities, services and a dynamic environment that enable companies to nurture ideas, innovate and develop.   Phases 1 and 2 of HKSP provide 20 buildings, offering 220 000 square metres of R&D office space.   The completion of HK$4.9 billion HKSP Phase 3 has increased the gross floor area of HKSP by around 50% to 330 000 square metres, accommodating over 600 partner companies and providing 15 000 job opportunities.

3.6   In 2014, ITC, in conjunction with HKSTPC, completed a review on the utilisation and long-term development direction of HKSP and Industrial Estates (IEs).   It is recommended, among other things, that HKSTPC should consider suitably raising the development density of HKSP to optimise its land use in light of the severe shortage of land resources in Hong Kong so as to increase the supply of R&D facilities.

3.7   The Government also revised its IE policy in 2015.   HKSTPC will hence build and manage multi-storey specialised industrial buildings for renting to multi-users in I&T industries.

R&D Centres

3.8   In 2006, the Government set up five R&D Centres to drive and coordinate applied R&D in their respective technology areas and promote commercialisation.   The five R&D Centres are –

(a)   Hong Kong Automotive Parts and Accessory Systems R&D Centre (APAS);

(b)   R&D Centre for Information and Communications Technologies under ASTRI;

(c)   Hong Kong Research Institute of Textiles and Apparel (HKRITA);

(d)   Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM); and

(e)   Nano and Advanced Materials Institute (NAMI).

3.9   To date, the ITF has committed a total of about HK$1.7 billion to support the operation of the four R&D Centres (except ASTRI) for 15 years from April 2006 to March 2021.   The operating expenditure of ASTRI is funded separately from Government's annual recurrent subvention due to historical reason.

3.10   As at May 2016, the five R&D Centres have conducted over 920 projects involving a funding amount of about HK$4.1 billion.   We are delighted that after a decade of operation, the R&D Centres have demonstrated solid performance.   For instance –

(a)   they have taken up a significant role as the focal point for technology collaboration among the Government, industry, academia and research sector;

(b)   they have obtained increasing support of the industry as demonstrated by a higher level of industry contribution over the years and that all of them have been able to exceed the latest target of 20%;

(c)   in terms of commercialisation, some of the R&D Centres have started receiving more income other than industry sponsorship for ITF projects, for example, contract service income, licensing fees and royalties;

(d)   they have made great effort in conducting trials in the public sector.   Over the past few years, they have conducted over 90 trial projects in the public sector; and

(e)   they have gradually made a name as the trusted R&D partner in their respective sectors.

Cyberport

3.11   The Cyberport is Hong Kong's information and communications technology (ICT) flagship facility with a cluster of over 400 ICT tenants. It is committed to supporting and promoting ICT in Hong Kong through the creation of a cluster of ICT companies and professionals, as well as implementation of programmes to foster industry development and nurture ICT start-ups.   Equipped with an array of state-of-the-art ICT facilities, the Cyberport currently offers 94 700 square metres of office space.

(B) Information and Communications Technology (ICT) Infrastructure With Respect to Public Wi-Fi Services and Public Sector Information

Public Wi-Fi Services

3.12   Hong Kong is a leading digital economy, consistently achieving top rankings in digital readiness and Internet access capabilities.   Hong Kong's ICT infrastructure is one of the most sophisticated and advanced in the world, providing a wide range of services at affordable prices. The Government has all along been committed to facilitating and encouraging the development of public Wi-Fi services for the convenience of the public.   OGCIO strives to leverage the advanced ICT infrastructure to develop it into a Wi-Fi Connected City.

3.13   The Government Wi-Fi Programme (Gov*WiFi*) was launched in 2008 to provide free Wi-Fi services mainly at government premises with high patronage including major parks, tourist attractions, leisure and culture facilities, etc.   No prior registration is required to use the services. As at July 2016, over 3 100 Wi-Fi hotspots have been installed at about 610 government premises.   To further improve connection speed, OGCIO has doubled the overall Wi-Fi connection speed at government premises with high patronage, and has enhanced the security of the service.   To ensure the quality of Gov*WiFi* service, the bandwidth usage in different premises are also monitored and adjusted regularly.

3.14   Apart from progressively extending the free Gov*WiFi* service to more government premises, OGCIO has also collaborated with the industry to launch the common branding of WiFi.HK in August 2014 to facilitate the public in using Wi-Fi services (free or time-limited free) provided by public and private organisations.   In July 2016, about 17 800 hotspots were provided under the Wi-Fi.HK brand in all the 18 districts across the territory.   Taking into consideration the successful model of Wi-Fi.HK, OGCIO plans to engage service providers to provide public Wi-Fi services in government premises under a public-private collaboration approach.   The number of hotspots under Wi-Fi.HK is expected to double in three years.

3.15   The WGI also noted other developments, for example, OGCIO is in discussion with Development Bureau on the adoption of ICT technologies, e.g. real-time monitoring of parking spaces, etc. in the West Kowloon project.   In addition, smart lamp posts are being considered in the smart city projects.   They might serve as convenient locations for installing Wi-Fi hotspots.

Public Sector Information

3.16   Public sector information (PSI) is the information produced, collected and disseminated by governments and public bodies.   Since 2015, the Government has started to release all free online government information in digital formats, with a view to tapping the creativity and ingenuity of the community to develop innovative applications using PSI. This helps bring convenience to the public and open up new business opportunities.

3.17   In support of this initiative, OGCIO launched the revamped PSI portal, Data.Gov.HK, on 18 March 2015.   The revamped portal has greater capacity and flexibility with new and useful functions.   The new portal also features apps using PSI datasets for public information.   As at August 2016, more than 6 000 datasets in 18 broad categories were available on the portal, covering practically every facet of life.

(C) Human Resource Development for I&T Activities

3.18   The success of a knowledge-intensive I&T sector hinges on the availability of human resource, in particular, talents engaging directly in R&D or providing direct services for R&D activities.   In terms of human resource supply, it was reported by UGC that there were 6 546 undergraduates and 1 482 postgraduates graduated in UGC-funded STEM related programmes in 2014-15, accounting for over 33% of the total graduates.   From the demand perspective, the Hong Kong Innovation Activities Statistics 2014 reported that there were 6 821 business establishments conducting technological innovation[4] activities in 2014, about 40% of them responded that the lack of qualified science and technology personnel was one of the factors that hindered their technological innovation activities.

(D) Policy Programmes Dovetailed with the National Five-Year Plan

3.19   The National Five-Year Plans identify potential growth areas, which give rise to numerous I&T development opportunities for Hong Kong.   The National 13th Five-Year Plan was not released at the time when the WGI was formulating its recommendations.   When WGI Members considered the past effort to dovetail the National 12th Five-Year Plan on the I&T development front, they agreed that the Government had already implemented many measures to exploit the various development opportunities, and noted that more effort could be invested to forge active collaboration activities outside Hong Kong. Measures that were implemented include broadening funding support and launching new initiatives to encourage more applied R&D activities. With the then imminent roll out of the National 13th Five-Year Plan, WGI Members expected technology areas that could help spearhead the 'Made in China 2025' plan, such as robotics, integrated circuit (IC) design, 5G, and green technology would be given more emphasis.   Some quangos such as ASTRI had already started to explore their possible roles in supporting the implementation.

---

[4] Technological innovation refers to the introduction of a technologically new or significantly improved product (goods or service) to the market or implementation of a technologically new or significantly improved process within an establishment.   The innovation is based on the results of new technological developments, new combinations of existing technology or utilisation of other knowledge acquired by the establishment.   Technological innovation activities cover any in-house or contracted-out R&D activities.

3.20   Pursuant to the deliberations by WGI Members on the current position and challenges pertaining to the development of I&T 'infrastructure', the findings that warrant Government's attention are summarised in **Box 1** below –

Box 1

Current Position	Challenges
• According to the Hong Kong Innovation Activities Statistics 2014, about 40% of business establishments that engaged in technological innovation activities responded that the lack of qualified science and technology personnel was one of the factors that hindered their technological innovation activities.	• Shortage of local talents and mismatch between graduate and employer expectations • Difficulties in attracting talents from other places to Hong Kong
• The manufacturing sector contributed to 1.2% of GDP in 2015.	• Inadequate manufacturing activities in Hong Kong for attaining a critical mass
• When compared with other economies, the Government of the Hong Kong Special Administrative Region has not identified or selected technology areas for focused development.	• Need for a stronger Government steer
• The Hong Kong start-up ecosystem has witnessed phenomenal growth over the past few years. Hong Kong was ranked in the top five fastest growing start-up ecosystems and one of the	• Concern for the sustainability of the start-up ecology

Current Position	Challenges
world's top 25 start-up hubs, according to the Global Start-up Ecosystem Ranking 2015[5].	
• R&D expenditure of UGC-funded institutions amounted to about HK$8.6 billion in 2014, and 83% was funded by the Government [mainly through the UGC/RGC].	• Inadequate research funding and the complex funding mechanism adopted by the UGC/RGC
• On development of I&T in Hong Kong, too much emphasis has been placed on local measures and R&D done locally.	• How to leverage the development opportunities outside Hong Kong
• The Government had implemented a lot of policy programmes to promote I&T development during the National 12th Five-Year Plan period albeit with room for improvement.	• Given the National 13th Five-Year Plan was not announced at the time WGI meetings were held, the WGI suggested the ACIT consider establishing a dedicated working group to review the opportunities for Hong Kong at a suitable time.

3.21   In addition to the above, the WGI has also discussed the outlook of I&T infrastructure in Hong Kong with respect to supporting the cross-disciplinary platforms of 're-industrialisation', 'healthy ageing' and 'smart city'.   The opportunities identified are summarised below –

   (a) ***Re-industrialisation*** – Expanding high value added production processes instead of bringing back traditional manufacturing

---

[5] Study published by a San Francisco based research firm, Compass.

activities is likely to present better opportunities for Hong Kong. To move forward, Hong Kong can take advantage of the advent of robotics, smart manufacturing technologies and nanotechnology. More efforts concentrated in brand building and advocacy work will help attract and retain high value added industrial processes in Hong Kong.

(b)   *Healthy ageing* – Hong Kong has an ageing population with rising life expectancy. The implementation of e-health services implies vast potentials for life sciences, stem cells and regenerative medicine. The lack of well-defined standards of the latter two technology fields presents opportunities worth exploring.

(c)   *Smart city* – Open data and connectivity are keys to smart city development. For open data to be optimally utilised in a smart city, the issues on data ownership and the right of use have to be sorted out in advance. Smart city development and sustainable environment go hand in hand. Thus, development of green technologies such as renewable energy and electric vehicle is a logical step in building a smart city.

Recommendations and Performance Indicators

3.22   With respect to its terms of reference **at Annex 3**, the WGI has drawn up a set of recommendations with relevant performance indicators for ACIT's consideration. The basic thrusts of a competitive 'infrastructure' are to have abundance of appropriate talent, an active manufacturing base, catalytic government support, vibrant entrepreneurial activity and adequate funding support. Building on these thrusts, the final recommendations and performance indicators, which have taken into account the views of ACIT Members, are presented below –

Recommendations

(a) Joint public and private sector efforts to attract and nurture talent to work in the I&T sector

Short-term

(i) I&T quangos should arrange more visits for secondary school students to raise students' interest in I&T activities and development. The students should be introduced to different fields of science and technology and have first-hand exposure to their potential applications.

(ii) The Government should explore ways of encouraging I&T quangos to set up micro funds for nurturing entrepreneurial spirit among secondary school students. Active participation of the industry is crucial to the success of the programme. The forms of participation could range from the nomination of project themes, sponsorship of projects to the provision of working mentors.

(iii) The Government should render more support to schools for participating in joint school science competitions and extra-curricular activities.

Medium-term

(iv) The Government should work with the higher education sector and industry to encourage STEM education and ensure that it is multi-disciplinary for meeting the diverse needs of the industry[6].

(v) The Government should explore the possibility of increasing the number of student intakes into UGC-funded STEM related programmes[6].

---

[6] Recommendation falls in the scope of the Working Group on Culture and Talent, see Chapter 5.

(b) The Government working with Mainland and overseas counterparts and the industry to explore possible measures of attracting talents outside of Hong Kong to work in the local I&T sector

Medium-term

(i) The Government should identify additional or enhanced measures for retaining Mainland/overseas students working in Hong Kong[6].

(ii) The Government should identify additional or enhanced measures for attracting overseas Hong Kong graduate returnees[6].

(iii) The Government should coordinate efforts among government departments, I&T quangos, the higher education sector and the industry to attract renowned Mainland/overseas universities and enterprises to set up research centres or start-up businesses in Hong Kong. Opportunities under the National 13th Five-Year Plan should be leveraged to enrich and deepen the local I&T ecosystem.

(c) The Government working with the industry to build a critical mass of manufacturing activities

To promote smart production, attract high value added technology industries as well as high value added manufacturing process.

Medium-term

(i) The Government should identify possible ways of attracting and cultivating a number of high value added industries in particular sectors that are –

- less mature in the Mainland;
- related to R&D of new materials; and

- related to the manufacturing of products that the Hong Kong brand would make a difference.

(d) The Government providing a stronger steer to the development of I&T

Short-term

(i) OGCIO should continue to spearhead the Wi-Fi.HK initiative with a view to improving the speed, quality and accessibility of public Wi-Fi services under the Wi-Fi.HK brand.

Medium-term

(ii) Providing a high level coordination within the Government to spearhead large-scale I&T initiatives, for instance, in smart city projects.

(iii) The Government should explore the feasibility of setting aside a dedicated item in the Government's budget for the procurement of I&T products and services.

(iv) The Government should study possible ways to encourage and enable local I&T companies to participate more actively in government procurement of products and services.

(v) The Government should coordinate the dissemination of datasets in digital formats from multiple sources/owners to the public.

(e) Concerted public and private sector efforts to strengthen the sustainability of the start-up ecology

Medium-term

(i) The Government should explore possible ways of encouraging private companies to participate in the provision of incubation or acceleration services.

(ii) The Government should work with the education sector and industry to formulate a plan to cultivate entrepreneurship mindset among Hong Kong students.

(iii) Providing funding for setting up a co-investment scheme to be administered by the Government or a selected quango.

(f) The Government identifying possible ways of strengthening the funding support for university applied R&D activities

To encourage universities to engage more actively in applied R&D activities.

Short-term

(i) The Government should encourage universities to solicit endowment fund dedicated to I&T related applied research.

Medium-term

(ii) The Government should explore an alternative and more flexible funding source outside UGC/RGC, for example, a translation fund[7].

(iii) The Government should work with the industry to lobby the Mainland to set up an 'I&T Infrastructure Fund' (科技基建基金) in Hong Kong under the 'Silk Road Fund' (絲路基金).

(iv) The Government should consider providing more funding support for the R&D Centres on mid-stream R&D.

---

[7] Recommendation falls in the scope of the Working Group on Business, see Chapter 4.

(g) **The Government working with the industry to explore development opportunities outside Hong Kong for local I&T sector**

Short-term

(i) Setting up a dedicated working group under the ACIT to further review the opportunities for Hong Kong after the promulgation of the National 13th Five-Year Plan.

Medium-term

(ii) A dedicated working group should be set up under the ACIT to look for development opportunities at Qianhai, Nansha and Hengqin.

Performance Indicators

3.23 In order to assess the progress of the various measures and recommendations, the WGI has suggested a number of possible performance indicators as set out below –

Recommendation (a) Joint public and private sector efforts to attract and nurture talent to work in the I&T sector

- Number of visits and visitors to I&T quangos organised for secondary schools
- Extra funding support for schools on I&T related extra-curricular activities
- Number of persons employed in the I&T sector
- Number of graduates from UGC-funded STEM related programmes

Recommendation (b) The Government working with Mainland and overseas counterparts and the industry to explore possible measures of attracting talents outside of Hong Kong to work in the local I&T sector

- Number of I&T immigrants or work visas issued to employees of I&T companies
- Number of research centres or start-up businesses set up by Mainland/overseas universities in Hong Kong

Recommendation (c) The Government working with the industry to build a critical mass of manufacturing activities

- Implementation of pilot projects under the revised IE programme
- R&D expenditure/economic contribution by the IE's tenant companies in specialised multi-storey buildings

Recommendation (d) The Government providing a stronger steer to the development of I&T

- Number of Wi-Fi.HK hotspots
- Establishment of a higher level coordination mechanism
- Government's budget for I&T provisions
- Amount of contracts awarded to local I&T companies
- Number of datasets made available to the public

Recommendation (e) Concerted public and private sector efforts to strengthen the sustainability of the start-up ecology

- Number of start-ups established
- Survival rate of start-ups
- Number of start-ups undergoing mergers and acquisition and initial public offerings
- Amount of investment by angels or venture capitalists in start-ups
- Number of patents filed by start-ups

CHAPTER 4 – WORKING GROUP ON BUSINESS

Background

4.1   The Working Group on Business (WGB) was established under the ACIT to examine top business and economic megatrends and positioning strategies relevant to I&T development in Hong Kong.   The WGB studied in particular initiatives to harness business development potential of universities and research institutes in R&D, with a view to formulating new recommendations on how to develop Hong Kong as a 'metropolitan laboratory' platform for spurring more active I&T activities. In the context of WGB's discussions, the term 'business' has a broader meaning covering entrepreneurship activities as well as funding.   The terms of reference of the WGB are at **Annex 5**.

4.2   There were nine members in the WGB, with Mr Denis Tse Tik-yang serving as the convenor.   The membership list is at **Annex 6**. Three WGB meetings were held between June and November 2015 to discuss and develop recommendations on enhancing the 'business' platform for the development of a competitive I&T sector.

Current Position and Challenges

4.3   The position of Hong Kong I&T development, at the time the WGB meetings were held, is summarised below.

(A) Entrepreneurial Funding Regime

4.4   The ratio of gross domestic expenditure on R&D (GERD) to GDP in Hong Kong has been criticised as inadequate comparing with other innovation-driven economies.   Despite government's efforts to boost public sector investment over the years, the increase in private sector spending on R&D has not been encouraging.   According to the Hong Kong Innovation Activities Statistics 2014, local business sector accounted for only 44% of the GERD in 2014, which may not be sufficient to drive I&T activities to the forefront of economic interest. For those business establishments that undertook technological innovation activities, the most important factors that might have slowed

their technological innovation activities were reported to be –

(a)   costs are too high;

(b)   lack of financing means or alternatives from sources outside the establishment or enterprise group; and

(c)   lack of investable funds within the enterprises.

4.5   The opportunity to access funding is crucial for most start-ups. Over the years, the Government has launched a myriad of programmes to encourage private sector investment in R&D and innovation activities. As at May 2016, these programmes include –

(a)   R&D Cash Rebate Scheme

The HK$200 million R&D Cash Rebate Scheme (CRS) launched in April 2010 provides cash rebate on the investment by enterprises in conducting R&D projects either funded by the ITF or in partnership with designated local public research institutions.   The cash rebate rate stood at 30% at the time the WGB meetings were held.   To enhance the effectiveness of the Scheme, it was announced at the 2016-17 Budget that the level of cash rebate should be increased to 40% for applications approved on or after 24 February 2016.   As at May 2016, the Scheme had approved about 1 350 applications involving rebate amounting to over HK$170 million.

(b)   Technology Start-up Support Scheme for Universities

In 2014, the Technology Start-up Support Scheme for Universities (TSSSU) was launched to provide an annual funding of up to HK$24 million to six local universities[8], initially for three years, to encourage university teams to start technology businesses and bring R&D results from the campus to real world applications.

---

[8]   The six local universities are City University of Hong Kong, Hong Kong Baptist University, The Chinese University of Hong Kong, The Hong Kong Polytechnic University, The Hong Kong University of Science and Technology, and The University of Hong Kong.

(c)   Corporate Venture Fund

In 2015, HKSTPC launched the Corporate Venture Fund (CVF) that co-invests in start-ups with private funds on a matching basis.   HKSTPC has earmarked HK$50 million for the CVF. The CVF aims to fill the funding gap encountered by local technology start-ups during their early investment stage, and encourage more angel/venture capital (VC) investment in the local I&T industry.   The CVF targets start-ups that are located in HKSP or have participated in its incubation programmes.

(d)   Enterprise Support Scheme under ITF

The Enterprise Support Scheme (ESS) was also introduced in 2015.   It aims to bring fresh impetus to promote private sector investment and further the development of Hong Kong's I&T sector.   It provides funding support to companies of all sizes to support their in-house R&D projects, with a matching fund ceiling of HK$10 million per project; and there will be no requirement for recoupment of Government's contribution.

(e)   Cyberport Creative Micro Fund

The Cybeport Creative Micro Fund (CCMF) is a seed fund set up to encourage innovation and creativity by sponsoring high potential and innovative start-up projects or business concepts in ICT-related areas.   A grant of HK$100,000 will be awarded to successful applicants over a 6-month project period for proofs of concept and for developing prototype products.   There are two types of CCMF, i.e. the Hong Kong Programme and the Cross-Border Programme, supporting aspiring entrepreneurs at different development stages and in different target markets.

(B)   Investment in Technology Focus Areas

4.6   The 2015 Consumer News and Business Channel (CNBC) Disruptor 50 list[9] reveals that the international business landscape has been disrupted by a range of innovative business models and technological breakthroughs.   Some Members considered that a broad direction of I&T development roadmap in Hong Kong should be mapped out.

4.7   According to the Hong Kong Innovation Activities Statistics 2014 published by the Census and Statistics Department, the total expenditure of in-house R&D activities in the business sector in 2014 amounted to HK$7.4 billion.   The top three technology areas – information technology, electrical and electronics engineering technology, and manufacturing technology, when combined, accounted for 86% of the business expenditure on R&D (BERD) (see Table 1).

4.8   Over the years, the Government's approach of promoting I&T is to create a conducive environment through the provision of excellent software and hardware support.   A number of technology areas and industry clusters have thrived under these supporting programmes which include –

R&D Centres

4.9   As detailed in paragraph 3.8, five R&D Centres have been set up to serve as the focal points for technology collaboration among the Government, industry, academia and the research sector in selected technology areas.   These technology areas are –

   (a)   automotive parts and accessory systems;
   (b)   ICT;
   (c)   textiles and clothing;

---

[9] In the 2015 Disruptor 50 list, CNBC features private companies in 16 industries - from aerospace to financial services to cyber security to retail - whose innovations are revolutionising the business landscape.   These forward-thinking upstarts have identified unexploited niches in the marketplace that have the potential to become billion-dollar businesses, and they rushed to fill them.   In the process, they are creating new ecosystems for their products and services.
Available from: http://www.cnbc.com/2015/05/12/cnbc-disruptor-50.html [Accessed in November 2015].

(d)   logistics and supply chain management; and

(e)   nanotechnology and advanced materials.

Industry Clusters

4.10   HKSP houses over 600 technology companies distributed across five clusters (i) ICT, (ii) electronics, (iii) biomedical technology, (iv) material and precision engineering and (v) green technology. In addition, three cross-disciplinary platforms are being developed on robotics, healthy ageing and smart city to facilitate the integration of advanced technologies in innovation products. Due to its public mission, the Cyberport is a prominent cluster of ICT companies in Hong Kong.

Innovation and Technology Fund

4.11   The ITF supports applied R&D projects and facilitates technology upgrading in manufacturing and service industries. It is one of the most important tools of the Government in promoting I&T. As at May 2016, the ITF had supported over 5 200 projects involving a total funding of about HK$11.3 billion. In terms of the distribution of ITF approved projects by technology area, the top three technology areas – information technology, electrical and electronics, and manufacturing technology, when combined, had received 66% of the total approved funding (see Table 2) since the inception of ITF.

4.12   The figures of BERD and ITF approved projects both suggest that R&D investments are broadly distributed across technology areas related to information technology, electrical and electronics engineering technology and manufacturing technology.

Table 1. Total Expenditure on In-house R&D Activities in the Business Sector in 2014 by Technology Area

Technology Area	Expenditure on In-house R&D Activities (HK$ million)
Information Technology	3,286.4
Electrical and Electronics Engineering Technology [#]	2,331.7
Manufacturing Technology	758.5
Biotechnology	389.3
Advanced Materials Technology	150.1
Environmental Technology	125.3
Nanotechnology	70.8
Social Sciences	61.3
Chinese Medicine	9.7
Humanities	2.1
Others	252.3
Total [@]	**7,437.5**

Notes:

 # 'Electrical and electronics engineering technology' associated with 'computer hardware' (such as integrated circuits) and 'communication technology' were included in the area of 'information technology'.

@ Figures include expenditure on in-house R&D activities conducted by a local party for itself and/or for other organisations.

Source:
Hong Kong Innovation Activities Statistics 2014, Census and Statistics Department.

Table 2. Distribution of Approved ITF Projects by Technology Area *(as at 31 May 2016)*

Technology Area	Funds Approved (HK$ million)
Information Technology	3,171.2
Electrical and Electronics	2,378.6
Manufacturing Technology	1,901.0
Nanotechnology	1,219.3
Biotechnology	647.8
Materials Science	378.1
Environmental Technology	210.0
Chinese Medicine	119.0
Others	973.2
Total	**11,294.8 ***

Note:
* Also includes funding to Research and Development Cash Rebate Scheme (Since April 2016), Partner State Key Laboratories, Hong Kong Branch(es) of Chinese National Engineering Research Centre(s), Technology Transfer Offices of universities and Technology Start-up Support Scheme for Universities, which is not categorised according to technology area.

(C) Collaboration on Technological Innovation Activities in the Business Sector

4.13   It is important to solicit interest of 'needle-moving' industry players who will be the major driving forces in entrepreneurial I&T activities in Hong Kong.   In 2014, 6 821 business establishments engaged in technological innovation activities in Hong Kong.   About 18% (1 223) of them were reported to have collaboration arrangements on technological innovation activities with other organisations in both private and public sectors.   However, only less than 40% of these 1 223 business establishments had established collaboration arrangement with company not affiliated to their own enterprise group[10].   There is a lack of proper channels for entrepreneurs to join industry alliances for business and R&D development.   There is room for more collaboration

---

[10] Hong Kong Innovation Activities Statistics 2014, Census and Statistics Department.

among industry players in technological innovation activities.

4.14   On the other hand, the ITF also supports I&T organisations to forge collaboration arrangement so as to encourage more industry collaboration on I&T.   Some examples are –

(a)   Aviation Services Research Centre

Over the past few years, the ITF has funded projects on developing new or improved aviation services technologies, all of which are led by The Hong Kong Polytechnic University (PolyU) in association with the Aviation Services Research Centre, which is an industry-led non-profit making organisation established by PolyU in collaboration with Boeing Corporation. These projects have also secured sponsorship from leading local companies specialising in aviation maintenance services.   Two completed projects, which together received over HK$19 million funding support, have successfully generated interest in the aviation industry.   PolyU is now actively planning for the transfer of the technologies to the industry.

(b)   Research Alliance Consortium

With funding support of the ITF, The Hong Kong University of Science and Technology (HKUST) and Massachusetts Institute of Technology (MIT) set up a Research Alliance Consortium involving local universities, MIT and multinational companies to work on industry-driven pre-competitive research in the field of intelligent living technology.   As at June 2016, five projects with a total funding of HK$41 million were approved under the ITF for the Consortium to commence R&D work in Hong Kong.

(D) Entrepreneurial Training

4.15   Other than having a strong technology background, successful technopreneurs need to be well versed in business.   It was noted by the WGB that the 'SkillsFuture' programme launched by the Singaporean Government is a national movement to provide their citizens with the opportunities to develop their fullest potential throughout life, regardless

of their starting points. Through this movement, the Singaporean Government hopes to see the skills, passion and contributions of every individual driving Singapore's next phase of development toward an advanced economy and inclusive society. A variety of resources is offered to help Singaporeans attain a mastery of skills. Small and medium sized enterprises (SMEs) will also be provided with assistance to overcome the constraints they face in developing capabilities and capacity. The Singaporean Government also works with industry partners to develop a shared pool of SkillsFuture mentors with specialised, industry-relevant skills, which SMEs could tap into.

4.16   In Hong Kong, a number of quasi-government agencies under ITB offer entrepreneurial training and support –

(a)   Government-backed incubation programmes

Incubation programmes operated by HKSTPC

HKSTPC operates Incu-App, Incu-Tech and Incu-Bio Programmes which are full-service incubation programmes that aim to nurture start-ups in web and mobile technology, technology and biotechnology, respectively. The programmes provide technology support, network collaboration and assistance in organisational development and publicity. Up to June 2016, the programmes had incubated more than 660 technology start-ups, empowering them to obtain about 890 intellectual property (IP) and patents, over 400 industry awards and over HK$1.55 billion in funding.

HKSTPC has also launched the Leading Enterprises Acceleration Programme (LEAP) which provides further support to selected current and graduate incubatees as well as current HKSP tenants to develop into regional or global companies and to prepare them for initial public offering (IPO), merger and acquisition and fund raising. LEAP provides technology start-ups with accelerated software and hardware support focusing on business development and corporate management.

Incubation programmes operated by Cyberport

The Cyberport Incubation Programme provides ICT companies with access to advanced facilities and technological resources, networking opportunities, support in business development, financing and hiring of graduate interns, as well as entrepreneurship and technology training. Financial assistance up to about HK$330,000 will be made available to incubatee companies over a two-year period. Furthermore, rent-free office space and free use of Cyberport facilities are provided during the incubation. The Cyberport has also launched the Cyberport Accelerator Support Programme to support its incubatees and alumni to participate in local, Mainland and overseas accelerator programmes, which offer valuable guidance on overseas expansion and fundraising, with a financial assistance up to HK$300,000 for each successful applicant to cover programme fees, travel, accommodation and other relevant expenses.

(b)   ASTRI Innovation Runway

In 2015, ASTRI launched its first-ever entrepreneurship fellow programme, ASTRI Innovation Runway (AIR), offering one-stop comprehensive pre-incubation support to assist young technology entrepreneurs with innovative ideas to start up their business. AIR is sponsored by the Government and Microsoft Hong Kong, and with the support of over 20 local companies, organisations, universities and incubators. It is designed to assist young technology entrepreneurs to overcome various obstacles at the start-up stage, and enable them to pursue their dreams and develop their business successfully.

Fellows of this programme will receive a monthly allowance, mentorship support, office facilities, field trips to successful technology companies in the Mainland, workshops, training, networking activities, etc. They may also utilise ASTRI's patents and license them for commercialisation upon graduation. Microsoft Hong Kong will also provide technical training and workshops for the fellows.

(E) Availability of Information and Technical Support

4.17   According to the Hong Kong Innovation Activities Statistics 2014, among the 6 821 business establishments that undertook technological innovation activities in 2014, there were 1 809 (27%), 2 194 (32%) and 2 425 (36%) establishments which found that the lack of information on required technology, the lack of information on markets, and the lack of external technical support services respectively had medium to high impact on their technological innovation activities.

4.18   The R&D Centres, HKSTPC and Cyberport are playing an active role in reaching out to both the industry and the higher education sector to bring them the latest information on technology development and market intelligence.   Workshops, seminars, conferences and networking events are organised by these quangos on a regular basis.

4.19   The Digital 21 Strategy is the blueprint for Hong Kong's overall development in ICT.   Entitled 'Smarter Hong Kong, Smarter Living', the latest Strategy sets out the framework to leverage new technologies, including cloud computing, wireless technology, Internet of Things, big data, etc., to propel continuous economic development, deliver intuitive e-services to the public and foster a thriving ICT industry.

4.20   Pursuant to the deliberations by WGB Members on the current position and challenges pertaining to the development of I&T 'business' platform, the findings that warrant Government's attention are summarised in **Box 2** below –

Box 2

Current Position	Challenges
• Five R&D Centres conduct applied R&D on selected technology areas. HKSP has facilitated the development of five industry clusters and three cross-disciplinary platforms while the Cyberport houses a	• Comparing to global development, local entrepreneurial efforts are not sufficiently focused for bringing notable impacts and benefits to our society.

Current Position	Challenges

prominent cluster of ICT companies.
 	
• Figures related to the amount of ITF approved funding by technology area and the BERD by technology area both suggest that local applied R&D investment is broadly distributed across technology areas related to information technology, electrical and electronics engineering technology and manufacturing technology.
 	
• The Government has implemented a number of funding programmes to encourage private sector I&T investment which include –
    - CRS;
    - TSSSU;
    - CVF;
    - ESS; and
    - CCMF.
 	
• In 2014, 6 821 business establishments were engaged in technological innovation activities.   Only about 18% (1 223) of them were reported to have collaboration arrangement on technological innovation activities with other organisations.   However, less than half of these 1 223 establishments established collaboration arrangement with
	
	• Series A funding for early stage start-up companies, is inadequate.
	
	• There is a lack of proper channels for entrepreneurs to join industry alliances for business and R&D development.

Current Position	Challenges
organisations outside of their own enterprise group.	
• HKSTPC and Cyberport operate a number of incubation programmes to nurture young start-up companies. ASTRI has launched the AIR, its first-ever entrepreneurship fellow programme, offering one-stop comprehensive pre-incubation support to assist young technology entrepreneurs.	• Existing mentorship programmes do not provide sufficient mentoring to young entrepreneurs for developing business skills and knowledge.
• Among the business establishments that undertook technological innovation activities in 2014, close to 30% of them found that the lack of information on required technology, the lack of information on markets, and the lack of external technical support services had medium to high impact on their technological innovation activities respectively.	• The availability of 'working mentors' and entrepreneurial re-tooling training are lacking in Hong Kong. • Lack of information lubricants, i.e. an intelligence-mapping platform to foster closer linkages between universities and industry. There is no single platform available to unite and curate the R&D results from local universities, R&D Centres, etc. As such, investors, entrepreneurs or industry players would find it hard to search for useful R&D information and activities relevant to their business and area of interest.
• The R&D Centres, HKSTPC and Cyberport have played an active role in reaching out to both the industry and the higher education sector to bring them the latest information on technology development and market intelligence.	

Recommendations and Performance Indicators

4.21   With respect to its terms of reference **at Annex 5**, the WGB has drawn up a set of recommendations with relevant performance indicators for ACIT's consideration.   The basic thrusts of the 'business' platform are to facilitate the raising of entrepreneurial capital, training of entrepreneurs and mapping of data and information distribution in the I&T ecosystem.   The goal is to speed up the matching of capital and expertise.   Building on these thrusts, the final recommendations and performance indicators, which have taken into account the views of ACIT Members, are presented below –

Recommendations

(a)   **The Government enhancing the fund raising platform**

To focus entrepreneurial effort pertaining to I&T development; and to bridge the Series A funding gap.

Short-term

(i) With the support of the entrepreneurial financing industry, the Government should take actions to explore the setting up of a thematic matching/co-investment fund with the following key features –

  • Adopting a 'fund of funds' approach to form a 'Thesis Funds' with selected 'needle-moving' industry partners and bringing in a credible VC manager when deemed beneficial;

  • Investment should be focused on post-seed-stage (Series A) Hong Kong-based companies set up for no more than 4 years.   The initial fund size is suggested to be about HK$500 million;

  • A broad direction of I&T development roadmap should be mapped out and priority should be given to projects that

make use of I&T to improve our daily life in a wide range of aspects, including communication, transportation, healthcare, education, the environment, public order, consumer spending and food safety. Following this direction, feasibility of entrepreneurial focuses would be explored and actionable themes would be prioritised with a view to utilising resources effectively;

- As a start, three to four themes could be selected such as IoT, robotics, smart city and financial technology (Fintech). The fund of each theme is suggested not to exceed HK$80 million. The funding scheme would operate for one to three years with a review to be conducted in the fourth year. A proper exit strategy should also be formulated in due course;

- Quangos, such as HKSTPC, could participate in these 'Thesis Funds' as a limited partner and could help solicit private sector investments to the fund; and

- The initial composition of the fund could adopt a 'HK$2 private fund to HK$1 government fund' matching basis. The maximum size of the fund would therefore be about HK$1.5 billion.

Medium-term

(ii) The Government should, together with the industry, explore the feasibility of providing more diversified funding channels to start-ups.

- Crowdfunding[11] comes in different types, one of which is 'product crowdfunding' that raises fund by inviting crowd investors to pre-order products/services that are yet to be developed.

---

[11] Crowdfunding, the practice of funding a project or venture by raising monetary contributions from a large number of people, has become popular in the Mainland and a number of overseas jurisdictions as one of the alternative funding channels for SMEs and start-ups.

- For financial return crowdfunding (i.e. peer-to-peer lending and equity crowdfunding), the Report of the Steering Group on Financial Technologies published in February 2016 suggested that the market may consider making reference to exemptions relating to professional investors under the existing regulatory framework for developing crowdfunding platforms targeting professional investors in Hong Kong. This may provide a plausible starting point for their business models. In addition, local financial regulators have set up liaison platforms for the Fintech sector, and parties interested in developing crowdfunding businesses to provide fund raising services to SMEs and start-ups could approach these liaison platforms to better understand the regulatory environment in Hong Kong.

- At the early stage of its implementation, financial return crowdfunding should be restricted to qualified investors and professional investors to mitigate risks for the general public.

(b) With the support of the Government, the industry should strengthen entrepreneurial training

To train up young talents with the required skills to excel in I&T related fields; and to prepare talents and leaders for an interdisciplinary future.

Medium-term

(i) Working mentorship programmes should be provided to young talents with the details as follows –

- Encourage I&T related enterprises, particularly those that are market leaders, to provide working mentorship to young talents;

- The mentorship programme should take place at workplaces providing on-the-job training and field

exposure to mentees; and

- Mentees will be coached by working mentors, who usually are mid-level technical managers, in a more engaging and hands-on approach.

(ii) Entrepreneurial re-tooling training should be provided with the following features –

- Position Hong Kong as a hub of re-tooling in the regional innovation economy;

- Redefine Hong Kong's role in executive education and fellows programmes. Work with top-tier universities to provide relevant entrepreneurial education and fellows training to talents and leaders for developing their interdisciplinary capacity. Examples of cross-disciplinary collaboration are –

  ➢ aesthetics and technology;
  ➢ computing, manufacturing and life sciences; and
  ➢ traditional industries and digital economy operating methodologies.

- This initiative will help the community gain a better position to cope with changes in economic circumstances and rapid development in technology.

(c) The Government working with the higher education sector and industry to set up an R&D curating and mapping platform

To provide cross-department/interdisciplinary university based R&D reference in Hong Kong for VCs and industry players.

Medium-term

(i) Set up a 'Central Index' containing curated R&D information such as research findings, technology

development and expert profiles, to provide information lubricants for investors, entrepreneurs and industry players to search for R&D activities in Hong Kong. It will help lower the search cost. The proposed platform is expected to have the following functions –

- Able to access knowledgeable and credible sources within the university community and maintain an active map of various developments;

- Aggregate R&D related information of the higher education sector, the five R&D Centres and the two technology parks; and

- Adopt a technology community-friendly content management format and editorial style. Curating competency is of the utmost importance, i.e. curating should be best carried out by a well-funded academically-neutral entity.

Performance Indicators

4.22   In order to assess the progress of the various measures and recommendations, the WGB has suggested a number of possible performance indicators as set out below –

Recommendation (a) The Government enhancing the fund raising platform

- Number of start-ups funded by the 'Thesis Funds'
- Amount of funding contributed by the Government
- Amount of funding matched concurrently and induced subsequently by VCs
- Size of the I&T ecosystem in terms of the number of start-ups, their general survival and fatality rates
- Number of persons employed in the I&T sector

Recommendation (b) With the support of the Government, the industry should strengthen entrepreneurial training

- Number of I&T enterprises that have joined mentorship scheme
- Number of participants registered in the mentorship scheme
- Estimation of the value added to GDP through the implementation of the mentorship scheme
- Tangible and intangible benefits obtained by the participants, the related enterprises as well as the community as a whole through the implementation of the mentorship scheme
- Number of new re-tooling courses provided by universities and other educational institutions
- Number of students enrolled in the courses
- Value added to the community

Recommendation (c) The Government working with the higher education sector and industry to set up an R&D curating and mapping platform

- Number of projects/platforms curated/mapped through ITF or others
- Availability of funding sources
- Sustainability of projects/platforms curated/mapped through ITF or others
- Benefits provided to relevant stakeholders and the community at large, in terms of new business opportunities, jobs and economic value

CHAPTER 5 – WORKING GROUP ON CULTURE AND TALENT

Background

5.1   The Working Group on Culture and Talent (WGCT) was established under the ACIT to examine issues relating to the development of culture and talent in the I&T sector.   The terms of reference of the WGCT are at **Annex 7**.

5.2   The WGCT had nine Members, with Dr Humphrey Leung Kwong-wai serving as the convenor.   The membership list is at **Annex 8**. Three meetings were held, between June and October 2015. Representatives from the Education Bureau and OGCIO attended some of the meetings.

5.3   In October 2015, the Chief Executive led a delegation of industry leaders and academics to visit Israel to learn more about its experience in promoting I&T development.   The ACIT Chairman and a number of Members also joined the visit.   Their insights from the visit were subsequently discussed at the WGCT meeting.

Current Position and Challenges

5.4   The position of Hong Kong's I&T development, at the time when the WGCT meetings were held, is summarised below.

(A)   Culture of Innovation

5.5   A vibrant innovation culture drives the activities of the I&T ecosystem.   Over the years, the Government has constantly injected resources and launched measures to foster such a culture.   Some examples of the positive impact are –

   (a) Hong Kong's GERD (public and private) rose from about HK$7.1 billion in 2001 to HK$16.7 billion in 2014 (an average annual growth of 7%)[12].

---

[12] Report on Annual Survey of Innovation Activities in the Business Sector 2001 to 2007 and Hong Kong Innovation Activities Statistics 2008 to 2014, Census and Statistics Department.

(b) The number of R&D personnel has more than doubled during the same period, from 11 000 to about 27 400 [12].

(c) The number of companies operating in the HKSP had been on the rise over the years from about 160 in 2007 to about 610 in June 2016, providing about 12 500 jobs.

(d) Hong Kong's start-up ecosystem has rocketed in the last few years. In 2016, Hong Kong saw a steady upward trend in the number of start-ups (+24%) and workstations (+24%), and a significant increase in the number of staff (+41%) from a year ago. According to InvestHK's latest survey on Hong Kong's start-up ecosystem, there were 1 926 start-ups, involving 5 618 workstations and 5 229 staff as of August 2016 in 48 locations of co-work spaces, incubation and acceleration programmes being surveyed.

5.6   The building blocks of our innovation culture have thrived under the support of substantial funding programmes and technological infrastructure provided by the Government as detailed in previous chapters. Examples of direct measures that aim to instill and promulgate the culture to a wider community are –

(a) General Support Programme

The General Support Programme (GSP) is a funding programme under the ITF which provides funding support to non-R&D projects that contribute to fostering an I&T culture in Hong Kong. Examples of GSP projects include conferences, exhibitions, seminars, workshops, studies and surveys, competitions, scholarships and youth activities.

(b) InnoTech Month

The Government organises and supports various activities to promote public interest in science and technology, in particular for the younger generation. These include the annual InnoTech Month (with the InnoCarnival as its highlight).

(c)   International IT Fest

The International IT Fest (IT Fest), organised by OGCIO, was inaugurated in 2013.   This annual event aims to enhance and promote Hong Kong's image as a leading ICT hub.   It features a variety of events in a wide range of ICT domains where Hong Kong is competitive and has made significant achievements.   It also promotes general public awareness about ICT.   With enthusiastic support from the industry, the scale of IT Fest has expanded over the years.   It has provided an ideal platform for industry players of local and overseas ICT sectors to share their experiences and foster cooperation.   Having regard to the Internet-driven economy, OGCIO organised the inaugural Internet Economy Summit (IES) in April 2016 as an international forum and a signature event of the IT Fest.

(B)   Academic and Research Excellence

5.7   The universities in Hong Kong count amongst the very best in the Asia-Pacific region in their teaching and research achievements. According to the Quacquarelli Symonds (QS) World University Ranking 2015, two of the eight universities funded by UGC were ranked within top 50 in the world.

5.8   According to UGC, 12% of the research submissions made by the eight UGC-funded institutions in respect of the Research Assessment Exercise (RAE) 2014 were judged by international experts as 'world leading' standard, while 34% attained 'international excellence' and the remainder overwhelmingly attained 'international standing' or 'regional standing'.   Nearly half of the research submissions attained international excellence or above.

5.9   The aggregate research expenditure in the financial year 2014-15 reported by the UGC-funded institutions amounted to about HK$8.6 billion.   Of this amount, the grants from UGC/RGC together with other financial support from the Government and Government related organisations constituted the bulk of research expenditure for the institutions.   Funding commitment from the Government has been on

the rising trend since 2004-05. In 2014-15, about 83% of the total research expenditure of the institutions came from the Government which amounted to about HK$7.2 billion, representing a 10% growth over the previous year[13].

(C) Nurturing Talent

5.10   The success of a knowledge-intensive I&T sector hinges on the availability of talents. In 2014-15, 31 630 students were enrolled in UGC-funded STEM related programmes, representing about 35% of the total students enrolment (see Table 3).

5.11   There were 6 546 undergraduates and 1 482 postgraduates graduated in UGC-funded STEM related programmes in 2014-15, accounting for over 33% of the total graduates (see Table 4).

---

[13] Hong Kong Innovation Activities Statistics 2014, Census and Statistics Department.

Table 3. Number of Student Enrolment (in headcount) in UGC-funded STEM Related Programmes [#], 2010-11 to 2014-15

Academic Year	Student Enrolment in UGC-funded STEM Related Programmes			Total Number of Student Enrolment [@] in UGC-funded Programmes
	Undergraduate	*Postgraduate* [*]	**Sub Total**	
2010-11	*19 542*	*4 105*	**23 647 (35.0%)**	**67 605 (100%)**
2011-12	*19 846*	*4 166*	**24 012 (35.0%)**	**68 670 (100%)**
2012-13	*25 876*	*4 328*	**30 205 (34.8%)**	**86 891 (100%)**
2013-14	*25 970*	*4 483*	**30 453 (34.3%)**	**88 660 (100%)**
2014-15	*27 064*	*4 566*	**31 630 (34.6%)**	**91 507 (100%)**

Notes:

 #   STEM related programmes include Biological Sciences, Physical Sciences, Mathematical Sciences, Computer Science & Information Technology, Engineering & Technology and Architecture & Town Planning.

*   Postgraduate includes taught postgraduate and research postgraduate.

@   Total Number of Student Enrolment includes students enrolled in undergraduate and postgraduate programmes.

Figures in brackets refer to percentage shares in total number of student enrolment.

Figures may not add up to the corresponding totals owing to rounding.

Source:

UGC – Student Enrolment of UGC-funded Programmes by Level of Study, Mode of Study and Academic Programme Category, 2010-11 to 2014-15.

Table 4. Number of Graduates (in headcount) in UGC-funded STEM Related Programmes #, 2010-11 to 2014-15

Academic Year	Graduates in UGC-funded STEM Related Programmes			Total Number of Graduates @ in UGC-funded Programmes
	Undergraduate	*Postgraduate* *	**Sub Total**	
2010-11	*6 022*	*1 358*	**7 380 (34.0%)**	**21 733 (100%)**
2011-12	*5 978*	*1 381*	**7 359 (33.9%)**	**21 719 (100%)**
2012-13	*6 253*	*1 367*	**7 621 (34.3%)**	**22 213 (100%)**
2013-14	*6 264*	*1 431*	**7 695 (34.0%)**	**22 643 (100%)**
2014-15	*6 546*	*1 482*	**8 029 (33.6%)**	**23 871 (100%)**

Notes:
 # STEM related programmes include Biological Sciences, Physical Sciences, Mathematical Sciences, Computer Science & Information Technology, Engineering & Technology and Architecture & Town Planning.
* Postgraduate includes taught postgraduate and research postgraduate.
@ Total Number of Graduates include students graduated in undergraduate and postgraduate programmes.

Figures in brackets refer to percentage shares in total graduates.
Figures may not add up to the corresponding totals owing to rounding.

Source:
UGC – Graduates of UGC-funded Programmes by Level of Study, Mode of Study and Academic Programme Category, 2010-11 to 2014-15.

5.12   Information Technology (IT) is one of the most active sectors with respect to I&T activities.   According to the 2014 Manpower Survey Report – Information Technology Sector[14], a total of about 83 000 persons were employed in the principal jobs of the IT sector in 2013-14.

---

[14] The survey is conducted by the Committee on Information Technology Training and Development of the Vocational Training Council in collaboration with the Census and Statistics Department.

5.13   The Government has placed increasing emphasis on talent development, attracting the young generation to consider pursuing I&T as a career, and providing exposure and incentives to them at different stages of their academic and intellectual development through various channels. Examples of such measures include –

(a)   Innovation and Technology Scholarship Award Scheme

Launched in 2011, the ITF together with Hongkong and Shanghai Banking Corporation Limited have been providing funding support to the Hong Kong Federation of Youth Groups to organise the Innovation and Technology Scholarship Award Scheme.   The Scheme provides young science talents the opportunity to expand their exposure outside Hong Kong and gain industry experience, with a view to encouraging the youth to pursue I&T as their future career.   Each year about 25 university students are awarded the scholarship to join a programme comprising overseas/Mainland attachment, mentorship, community service and local internship. Throughout the years, the Scheme has established itself as one of the most recognised schemes of its kind in Hong Kong, and has received strong support and positive feedback.

(b)   Internship Programme

The Internship Programme under the ITF provides funding support for university graduates to work on R&D projects funded by the ITF as interns.   Each ITF project can engage up to two interns at any given time.   The maximum period of internship is 24 months.   With effect from 24 February 2016, the monthly allowance for an intern was increased to HK$14,000 for a graduate with Bachelor's degree and HK$16,500 for a graduate with a Master's or higher degree.   Over 60% of interns who had completed the programme either found a job or indicated interest in working in the scientific research field.   As at May 2016, the Internship Programme had already funded over 2 150 intern positions to provide training and employment opportunities for local graduates since its inception in 2004.   To encourage more local graduates to pursue a career in I&T, the

Internship Programme will be extended to cover R&D projects undertaken by incubatees and SME tenants of HKSTPC and Cyberport in December 2016.

(c)   Technology Start-up Support Scheme for Universities

The TSSSU incentivises science, technology and engineering graduates to pursue their career in the I&T sector, adding fresh impetus to the innovation ecosystem.   Details of this Scheme are set out in paragraph 4.5.

(d)   Incubation Programmes

The incubation programmes at HKSP and Cyberport provide a spawning ground for young technopreneurs by offering affordable accommodation, shared-use facilities and equipment as well as business related assistance to support their innovation activities.   The details of these programmes are set out in paragraph 4.16.

(e)   Enriched IT Programme

ICT is embedded in practically all spheres of economic activities and there is an increasing demand for ICT talents in different domains.   Schools are the best places to scout and develop IT talents.   Early exposure to IT coupled with intensive training on logical thinking and creative problem solving in students' formative years is crucial in nurturing talents in this area.

The 8-year Enriched IT Programme in Secondary Schools was launched in the 2015-16 school year, with eight secondary schools selected to operate Enriched IT Classes to provide intensive IT coaching to students (from secondary two to secondary six) interested and talented in IT.   In addition, other secondary schools would be invited to organise IT activities each school year.   A total of 85 local schools have received funding support up to HK$50,000 each to organise IT activities in 2016.

5.14   Pursuant to the deliberations by WGCT Members on the current

position and challenges pertaining to the development of culture and talent for the I&T sector, the findings that warrant Government's attention are summarised in **Box 3** below.   The WGCT noted that Hong Kong being a small and open economy is susceptible to external factors and other developments outside Hong Kong.

Box 3

Current Position	Challenges
• There is already a pool of I&T talents in Hong Kong.	• We are facing competition for talents from other industries and economies.
• Universities have made many world-class academic achievements and are strong in basic research.	• How could universities involve more in knowledge transfer to the industry for commercialisation?
• Quality basic education in schools is well recognised internationally.	• Curriculum does not catch up with rapid I&T development, and there is too much emphasis on examination results.
• A foundation of Government-Industry-Academia-Research collaboration has been built.	• There is room for further intersectoral collaboration.
• Financial markets are well established in Hong Kong.	• Private investment in R&D is inadequate. Investors tend to be risk-averse in I&T.
	• Society is less tolerant to risk-taking and failure as compared with some other economies.

Recommendations and Performance Indicators

5.15   With respect to its terms of reference **at Annex 7**, the WGCT has drawn up a set of recommendations and performance indicators.   The recommendations aim to develop a culture that encourages innovation, discovery, technology breakthroughs and risk-taking; and create satisfying and quality I&T jobs in Hong Kong in a bid to groom, re-tool, recruit and retain talents.

5.16   The proposed recommendations generally follow these broad principles –

(a)   There is no certainty in predicting future technology and manpower needs.   An appropriate risk-taking attitude should be adopted to allow for trial and error;

(b)   Hong Kong can leverage R&D strengths of its higher education sector as the institutions are at the forefront of R&D.   However, institutional autonomy should also be respected;

(c)   Start-up companies alone cannot jumpstart the I&T sector. MNCs are a crucial driving force in the development of the sector; and

(d)   Recommendations must be practical and executable, from the perspectives of both the public and private sectors.

5.17   The final recommendations, which have taken into account the views of ACIT Members as well as the WGCT are presented below –

Recommendations

(a)   **Joint public and private sector efforts to attract and nurture talent to work in the I&T sector [related to paragraph 3.22(a)]**

To groom I&T talents at their young age and re-tool technopreneurs for their further advancement.

(i) The education sector should groom talents at a young age and enhance school I&T curriculum through –

- encouraging 'Popular Science' in schools and society;

- introducing computer coding to students; and

- nurturing creativity and emphasising entrepreneurial spirit in the education system.

(ii) Talents should be re-tooled outside the formal education system by –

- strengthening education outside classrooms through events such as training camps, science competitions, etc. to help young people develop skills and interests, and provide them with opportunities to exchange ideas and learn from one another; and

- encouraging enterprises to re-tool themselves by having their staff participating in training events.

Learning at schools and learning outside classrooms are both important.   An inquisitive mind in science and technology can be nurtured at a young age.   Implementation of the above recommendations would be helpful to train the next generations to meet the future challenges of a knowledge economy.

(b) With the support of the Government, the higher education sector and industry should make joint efforts to accelerate knowledge transfer/commercialisation activities

To unleash the potentials of the higher education sector with respect to their technology transfer capability and capacity.

Medium-term

(i) The Government should identify ways to improve Student-University-Corporate-Government linkage through –

- reviewing the coordination between universities and funding mechanism and putting more emphasis on knowledge transfer to the industry for commercialisation;

- encouraging corporates to work with universities by providing appropriate incentives;

- encouraging sponsorship of awards, internships, scholarships and creation of R&D jobs by corporates; and

- providing longer term funding for applied research/commercialisation activities by the Government (e.g. programme-based for 10 years).

(ii) The Government and the higher education sector should jointly explore the possibility of providing incentives to encourage university academic staff to conduct applied R&D and form start-up companies to commercialise their inventions. In the longer term, consideration should be made on whether it is desirable to create a separate 'track' for academics focusing on translational research.

Universities are capable of playing a bigger role in the development of our economy in view of their academic strengths. The above recommendations would incentivise universities and academics to engage more actively in applied R&D and technology transfer activities, creating new opportunities for academia to contribute their expertise to the industry.

(c) The Government working with key players in the ecosystem to remove public misconception and foster a vibrant I&T culture

To promote a positive attitude towards I&T development in Hong Kong and address the risk-averse tendency of the business sector.

Short-term

(i) The Government and other relevant parties should launch more activities to promote success stories, etc. An example of which is to convey the message of 'Future Skill + Future Job = Future Career' and advocate that a trial-and-error approach is essential for achieving future success in I&T. This initiative can be launched in the near term.

Medium-term

(ii) The Government should work with the education sector and industry to create an environment conducive to I&T development, by providing more recognition to students on non-examination related achievements as well as encouraging corporate sponsorship of I&T internships, scholarships, etc.

(iii) In parallel, the Government should work with the education sector to enhance the school I&T curriculum through promoting 'Popular Science' and 'Netiquette' among students. Students should be shown how to accept failures and learn to equip themselves for new challenges.

(d)   The Government strengthening the efforts to better utilise existing resources to grow the existing 'clusters'

To draw talents into the I&T ecosystem and foster an effective talent pool of R&D personnel and technopreneurs in Hong Kong.

Short- to medium-term

(i) The Government should step up its efforts in attracting MNCs and global research institutions to set up branches/R&D centres in Hong Kong. One of the positive impacts is to create more opportunities for local talents to acquire the necessary skills, knowledge and experience for driving I&T development.

Hong Kong has been providing world-class infrastructure and offering a life style appealing to up and coming professionals and MNCs. These advantages should be leveraged to attract and retain talents who can help consolidate the growth of the I&T sector.

Medium-term

(ii) The Government should work with the I&T related quangos and organisations to enhance the ecosystem by –

• encouraging existing facilities to form clusters to maximise impact; and

• attracting I&T talents to work in the clusters which will facilitate cross-fertilisation of ideas and innovation activities.

(iii)With the support of the Government, I&T organisations in both the industry and higher education sector should formulate and implement measures that leverage Hong Kong's unique advantages of being an international city under 'One Country, Two Systems' to attract, recruit, and

retain overseas and Mainland talents as well as Hong Kong overseas returnees.

Performance Indicators

5.18   In order to assess the progress of the various measures and recommendations, the WGCT has suggested a number of possible performance indicators as set out below –

Recommendation (a) Joint public and private sector efforts to attract and nurture talent to work in the I&T sector

- Number of student enrolment in STEM related programmes at the UGC-funded institutions

Recommendation (b) With the support of the Government, the higher education sector and industry should make joint efforts to accelerate knowledge transfer/commercialisation activities

- New impact criteria be established for universities, such as knowledge transfer to the industry for commercialisation, patent pick up rate, social impact through adoption by society, new corporate R&D activities and investment (e.g. new R&D laboratories), etc.

Recommendation (c) The Government working with key players in the ecosystem to remove public misconception and foster a vibrant I&T culture

- Number of students admitted to universities not mainly based on examination results, number of corporate internships, longitudinal measure of students and graduates[15]

---

[15] To be further discussed with universities.

Recommendation (d) The Government strengthening the efforts to better utilise existing resources to grow the existing 'clusters'

- Number of MNC R&D [16] establishments in HKSP and Cyberport
- Incubation and acceleration activities in the clusters
- Number of I&T R&D jobs and companies in HKSP and Cyberport[17]
- Number of I&T immigrants or work visas issued to employees of I&T companies

---

[16] A definition of 'MNC' needs to be developed. Currently, HKSP, Cyberport, and government agencies (e.g. Census and Statistics Department, and InvestHK) do not have any definition of 'MNC'. HKSP and Cyberport only keep number of establishments based on the place of birth.

[17] Cyberport has not defined 'I&T' and 'R&D', thus the baselines are not available. Cyberport only keeps figures of 'information technology jobs and companies', but the number would likely be different from that of 'I&T' and/or 'R&D'.

CHAPTER 6 – KEY PERFORMANCE INDICATORS

6.1   Performance indicators monitor the implementation and effectiveness of policies and measures, gauge trends and assess tactical courses of action.   Each performance indicator embodies an objective and measures performance against a goal.   The performance indicators at the tactical and operation level of each specific recommendation have been set out in previous chapters.

6.2   The ensuing paragraphs in this Chapter will deliberate on nine overarching key performance indicators (KPIs) covering four dimensions, namely (a) R&D intensity, (b) participation of the business sector in R&D and commercialisation activities, (c) entrepreneurial activities; and (d) value creation.

6.3   For each KPI, a target has been set with reference to relevant historical performance from 2009 to 2014 unless otherwise stated.   The target year of achievement is set at 2020.

(A) R&D Intensity

6.4   Gross domestic expenditure on R&D (GERD) is the total in-house R&D expenditure performed within a country or territory during a given period.   It is a comprehensive measure of R&D activities[18] performed within a country or territory but excludes payments made abroad.   The GERD covers the following sectoral R&D expenditure –

- Business sector
- Higher education sector
- Government sector (including public technology support organisations[19])

---

[18] According to the Hong Kong Innovation Activities Statistics Report 2014, R&D activities are defined as creative work undertaken on a systematic basis so as to increase the stock of knowledge for devising new or improved products/processes/applications.   The way to distinguish R&D from similar activities is the presence of an appreciable element of novelty or innovation and the resolution of scientific and/or technological uncertainty, i.e. when the solution to a problem is not readily apparent to someone familiar with the stock of commonly used knowledge and techniques in the area concerned.

[19] Public technology support organisations include HKPC, ASTRI and R&D Centres (viz. APAS, LSCM, HKRITA, NAMI and the R&D Centre for Information and Communications Technologies under ASTRI).

6.5   In 2014, the GERD of Hong Kong, i.e. total expenditure on R&D performed in the business sector, higher education institutions and government sector, stood at HK$16.7 billion.

GERD as a Percentage of GDP

6.6   International comparison of the GERD is usually done in two scaling factors: GDP and population.   A country or territory's GERD as a percentage of its GDP is considered an indicator of the country or territory's degree of R&D intensity and is a commonly used for international comparison.

6.7   In 2014, the GERD as a percentage of the GDP of Hong Kong was 0.74%.   As shown in Table 5 below, the GERD as a percentage of the GDP has remained more or less at this level between 2009 and 2014, even though there was an average annual increase of 5.4% in nominal terms.   This has led to a misconception that R&D activities have remained stagnant in the past few years.   The major reason is that there has been a similar growth in the GDP, mainly propelled by the services sector, particularly financial and tourism services.

Table 5. GERD and GDP (Current Market Prices) in Hong Kong, 2009-2014

Year	GERD (HK$ million)	GDP at current market prices (HK$ billion)	GERD as % of GDP
2009	12,833	1,659	0.77
2010	13,313 (+3.7%)	1,776 (+7.1%)	0.75
2011	13,945 (+4.7%)	1,934 (+8.9%)	0.72
2012	14,816 (+6.3%)	2,037 (+5.3%)	0.73
2013	15,613 (+5.4%)	2,138 (+5.0%)	0.73
2014	16,727 (+7.1%)	2,258 (+5.6%)	0.74

Note:
Figures in brackets represent a year-on-year change.

Source:
Census and Statistics Department, HKSARG.

6.8   In addition, it must be noted that the GERD as a percentage of the GDP is generally calculated on the basis of country-level data, and for many countries, both defence and manufacturing are important drivers of R&D activities.   Cities with relatively limited diversity in their economic makeup may thus have less impressive figures when compared with country figures.

6.9   Comparisons with selected economies are in Table 6 below.

Table 6.   GERD as a Percentage of GDP of Selected Economies in 2014

	GERD as % of GDP [*]
Hong Kong	0.74 [^]
Mainland China	2.05
Singapore	2.20
United Kingdom (UK)	1.68 [+]
London	*1.06* [+]
United States of America (USA)	2.75 [#]

Sources:
*   Main Science and Technology Indicators of OECD, unless otherwise stated.
^   Census and Statistics Department, HKSARG.
+   Eurostat, European Commission.
 #   National Science Foundation, USA.

6.10   As illustrated in the table above, London's GERD was 1.06% of its GDP, against UK's 1.68% in 2014.   Hong Kong is very similar to London in this respect, both being service-driven economies, with negligible manufacturing and defence components.   In London, the share of total gross value added in the manufacturing sector was about 3% in 2014.   In comparison, our manufacturing sector contributed to about 1% of the GDP in the same period[20].   In both cities, services (especially financial, professional, property-related and tourism-related services) constitute the lion's share of the economy.

---

[20] Please refer to Table 10 for detailed figures.

6.11   Accordingly, we consider that rather than comparing Hong Kong's GERD as a percentage of the GDP with other countries, it may be more meaningful to place emphasis on Hong Kong's own growth.

6.12   We envisage that with government's strong commitment to promoting I&T, the business sector's increasing emphasis on I&T as a competitive edge, flourishing start-up and entrepreneurial activities, as well as growing public enthusiasm towards I&T as an economic driver, the I&T ecosystem is picking up the momentum to forge ahead.

KPI 1 – To increase the GERD as a percentage of the GDP to 1% by 2020.   This means that assuming the nominal GDP growth rate to be 3.5% in 2016 and 4.5% each year in 2017 to 2020, the GERD will increase to around HK$30 billion (at current prices) in 2020, an increase of about 79% from 2014.

GERD per Capita

6.13   The GERD is also compared using per capita value as it is influenced by a country/territory's demography, as well as its propensity to perform R&D.   Historical figures of the GERD per capita of Hong Kong during the period of 2009 to 2014 are presented in Table 7.

Table 7. GERD per Capita (HK$) in Hong Kong, 2009-2014

Year	GERD per Capita (HK$)	GERD (HK$ million)	Population (million)
2009	1,841	12,833	6.97
2010	1,896 (+3.0%)	13,313 (+3.7%)	7.02 (+0.7%)
2011	1,972 (+4.0%)	13,945 (+4.7%)	7.07 (+0.7%)
2012	2,072 (+5.0%)	14,816 (+6.3%)	7.15 (+1.2%)
2013	2,171 (+4.9%)	15,613 (+5.4%)	7.19 (+0.5%)
2014	2,310 (+6.3%)	16,727 (+7.1%)	7.24 (+0.8%)

Note:
Figures in brackets represent a year-on-year change.

Source:
Census and Statistics Department, HKSARG.

6.14   In 2013, our GERD per capita (in current PPPUS$)[21] was PPPUS$391.   Comparisons with selected economies are in Table 8 below.

Table 8. GERD per Capita (in current PPPUS$) of Selected Economies in 2013

	GERD per Capita (in current PPPUS$)
Hong Kong	391
Mainland China	245
Singapore	1,605
UK	646
USA	1,441

Source:
UNESCO Institute for Statistics.

KPI 2 – Following from KPI 1 above which aims to increase the GERD to about HK$30 billion (at current prices) in 2020, and assuming that the population will increase to 7.58 million in 2020, our target GERD per capita by 2020 is HK$3,960.

Public Sector Expenditure on R&D

6.15   R&D expenditure by the public sector is a direct measure of the level of R&D intensity at the higher education and government sectors. It is highly sensitive to government's investment in R&D, thus providing a more direct measure of government's effort in driving I&T development.

6.16   Historical figures of public sector expenditure on R&D between 2009 and 2014 are presented in Table 9 below.

---

[21] Purchasing power parity (PPP) - Currency exchange rate that equalise the purchasing power of different currencies.   This means that a given sum of money, when converted into US dollars at the PPP exchange rate (PPP dollars), will buy the same basket of goods and services in all countries.   In other words, PPP is the rate of currency conversion which eliminate the differences in price levels among countries.   Thus, comparisons between countries reflect only differences in the volume of goods and services purchased.

Table 9. Public Sector Expenditure on R&D in Hong Kong, 2009-2014

Year	R&D Expenditure in the Public Sector (HK$ million)
2009	7,359
2010	7,545 (+2.5%)
2011	7,751 (+2.7%)
2012	8,169 (+5.4%)
2013	8,596 (+5.2%)
2014	9,290 (+8.1%)

Note:
Figures in brackets represent a year-on-year change.

Source:
Census and Statistics Department, HKSARG.

__KPI 3 – We aim to raise the public sector expenditure on R&D to HK$13.5 billion (at current prices) by 2020, representing an increase of some 45% compared with 2014.__

(B) Participation of the Business Sector in R&D and Commercialisation Activities

6.17   One important means to turn R&D outputs into economic benefits is the participation of the business sector in R&D and commercialisation activities.   Business participation reflects the current state of the I&T ecosystem as well as its propensity to grow and sustain.

Manufacturing Activities

6.18   Manufacturing activities involve integration of technologies from different disciplines and innovations of different forms.   The manufacturing sector is an incubator of I&T development.   To stay competitive, the manufacturing sector is under increasing pressure to invest in R&D for both process and product innovation to improve productivity and expand businesses.

6.19   In 2015, contribution to the GDP by the manufacturing sector stood at only 1.2%.   Historical figures are in Chart 1 below, and comparisons with selected economies are in Table 10.

Chart 1. Percentage Contribution of Manufacturing Sector to GDP at Basic Prices, 2009-2015
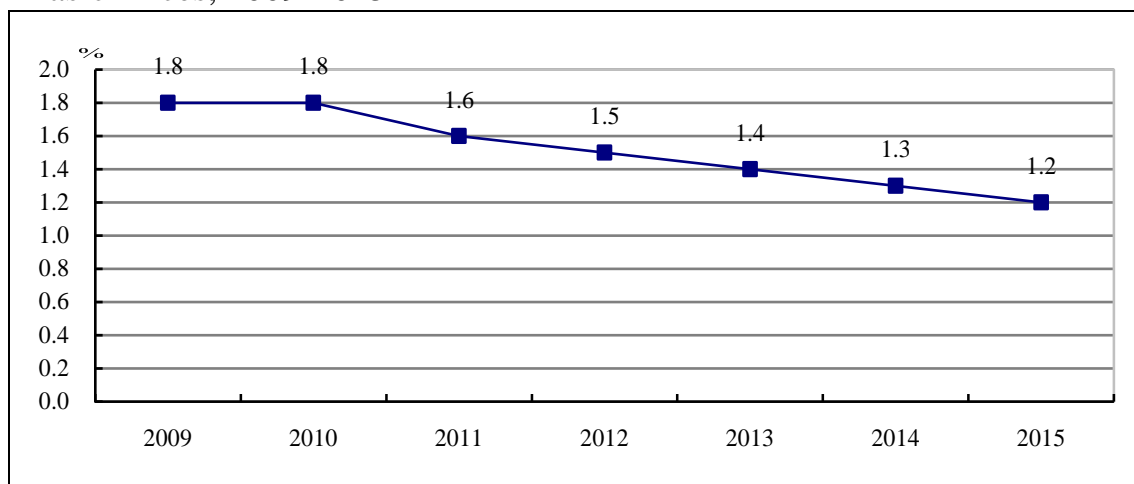
Source:
Census and Statistics Department, HKSARG.

Table 10. Contribution to GDP by Economic Activity of Selected Economies in 2014

	Contribution to GDP *		
	Agriculture	**Manufacturing**	**Services**
Hong Kong [1]	0%	1%	93%
Mainland China	9%	30%	48%
Singapore [1]	0%	18%	75%
UK [1]	1% [+]	10% [+]	79% [+]
London [1]	*N/A* [^]	*3%* [^]	*91%* [^]
USA	1%	12%	78%

Note:
(1)   Figures are calculated based on the value added of individual economic activities.

Sources:
*   The World Bank Group, unless otherwise stated.
+   Eurostat, European Commission.
^   Office for National Statistics, UK.

6.20   We are committed to promoting Hong Kong's re-industrialisation. We aim to spur the growth of a new generation of high-value added manufacturing activities in Hong Kong, and facilitate the upgrading and

transformation of Hong Kong industries to smart production. One of the measures is to enhance support for science, innovation and technology-based production activities by providing suitable premises in industrial estates. The development of the Advanced Manufacturing Centre and the Data Technology Hub in the Tseung Kwan O Industrial Estate will provide an additional gross floor area of over 130 000 square metres for high-value manufacturing and data technology operations.

KPI 4 – We aim to reverse the declining trend of the manufacturing sector's contribution to GDP by 2020.

Public Sector vs Private Sector Expenditure on R&D

6.21   Private sector expenditure on R&D is an important indicator of business commitment to innovation. R&D spending indicates that a firm is serious about exploring or generating new ideas with a view to developing new or improved products, services, or processes.

6.22   In 2014, the ratio of public to private sector expenditure on R&D in Hong Kong is about 56:44. Historical figures are in Table 11.

Table 11. Public and Private Sector Expenditure on R&D, 2009-2014

Year	Public Sector (%)	Private Sector (%)
2009	57	43
2010	57	43
2011	56	44
2012	55	45
2013	55	45
2014	56	44

Source:
Census and Statistics Department, HKSARG.

6.23   Comparisons with selected economies are in Table 12 below.

Table 12. Ratio of Public Sector Expenditure on R&D to Private Sector Expenditure on R&D of Selected Economies in 2014

	R&D Expenditure by Performing Sector [*]	
	Public Sector (%)	**Private Sector (%)**
Hong Kong	56 [^]	44 [^]
Mainland China	23	77
Singapore	39	61
UK	34	66 [1]
London	*54* [+]	*46* [1][+]
USA	25 [#]	75 [1][#]

Notes:
(1) Include private non-profit sector.

Sources:
* Main Science and Technology Indicators of OECD, unless otherwise stated.
^ Census and Statistics Department, HKSARG.
+ Eurostat, European Commission.
 # National Science Foundation, USA.

6.24   Since the establishment of ITB in November 2015, the Government has already committed to invest an additional HK$18 billion to promote the development of I&T, including the injection of HK$8.2 billion to finance the development of the two pilot projects in the TKO Industrial Estate, and HK$4.4 billion for the expansion of the Science Park, home to a great number of technology companies from homegrown start-ups to MNCs.   Through the enhanced public funding programmes, the Government is also promoting R&D in specific technology platforms.   Apart from encouraging the local business sector to invest in R&D activities, the enhanced infrastructure and funding programmes are also part of our strategy to attract more MNCs to establish their R&D operations here in Hong Kong.

KPI 5 – We aim to flip the ratio of public sector expenditure vs private sector expenditure on R&D from 56:44 to 45:55 by 2020.

(C) Entrepreneurial Activities

6.25   Commercialisation of laboratory inventions and R&D outputs requires vibrant entrepreneurial activities to identify and exploit new products, processes or markets.

Number of Start-ups

6.26   Having a healthy rate of creation of new businesses is an indication of the population's motivation, capabilities and resources to start new firms that have the potential to contribute to the economy.

6.27   Hong Kong's start-up ecosystem has rocketed in the last few years.   In 2016, Hong Kong saw a steady upward trend in the number of start-ups (+24%) and workstations (+24%), and a significant increase in the number of staff (+41%) from a year ago.   According to InvestHK's latest survey on Hong Kong's start-up ecosystem, there were 1 926 start-ups, involving 5 618 workstations and 5 229 staff as of August 2016 in 48 locations of co-work spaces, incubation and acceleration programmes being surveyed.

6.28   Figures on the number of start-ups in co-work spaces, incubators and accelerators compiled by InvestHK between 2014 and 2016 are in Table 13.   Historical data before 2014 is not available. Comparisons with selected economies are also not available due to the lack of an internationally accepted definition of start-ups.

Table 13. Number of Start-ups in Co-work Spaces, Incubation and Acceleration Programmes, 2014-2016

Year	Number of Start-ups
2014	1,065
2015	1,558 (+46%)
2016	1,926 (+24%)

Note:
Figures in brackets represent a year-on-year change.

Source:
InvestHK - Survey on Hong Kong's Start-up Ecosystem.

**KPI 6 – Our target number of start-ups in co-work spaces, incubators and accelerators is 2,500 by 2020, representing an increase of about 135% from 2014, or a compound growth rate of about 7% each year between 2016 and 2020.**

Amount of Investment in Start-ups

6.29   The entrepreneurial performance and economic potentials of the local I&T sector is also reflected by the amount of VC investment[22] at Series A and B rounds.   It also indicates the growth of the local venture capital industry.   In 2015, investment in Series A (seed[23]/start-up /early stage[24]) and Series B (expansion/growth capital[25]) funding rounds amounted to HK$995 million as captured by the Asian Venture Capital Journal (AVCJ)[26].   Historical figures are in Table 14 below.

Table 14. Venture Capital Investment, 2009-2015

Year	Amount of VC Investment (HK$ million)
2009	371
2010	192 (-48%)
2011	331 (+73%)
2012	568 (+72%)
2013	119 (-79%)
2014	583 (+392%)
2015	995 (+71%)

Note:
Figures in brackets represent a year-on-year change.

Source:
AVCJ.

---

[22] VC Investment - Minority investments of venture capital firms in a new business (usually less than 3 years of establishment), as defined by the _AVCJ_.   Thus, angel investment and TSSSU implemented by the Government are not included.

[23] Seed/R&D - Financing provided to a venture with an initial concept for R&D of a product, as defined by the _AVCJ_.

[24] Start-up/Early Stage - Financing provided to a venture for product development and initial marketing; the company may be in the process of being organised or may have been in business for a short time, but has not yet sold its product commercially, as defined by the _AVCJ_.

[25] Expansion/Growth Capital - Financing provided for the growth and expansion of a company that has built up a short track record; capital may be used to finance increased production capacity, market or product development and/or as additional working capital, as defined by the _AVCJ_.

[26] AVCJ estimates that its research covers some 70% of total market activities.

6.30   Comparisons with selected economies are in Table 15.

Table 15. Venture Capital Investment of Selected Economies in 2015

	Amount of VC Investment (HK$ million)
Hong Kong	995
Japan	5,027
Mainland China	101,696
Singapore	7,157
Taiwan	1,857

Source:
AVCJ.

KPI 7: We aim to increase the amount of VC investment to HK$3 billion per year by 2020, representing an increase of about 415% from 2014.

(D) Value Creation

6.31   Successful commercialisation of the final output of innovation results, in additional to generating sales and profits from new products or and reducing cost, could possibly create additional employment in the production, marketing, and services of the products concerned. Furthermore, it helps foster Hong Kong as an I&T hub, attracting I&T investment to Hong Kong.

Attracting I&T investment to Hong Kong

6.32   Hong Kong is the 'super-connector' between the Mainland of China and the rest of the world. This applies not only to financial services, trade and culture, but also to science, innovation and technology. Over the past twelve months, we have attracted top-tier research institutions and companies from all over the world, such as the Massachusetts Institute of Technology and the Karolinska Institutet of Sweden, to set up their first overseas R&D and innovation centres in Hong Kong outside their own country.

6.33   The indicator on the number of major establishments setting up I&T facilities in Hong Kong provides an indication of Hong Kong's position as an I&T hub in attracting inward investment.   Major establishments are expected to fall within one of the following categories –

- International reputable universities or research institutes (references will be made to rankings such as The Times Higher Education World University Rankings, QS World University Rankings, etc.)

- Multinational corporations (references will be made to lists such as Fortune list, Forbes list, Fortune China 500, etc.)

- State level engineering research centres or laboratories (e.g. Partner State Key Laboratory, Hong Kong Branch of Chinese National Engineering Research Centre, etc.)

KPI 8 – We aim to attract at least 20 major establishments to set up I&T facilities in Hong Kong by 2020.

Employment in I&T sector

6.34   Employment in the I&T sector covers two groups –

(a) R&D personnel who are highly trained researchers, scientists, engineers and technicians with high levels of technical experience and training, and other support staff who contribute directly to carrying out R&D projects and activities and;

(b) those employees deployed to the commercialisation of R&D[27] results performed in-house or technology and know-how (related to product and process innovation) acquired from other parties.

6.35   In 2014, the number of persons employed in the I&T sector was about 33 660.

---

[27] Examples of activities related to commercialisation of R&D include production start-up; tooling up and industrial engineering for production or delivery of new products; market introduction of new products and training of staff on use of new production technology or new processes.

6.36   Historical figures between 2009 and 2014 are in Table 16 below. The growth rate of I&T sector generally exceeded the overall growth of the total labour force by a significant margin during this period.

Table 16. Number of Persons Employed in the I&T Sector [1] per 1 000 Labour Force [2] in Hong Kong, 2009-2014

Year	Number of Persons Employed in the I&T Sector	Number of Persons Employed in the I&T Sector per 1 000 Labour Force	Number of Labour Force ('000)
2009	27 470	8.1	3 400
2010	28 820 (+4.9%)	8.5 (+4.6%)	3 409 (+0.3%)
2011	29 260 (+1.5%)	8.5 (-0.03%)	3 462 (+1.6%)
2012	30 240 (+3.3%)	8.6 (+1.6%)	3 520 (+1.7%)
2013	32 000 (+5.8%)	8.9 (+4.1%)	3 579 (+1.7%)
2014	33 660 (+5.2%)	9.3 (+4.2%)	3 612 (+0.9%)

Notes:
(1) Since I&T sector involves significant non-routine activities, employment in respect of these activities is measured by the volume of labour input to I&T in full-time equivalent terms (in terms of man-years).
(2) Foreign domestic helpers are excluded.

Figures in brackets represent a year-on-year change.

Source:
Census and Statistics Department, HKSARG.

KPI 9 – We aim to increase the number of employees in the sector to 42,600 by 2020, representing an increase of about 27% from 2014. Assuming that the labour force will increase to 3.63 million in 2020, the I&T personnel per 1 000 labour force would then reach 11.7.

6.37   To summarise, the nine KPIs are listed below –

Strategic KPI		Proposed Target by 2020	% change (from 2014)
(A) R&D Intensity			
KPI 1	GERD as a percentage of GDP	1% (about HK$30 billion at current prices)	+79%
KPI 2	GERD per capita	HK$3,960 per capita	N.A.
KPI 3	Public sector expenditure on R&D	HK$13.5 billion (at current prices)	+45%
(B) Participation of Business Sector in R&D and Commercialisation Activities			
KPI 4	Manufacturing sector's contribution to GDP	Reverse the declining trend	N.A.
KPI 5	Ratio of public sector expenditure vs. private sector expenditure on R&D	45:55	N.A.
(C) Entrepreneurial Activity			
KPI 6	Number of start-ups in co-work spaces, incubators and accelerators	2 500	+135%
KPI 7	Amount of VC investment	HK$3 billion (at current prices) per year	+415%
(D) Value Creation			
KPI 8	Number of new I&T facilities	20	N.A.
KPI 9	No of persons employed in the I&T Sector	42 600	+27%
	No. of persons employed per 1 000 labour force in the I&T Sector	11.7	N.A.

Note:
N.A. Not applicable

6.38   We are mindful that there is a host of many external factors, such as global and local economic environment, overall investor sentiment toward technology and start-up ventures, etc., that would hinder the efforts from achieving the above targets. That said, the Government would continue to work closely with various stakeholders in the I&T ecosystem and strive the best to create a conducive environment for I&T sector to grow and strive.

CHAPTER 7 – CONCLUDING REMARKS

7.1   The recommendations put forward by the three working groups aim to strengthen the principal building blocks of our I&T ecosystem and enrich the ecology for I&T related activities in Hong Kong.   Issues and challenges concerning the building blocks – 'infrastructure', 'business' and 'culture and talent' are all interdependent.   The consolidated recommendations are listed in Table 17.

7.2   In early 2016, the Government announced a multitude of new initiatives to promote I&T.   They are in line with the recommendations proposed by the ACIT and are also indicated in Table 17.   A full list of programmes that are in operation or will be launched under ITB is set out in **Annex 9**.

7.3   The recommendations of this report provide an outline of the directions, focus areas and new initiatives for furthering the I&T development of Hong Kong.   We would require the joint efforts of all stakeholders so that all essential factors of success are in place, including institutional structures, funding mechanisms, support and assistance of both the public and private sectors such as government agencies and the education sector, and implementation planning, among many others.   It is crucial that the Government continues to provide the clearest policy steer and implement the necessary measures to engender a thriving I&T ecosystem, and that all stakeholders, including the academia, industrialists, technopreneurs, investors and technologists work together in achieving this common goal.

Table 17. Consolidated Recommendations

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
1. The Government working with the industry to build a critical mass of manufacturing activities [paragraph 3.22(c)] *Medium-term* 1.1 The Government should identify possible ways of attracting and cultivating a number of high value added industries in particular sectors.	• Implementation of pilot projects under the revised IE programme. • R&D expenditure/economic contribution by the IE's tenant companies in specialised multi-storey buildings.	• HKSTPC is considering promoting smart production and research at the Tseung Kwan O Industrial Estate. It is estimated that the project would cost HK$8.2 billion and would be completed in 2021-22. [paragraph 47 of the 2016-17 Budget] • HKSTPC will construct multi-storey buildings in the remaining space and recover idle factory premises in IE. • HKPC will facilitate industrial upgrading and transformation, enabling enterprises to embrace 're-industrialisation' and move towards high value added production. [paragraph 77 of the 2016 Policy Address]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
2. The Government providing a stronger steer to the development of I&T [paragraph 3.22(d)] *Short-term* 2.1 OGCIO should continue to spearhead the Wi-Fi.HK initiative with a view to improving the speed, quality and accessibility of public Wi-Fi services under the Wi-Fi.HK brand. *Medium-term* 2.2 Providing a high level coordination within the Government to spearhead large-scale I&T initiatives, for instance, in smart city projects. 2.3 The Government should explore the feasibility of setting aside a dedicated item in the Government's budget for the procurement of I&T products and services. 2.4 The Government should study possible ways to encourage and enable local I&T companies to participate more actively in	• Number of Wi-Fi.HK hotspots. • Establishment of a higher level coordination mechanism. • Government's budget for I&T provisions. • Amount of contracts awarded to local I&T companies. • Number of datasets made available to the public.	• The Government will progressively expand the coverage of free Wi-Fi services by doubling the number of hotspots from 17 000 to 34 000 within three years to provide such services at all public rental housing estates and public hospitals, markets, parks, sitting-out areas, promenades, tourist spots, public transport interchanges and land boundary control points. [paragraph 84 of the 2016 Policy Address] • ITB will, in collaboration with research institutions and public and private organisations, study the development of a 'smart city', which includes providing free Wi-Fi services, opening up more public data to facilitate development of user-friendly mobile applications (apps). ITB will formulate a digital framework

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
government procurement of products and services. 2.5 The Government should coordinate the dissemination of datasets in digital format from multiple sources/owners to the public.		and standards for the development of a 'smart city'. [paragraph 85 of the 2016 Policy Address] • 5 000 datasets in digital formats were released in 2015 through the Public Sector Information portal. To foster information technology (IT) application and development, the Government will refine the existing geographic information systems and explore ways to align and integrate the spatial data in Hong Kong, including the location and relevant information of facilities that are above, on and under ground level. [paragraph 51 of the 2016-17 Budget]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
3. Concerted public and private sector efforts to strengthen the sustainability of the start-up ecology [paragraph 3.22(e)] *Medium-term* 3.1 The Government should explore possible ways of encouraging private companies to participate in the provision of incubation or acceleration services. 3.2 The Government should work with the education sector and industry to formulate a plan to cultivate entrepreneurship mindset among Hong Kong students. 3.3 Providing funding for setting up a co-investment scheme to be administered by the Government or a selected quango.	• Number of start-ups established. • Survival rate of start-ups. • Number of start-ups undergoing mergers and acquisition and initial public offerings. • Amount of investment by angels or venture capitalists in start-ups. • Number of patents filed by start-ups.	• Cyberport will allocate HK$200 million to launch a Cyberport Macro Fund for investment in its ICT start-ups. [paragraph 82 of the 2016 Policy Address] • The Government will set aside HK$2 billion to set up the Innovation and Technology Venture Fund for co-investing with private venture capital funds on a matching basis. [paragraph 83 of the 2016 Policy Address]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
4. The Government identifying possible ways of strengthening the funding support for university applied R&D activities [paragraph 3.22(f)] _Short-term_ 4.1 The Government should encourage universities to solicit endowment fund dedicated to I&T related applied research. _Medium-term_ 4.2 The Government should explore an alternative and more flexible funding source outside the UGC/RGC, for example, a translation fund. 4.3 The Government should work with the industry to lobby the Mainland to set up an 'I&T Infrastructure Fund' (科技基建基金) in Hong Kong under the 'Silk Road Fund' (絲路基金). 4.4 The Government should consider providing more funding support for R&D Centres on mid-stream R&D.		• The Government has proposed to inject HK$2 billion to launch a Midstream Research Programme for Universities to provide funding support for universities to carry out more midstream and applied research projects in key technology areas. [paragraph 55(a) of the 2016-17 Budget]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
5. The Government working with the industry to explore development opportunities outside Hong Kong for local I&T sector [paragraph 3.22(g)] _Short-term_ 5.1 Setting up a dedicated working group under the ACIT to further review the opportunities for Hong Kong after the promulgation of the National 13th Five-Year Plan. _Medium-term_ 5.2 A dedicated working group should be set up under the ACIT to look for development opportunities at Qianhai, Nansha and Hengqin.		

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
6. The Government enhancing the fund raising platform [paragraph 4.21(a)] *Short-term* 6.1 With the support of the entrepreneurial financing industry, the Government should take actions to explore the setting up of a thematic matching/co-investment fund. *Medium-term* 6.2 The Government should, together with the industry, explore the feasibility of providing more diversified funding channels to start-ups.	• Number of start-ups funded by the 'Thesis funds'. • Amount of funding contributed by the Government. • Amount of funding matched concurrently and induced subsequently by VCs. • Size of the I&T ecosystem in terms of the number of start-ups, their general survival and fatality rates. • Number of persons employed in the I&T sector.	• The Hong Kong Monetary Authority (HKMA), the Securities and Futures Commission (SFC) and the Office of the Commissioner of Insurance will set up Fintech dedicated platforms to liaise with the industry to ensure that the market will balance between market demand and investors' understanding and tolerance of risk when introducing innovative financial products and services. [paragraph 61 of the 2016-17 Budget]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
7. With the support of the Government, the industry should strengthen entrepreneurial training [paragraph 4.21(b)] *Medium-term* 7.1 Working mentorship programmes should be provided to young talents. 7.2 Entrepreneurial re-tooling training should be provided.	• Number of I&T enterprises that have joined mentorship scheme. • Number of participants registered in the mentorship scheme. • Estimation of the value added to GDP through the implementation of the mentorship scheme. • Tangible and intangible benefits obtained by the participants, the related enterprises as well as the community as a whole through the implementation of the mentorship scheme. • Number of new re-tooling courses provided by universities and other educational institutions. • Number of students enrolled in the courses. • Value added to the community.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
8. The Government working with the higher education sector and industry to set up an R&D curating and mapping platform [paragraph 4.21(c)] _Medium-term_ 8.1 Set up a 'Central Index' containing curated R&D information which provides information lubricants for investors, entrepreneurs and industry players to search for R&D activities in Hong Kong. It will help lower the search cost.	• Number of projects/platforms curated/mapped through ITF or other. • Availability of funding sources. • Sustainability of projects/platforms curated/mapped through ITF or other. • Benefits provided to relevant stakeholders and the community at large, in terms of new business opportunities, jobs and economic value.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
9. Joint public and private sector efforts to attract and nurture talent to work in the I&T sector **[paragraphs 3.22(a) and 5.17(a)]** *Short-term* 9.1 I&T quangos should arrange more visits for secondary school students to raise students' interest in I&T activities and development. The students should be introduced to different fields of science and technology and have first-hand exposure to their potential applications. 9.2 The Government should explore ways of encouraging I&T quangos to set up micro funds for nurturing entrepreneurial spirit among secondary school students. Active participation of the industry is crucial to the success of the programme. The forms of participation could range from the nomination of project themes, sponsorship of projects to the provision of working mentors.	• Number of visits and visitors to I&T quangos organised for secondary schools. • Extra funding support for schools on I&T related extra-curricular activities. • Number of student enrolment in STEM related programmes at the UGC-funded institutions. • Number of persons employed in the I&T sector. • Number of graduates from UGC-funded STEM related programmes.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
9.3 The Government should render more support to schools for participating in joint school science competitions and extra-curricular activities.		
Short- to medium-term		
9.4 The education sector should groom talent at a young age and enhance school I&T curriculum.		
9.5 Talents should be re-tooled outside the formal education system.		
Medium-term		
9.6 The Government should work with the higher education sector and industry to encourage STEM education and ensure that is multi-disciplinary for meeting the diverse needs of the industry.		
9.7 The Government should explore the possibility of increasing the number of student intakes into UGC-funded STEM related programmes.		

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
10. The Government working with Mainland and overseas counterparts and the industry to explore possible measures of attracting talents outside of Hong Kong to work in the local I&T sector [paragraph 3.22(b)] *Medium-term* 10.1 The Government should identify additional or enhanced measures for retaining Mainland/overseas students working in Hong Kong. 10.2 The Government should identify additional or enhanced measures for attracting overseas Hong Kong graduates returnees. 10.3 The Government should coordinate efforts among government departments, I&T quangos, the higher education sector and the industry to attract renowned Mainland/overseas universities and enterprises to set up research centres or start-up businesses in Hong Kong. Opportunities under the National 13th	• Number of I&T immigrants or work visas issued to employees of I&T companies. • Number of research centres or start-up businesses set up by Mainland/overseas universities in Hong Kong.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
Five-Year Plan should be leveraged to enrich and deepen the local I&T ecosystem.		
11. With the support of the Government, the higher education sector and industry should make joint efforts to accelerate knowledge transfer/commercialisation activities [paragraph 5.17(b)] _Medium-term_ 11.1 The Government should identify ways to improve Student-University-Corporate-Government linkage. 11.2 The Government and the higher education sector should jointly explore the possibility of providing incentives to encourage university academic staff to conduct applied R&D and form start-up companies to commercialise their inventions. In the longer term, to consider if it is desirable to create a separate 'track' for academics focusing on translational research.	• To establish new impact criteria for universities, such as knowledge transfer to the industry for commercialisation, patent pick up rate, social impact through adoption by society, new corporate R&D activities and investment (e.g. new R&D laboratories), etc. Once the new criteria are established, KPIs can be further developed.	• Extend the scheme that provides funding support for the technology transfer work of six universities by three years to 2018-19. [paragraph 55 (d) of the 2016-17 Budget] • Reaffirm the support for the TSSSU to assist technology start-ups established by university teams in commercialising research results. [paragraph 55(e) of the 2016-17 Budget]

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
12. The Government working with key players in the ecosystem to remove public misconception and foster a vibrant I&T culture [paragraph 5.17(c)] *Short-term* 12.1 The Government and other relevant parties should launch more activities to promote success stories, etc. *Medium-term* 12.2 The Government should work with the education sector and industry to create an environment conducive to I&T development, by providing more recognition to students on non-examination related achievements as well as encouraging corporate sponsorship of I&T internships, scholarships, etc. 12.3 In parallel, the Government should work with the education sector to enhance the school I&T curriculum through promoting 'Popular Science' and 'Netiquette' among	• Number of students admitted to universities not mainly based on examination results, number of corporate internships, longitudinal measure of students and graduates.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
students. Students should be shown how to accept failures and learn to equip themselves for new challenges.		
13. The Government strengthening the efforts to better utilise existing resources to grow the existing 'clusters' [paragraph 5.17(d)] _Short- to medium-term_ 13.1 The Government should step up its efforts in attracting MNCs and global research institutions to set up branches/R&D centres in Hong Kong. _Medium-term_ 13.2 The Government should work with the I&T related quangos and organisations to enhance the ecosystem.	• Number of MNC R&D establishments in HKSP and Cyberport. • Incubation and acceleration activities in the clusters. • Number of I&T R&D jobs and companies in HKSP and Cyberport. • Number of I&T immigrants or work visas issued to employees of I&T companies.	

Recommendation	Performance Indicators	Initiatives in 2016 Policy Address and 2016-17 Budget
13.3 With the support of the Government, I&T organisations in both the industry and higher education sector should formulate and implement measures that leverage Hong Kong's unique advantages of being an international city under 'One Country, Two Systems' to attract, recruit, and retain overseas and Mainland talents as well as Hong Kong overseas returnees.		

**Advisory Committee on
Innovation and Technology**

Membership List

Chairman
Secretary for Innovation and Technology
Mr Nicholas W Yang

Ex-officio Members (4)
Chairman of the Hong Kong Science and Technology Parks Corporation
The Hon Mrs Fanny Law Fan Chiu-fun

Chairman of the Hong Kong Applied Science and Technology Research
Institute Company Limited
Mr Wong Ming-yam

Chairman of the Hong Kong Productivity Council
Mr Willy Lin Sun-mo

Chairman of the Research Grants Council
Professor Benjamin Wah Wan-sang

Non-official Members (23)
Mr Johnny Chan Kok-chung
Professor Tony Chan Fan-cheong
Mr Stark Chan Yik-hei
Professor Roland Chin Tai-hong
Professor Ching Pak-chung
Mr Paul Chow Man-yiu
Dr Roy Chung Chi-ping
Professor Horace Ip Ho-shing
Professor Nancy Ip Yuk-yu
The Hon Mrs Regina Ip Lau Suk-yee
Dr Humphrey Leung Kwong-wai
Dr Simon Leung Lim-kin
Mr Victor Lo Chung-wing
Mr Ma Siu-leung

Dr the Hon Elizabeth Quat
Professor Joseph Sung Jao-yiu
Professor Timothy Tong Wai-cheung
Mr Denis Tse Tik-yang
Mr Frank Wang Tao
Ir Dr Jolly Wong Chun-kau
Ms Marjorie Yang Mun-tak
Mr Eric Yeung Chuen-sing
Mr Joseph Yu Shin-gay

<u>Official Members (2)</u>
Permanent Secretary for Innovation and Technology
Commissioner for Innovation and Technology

<u>Secretary</u>
Assistant Commissioner for Innovation and Technology (Policy and Development)

Advisory Committee on Innovation and Technology

Terms of Reference

To advise the Government of the Hong Kong Special Administrative Region on the strategic and developmental enhancements of innovation and technology (I&T) in Hong Kong, with focus on making the best use of Hong Kong's advantages of 'one country' and 'two systems' and further strengthening the coordination among the Government, industry, academia and research sectors.   In this regard, the Advisory Committee on Innovation and Technology will -

‒   identify strategic social and economic goals, including viable key performance indicators, focused areas and priorities in I&T development and make recommendations for policy formulation;

‒   advise on the most effective coordination and synergy among the stakeholders;

‒   advise on how to foster Hong Kong's collaboration with the Mainland and other economies in I&T, in line with the regional and global megatrends;

‒   advise on the means to attract investments in Hong Kong's I&T sector; and

‒   advise on ways to nurture and attract relevant local and overseas talents.

**Advisory Committee on
Innovation and Technology
Working Group on Infrastructure (WGI)**

Terms of Reference

1. To take stock of what has been done and identify the missing links in the innovation and technology (I&T) ecosystem of Hong Kong.

2. To review National 12th Five-Year Plan (2011-2015) and identify the I&T areas that Hong Kong (a) is having relevant development; (b) behind the development progress of the Mainland; and (c) not relevant to Hong Kong or is too late for Hong Kong to catch up with a view to identifying Hong Kong's possible roles in the 13th Five-Year Plan.

3. Having regard to the discussions of Items 1 & 2 and relevant overseas experience, to come up with executable short (realised within two years) and medium term (implemented in two to five years) recommendations that could help develop a more favourable I&T ecosystem in the following aspects —

    –   Development of local market : Government and public organisations as lead I&T users; recognition of I&T as essential growth factor by business and industrial sectors

    –   Development as a model city of selected technologies with a view to influencing development of international standards (need to dovetail with the Working Group on Business)

    –   Collaboration among industries, universities and the research and development community

    –   Enhancement of Mainland collaboration

    –   Improvements of existing funding support

    –   Positioning and branding of Hong Kong as an I&T Hub

Membership of the WGI

Mr Wong Ming-yam *(Convenor)*

Professor Horace Ip Ho-shing

Professor Nancy Ip Yuk-yu

Dr Simon Leung Lim-kin

Dr the Hon Elizabeth Quat

Professor Timothy Tong Wai-cheung

Professor Benjamin Wah Wan-sang

Ms Marjorie Yang Mun-tak

Mr Eric Yeung Chuen-sing

In attendance

Commissioner for Innovation and Technology or her representative

Secretary

Assistant Commissioner for Innovation and Technology
(Infrastructure and Quality Services)

**Advisory Committee on
Innovation and Technology
Working Group on Business (WGB)**

Terms of Reference

1. Pinpoint, and over time revisit, top business and economic megatrends and positioning strategies relevant to Innovation and Technology (I&T) for Hong Kong.

2. In particular, study initiatives to harness business development potential of university and research institute Research and Development (R&D) in Hong Kong.

3. Develop Hong Kong as 'Metropolitan Lab' platform that:

    – Compartmentalise first-principle problems seen in mature metropolitan cities such as Hong Kong;

    – Encourage open crowd-sourced experimentation, ambidextrous between sourcing and building; and

    – Rethink funding programmes that match funding with bold solutions.

Membership of the WGB

Mr Denis Tse Tik-yang *(Convenor)*

Mr Stark Chan Yik-hei

Professor Ching Pak-chung

Dr Roy Chung Chi-ping

The Hon Mrs Regina Ip Lau Suk-yee

Dr the Hon Elizabeth Quat

Mr Eric Yeung Chuen-sing

Mr Joseph Yu Shin-gay

Mr Stanley Lau Chin-ho
(Mr Lau passed away on 12 June 2016.)

In attendance

Commissioner for Innovation and Technology or her representative

Secretary

Assistant Commissioner for Innovation and Technology
(Infrastructure and Quality Services)

**Advisory Committee on
Innovation and Technology
Working Group on Culture and Talent (WGCT)**

Terms of Reference

Having regard to the terms of reference of the Advisory Committee on Innovation and Technology (ACIT) –

1.   to act as a platform to exchange views and information on matters relating to the development of culture and talent in the innovation and technology sector; and

2.   to research and consider issues and strategies necessary for the enhancement of the innovation and technology culture in Hong Kong and its talent pools, and to report to the ACIT its findings and advice.

Membership of the WGCT

Dr Humphrey Leung Kwong-wai *(Convenor)*

Mr Johnny Chan Kok-chung

Professor Tony Chan Fan-cheong

Professor Roland Chin Tai-hong

Mr Paul Chow Man-yiu

Mr Ma Siu-leung

Professor Joseph Sung Jao-yiu

Ir Dr Jolly Wong Chun-kau

Mr Eric Yeung Chuen-sing

In attendance

Representative(s) from the Education Bureau

Representative(s) from the Innovation and Technology Commission

Representative(s) from the Office of the Government Chief Information Officer

Secretary

Secretary-General (Testing and Certification),
Innovation and Technology Commission

**Funding Programmes in support of
Innovation and Technology Development in Hong Kong**

(I)   INTRODUCTION

Under the Innovation and Technology Bureau (ITB), there is a range of programmes that provide support for the development of innovation and technology (I&T) ecosystem.   They are administrated respectively by the Bureau itself and its departments – the Innovation and Technology Commission (ITC) and the Office of the Government Chief Information Officer (OGCIO).

(II)   INNOVATION AND TECHNOLOGY BUREAU

(A) Innovation and Technology Fund for Better Living (FBL)
The HK$500 million FBL supports I&T projects that aim to make the daily life of Hong Kong people more convenient, more comfortable and safer; or address the needs of specific groups. The FBL will normally only accept applications from non-government organisations, non-profit organisations, professional bodies, trade associations and public bodies.   A successful applicant will receive a grant equivalent to the difference between the eligible costs of the project and funding received from other sources (such as funding from a parent organisation, sales proceeds or third party sponsorship), subject to a cap of 90% of the eligible costs of the project or HK$5 million, whichever is the less.

(III) INNOVATION AND TECHNOLOGY COMMISSION

(A) Innovation and Technology Fund (ITF)

(1) Innovation and Technology Support Programme (ITSP)

The ITSP is the largest funding programme under the ITF which supports mid-stream/downstream applied research and development (R&D) projects mainly undertaken by the five R&D Centres set up by the Government, local universities and other designated local public research institutions.

There are broadly two categories of projects under the ITSP, namely –

➢ platform projects which are intended for the benefit of the industry as a whole. These projects require industry contribution of at least 10% of the project cost from one company. The industry sponsor(s) will not be entitled to own the project intellectual property (IP); and

➢ collaborative projects which are intended to provide support to the industry or a company in conducting R&D, realising/commercialising the IP and taking the R&D outcome to the market. These projects require higher levels of industry contribution of at least 30% of the project cost for projects conducted by R&D Centres or at least 50% for projects conducted by other research institutions. The industry partner will be entitled to exclusive right to utilise the project IP for a defined period or own the project IP.

Furthermore, there is a special funding arrangement for exploratory and forward looking R&D projects which aims to provide the foundation for future applied R&D projects. The current maximum funding amount is HK$2.8 million for each of these projects conducted by R&D Centres (Seed projects) and HK$1.4 million each one conducted by universities and other research institutions (Tier 3 projects). Industry contribution is not mandatory.

(2) Guangdong-Hong Kong Technology Cooperation Funding Scheme (TCFS)

The TCFS operates under the ITSP funding framework.   It aims to enhance the level of collaboration on R&D between organisations in Hong Kong and Guangdong Province. Projects funded by the TCFS will have to demonstrate an element of Guangdong/Hong Kong cooperation (e.g. collaboration between research institutes and enterprises in Guangdong, Shenzhen and Hong Kong).

(3) Public Sector Trial Scheme (PSTS)

To promote realisation or application of the R&D results in the public sector, the Government introduced the PSTS in March 2011, whereby additional funding is provided to completed R&D projects funded by the ITF for the production of prototypes/samples and the conducting of user trials in the public sector, including government departments, public bodies and trade associations.

In April 2014, the Government improved the PSTS by raising the funding ceiling for PSTS projects from 30% to 50% so as to encourage the conduct of larger scale trial scheme to assess speedily and comprehensively the effectiveness of the new innovation.

As recommended by the comprehensive review of ITF ('Review')[28], the funding ceiling of PSTS projects has been raised from 50% to 100% of the original project costs for projects undertaken by R&D Centres to speed up the process of industry adoption of R&D results.   To strengthen our support to local start-ups, we will extend the PSTS to incubatees (including graduate-tenants) of The Hong Kong Science and Technology Parks Corporation (HKSTPC) and

---

[28] To evaluate the operation of ITF after some 15 years of operation and identify areas of improvement, the Administration conducted the Review and briefed the Legislative Council Panel on Commerce and Industry on the progress and recommendations arising from the Review at its meetings on 18 February, 18 March and 18 November 2014 vide LC Paper No. CB(1)885/13-14(03), LC Paper No. CB(1)1072/13-14(07) and LC Paper No. CB(1)211/14-15(03) respectively.

Cyberport in December 2016, with a funding ceiling of HK$1 million per project.

(4) *University-Industry Collaboration Programme (UICP)*
The UICP is a funding programme under the ITF which provides matching grant for collaborative projects undertaken by local companies in collaboration with universities. The three schemes under UICP include –

➢ Teaching Company Scheme: to support local companies to take on postgraduate students from local universities to assist in proprietary R&D work;

➢ Matching Grant for Joint Research: to foster private companies to collaborate with universities in proprietary R&D projects; and

➢ Industrial Research Chair Scheme: to assist universities and industry to develop research efforts that meet industrial needs by inviting professors to lead designated R&D projects.

The UICP mainly aims to encourage enterprises to collaborate with local universities to fully leverage the knowledge and resources of the universities and benefit from the R&D results.

(5) *General Support Programme (GSP)*
The GSP is a funding scheme under the ITF for supporting non-R&D projects that contribute to the upgrading and development of Hong Kong industries, as well as fostering an I&T culture in Hong Kong.

Projects to be supported under the GSP may include conferences, exhibitions, seminars, workshops, promotional events, studies and surveys, youth activities, events or projects to support platform building / upgrading of industry, etc. In general, the GSP will not support projects that promote products/services from a specific commercial entity.

Under the GSP, there are two other sub-programmes, namely the Internship Programme and the Patent Application Grant (PAG).

(i) *Internship Programme*
The Internship Programme supports organisations undertaking R&D projects funded by the ITF for recruiting graduates from local universities as interns to work on the R&D projects.

Each project can engage up to two interns at any one time for a maximum period of 24 months. Since 24 February 2016, the internship allowance for graduates with a Bachelor degree has been increased from HK$12,000 to HK$14,000 and that for graduates with a Master or higher degree from HK$14,000 to HK$16,500.

To step up our efforts in supporting private sector investment in R&D and nurturing our I&T talents, the Internship Programme will be extended to cover R&D projects undertaken by incubatees and small and medium enterprise (SME) tenants of HKSTPC and Cyberport in December 2016.

(ii) *Patent Application Grant*
The PAG aims to encourage local companies and inventors to capitalise their intellectual work through patent registration.

The PAG provides funding support for patent applications from an individual or a company who/which has never owned a patent before, including cost for patent search-cum-technical assessment and other costs involved in the patent application process, such as attorney fees, consultant fees, etc. At present, the funding ceiling for grant to each person or company is HK$250,000 or 90% of the cost of patent application.

(6) *Enterprise Support Scheme (ESS)*
The ESS aims to bring fresh impetus to promote private sector investment and further the development of Hong Kong's I&T sector. It provides funding support to companies of all sizes to support their in-house R&D projects, with a matching fund ceiling of HK$10 million per project; and there will be no requirement for recoupment of Government's contribution. Project period of ESS should not be longer than two years and all IP rights arising from the project belong to the company.

(7) *R&D Cash Rebate Scheme*
The HK$200 million R&D Cash Rebate Scheme launched in April 2010 provides cash rebate on the investment by enterprises in conducting R&D projects funded either by the ITF or in partnership with designated local public research institutions. It aims to reinforce the research culture among private companies and to encourage them to establish stronger partnership with local research institutions. The level of cash rebate is 40% for applications approved on or after 24 February 2016.

(8) *Technology Start-up Support Scheme for Universities (TSSSU)*
TSSSU provides funding supports to encourage university teams to start technology businesses and bring R&D results from the campus to real world applications. It provides an annual funding of up to HK$4 million to each of the six local universities[29]. Each funded technology start-up may receive up to HK$1.2 million each year for no more than three years.

(9) *Technology Voucher Programme (TVP)*
To enhance the long-term competitiveness of local SMEs, the Government launched the HK$500 million TVP under the

---

[29] Six universities are City University of Hong Kong, Hong Kong Baptist University, The Chinese University of Hong Kong, The Hong Kong Polytechnic University, The Hong Kong University of Science and Technology, and The University of Hong Kong.

ITF in November 2016 to subsidise their use of technological services and solutions to improve productivity, or upgrade or transform their business processes.   The programme will be implemented on a pilot basis for an initial period of three years.

The Government will review the effectiveness and the modus operandi of the programme, such as the funding scope, funding amount and vetting procedures after two years, or when it foresees full commitment of HK$500 million, whichever is the earlier.

(10) *Midstream Research Programme (MRP) for Universities*
The MRP provides support for institutions funded by the University Grants Committee (UGC)[30] to carry out more midstream R&D projects in key technology areas.   The Government has injected an additional HK$2 billion into the ITF as endowment capital for generating investment income to fund projects under the MRP.

Having regard to the amount of projected funding from investment income, funding up to HK$5 million for each approved project will be provided.   For projects involving inter-discipline or multi-institution collaboration (where each participating institution would need to undertake a substantive part of the R&D work), the funding ceiling will be HK$10 million.   As the focus is on midstream research work, there will be no mandatory industry sponsorship requirement under the MRP.   Project duration would be under three years[31] in most cases.   The Government will launch the MRP in December 2016.

---

[30] At present, there are eight UGC-funded institutions, including City University of Hong Kong, Hong Kong Baptist University, Lingnan University, The Chinese University of Hong Kong, The Education University of Hong Kong, The Hong Kong Polytechnic University, The Hong Kong University of Science and Technology, and The University of Hong Kong.

[31] For other R&D funding schemes under the ITF, the maximum project duration is between two to three years.   For research project grants under the Research Endowment Fund for UGC-funded institutions, the maximum project duration is between one to five years.

(11) Innovation and Technology Venture Fund (ITVF)

In view of inadequate funding sources available to I&T start-ups, particularly those in the early growth stages, i.e. Series A to B, the Government would set aside HK$2 billion to set up the ITVF to encourage investment from venture capital (VC) funds in local I&T start-ups. The Government plans to launch the ITVF in the first half of 2017.

(B) Corporate Venture Fund (CVF)

The CVF launched by HKSTPC is set up to co-invest in start-ups with private funds on a matching basis. HKSTPC has earmarked HK$50 million for the CVF. Together with funding from private co-investors, at least HK$100 million would be made available to the local technology start-ups. The CVF aims to fill the funding gap encountered by local technology start-ups during their early investment stage, and encourage more angel/VC investment in the local I&T industry. The CVF targets start-ups that are located in the Hong Kong Science Park (HKSP) or have participated in its incubation programmes.

(C) Hong Kong Science Park Incubation Programmes

HKSTPC operates Incu-App, Incu-Tech and Incu-Bio Programmes which are full-service incubation programmes that aim to nurture start-ups in web and mobile technology, technology and biotechnology, respectively. The incubatees joining the programmes can enjoy a wide range of assistance, including the provision of subsidised office space and shared facilities, financial aid package, technical and management assistance, promotion and development assistance and business support such as access to angel investors and venture capitalists by way of investment matching events.

(D) Leading Enterprises Acceleration Programme (LEAP)

LEAP is launched by HKSTPC to provide further support to selected current and graduate incubatees as well as current HKSP tenants to develop into regional or global companies and to prepare them for initial public offering, merger and acquisition and fund raising. LEAP provides technology start-ups with accelerated software and hardware support focusing on business development

and corporate management.

(E) ASTRI Innovation Runway (AIR)

AIR programme is organised by the Hong Kong Applied Science and Technology Research Institute (ASTRI). It offers one-stop comprehensive pre-incubation support to assist young technology entrepreneurs with innovative ideas to start up their business. AIR is sponsored by the Government and Microsoft Hong Kong, and with the support of over 20 local companies, organisations, universities and incubators. It is designed to assist young technology entrepreneurs to overcome various obstacles at the start-up stage, and enable them to pursue their dreams and develop their business successfully.

Fellows of this programme will receive a monthly allowance, mentorship support, office facilities, field trips to successful technology companies in the Mainland, workshops, training, networking activities, etc. They may also utilise ASTRI's patents and license them for commercialisation upon graduation. Microsoft Hong Kong will also provide technical training and workshops for the fellows.

(IV) OFFICE OF THE GOVERNMENT CHIEF INFORMATION OFFICER

(A) Cyberport Creative Micro Fund (CCMF)

The CCMF is a seed fund set up to encourage innovation and creativity by sponsoring high potential and innovative start-up projects or business concepts in information and communications technology (ICT)-related areas. A grant of HK$100,000 will be awarded to successful applicants over a 6-month project period for proofs of concept and for developing prototype products. There are two types of CCMF, i.e. the Hong Kong Programme and the Cross-Border Programme, supporting aspiring entrepreneurs at different development stages and in different target markets.

(B) Cyberport Macro Fund (CMF)

The HK$200 million CMF recently launched in August 2016 will invest in Cyberport's ICT start-ups to assist them in attracting more investment funding from other private and public investors. The accumulative investment per investee is set to be between HK$1 million to HK$20 million.

(C) Cyberport Incubation Programme

The Cyberport Incubation Programme provides ICT companies with access to advanced facilities and technological resources, networking opportunities, support in business development, financing and hiring of graduate interns, as well as entrepreneurship and technology training. Financial assistance up to about HK$330,000 will be made available to incubatee companies over a two-year period. Furthermore, rent-free office space and free use of Cyberport facilities are provided during the incubation. The Cyberport has also launched the Cyberport Accelerator Support Programme to support its incubatees and alumni to participate in local, Mainland and overseas accelerator programmes, which offer valuable guidance on overseas expansion and fundraising, with a financial assistance up to HK$300,000 for each successful applicant to cover programme fees, travel, accommodation and other relevant expenses.