

For discussion
on 15 May 2018

Legislative Council Panel on Commerce and Industry

**Proposals to Strengthen the Research and Technological Capabilities
of Hong Kong**

PURPOSE

This paper seeks Members' support to –

- (a) establish two research clusters at the Hong Kong Science Park (“Science Park”);
- (b) provide additional resources for the Hong Kong Science and Technology Parks Corporation (“HKSTPC”) to support healthcare and artificial intelligence (“AI”) and robotics technologies researches, and its other tenants/incubatees; and
- (c) create one permanent directorate post of Administrative Officer Staff Grade C (“AOSGC”) in the Innovation and Technology Commission (“ITC”) to implement various new innovation and technology (“I&T”) initiatives.

BACKGROUND

2. I&T development is among the top policy priorities of the Government. The Chief Executive (“CE”) has in her Policy Address delivered in October 2017 set out eight major areas¹ to spearhead I&T development in Hong Kong. Subsequently, the 2018-19 Budget set aside \$50.3 billion to implement new I&T initiatives, including, inter alia, the proposals set out in paragraphs 1(a) and (b) above. Details of these initiatives are elaborated in the ensuing paragraphs.

¹ The eight major areas include: (a) increasing resources for research and development (“R&D”); (b) pooling together technology talent; (c) providing investment funding; (d) providing technological research infrastructure; (e) reviewing existing legislations and regulations; (f) opening up government data; (g) Government to lead changes to procurement arrangements; and (h) strengthening popular science education.

(A) ESTABLISHING RESEARCH CLUSTERS

Proposal

Healthcare Technologies

3. Healthcare technologies are one of Science Park's focused technology platforms. Universities in Hong Kong have strong research capability in healthcare technologies. The University of Hong Kong and the Chinese University of Hong Kong have set up clinical trial centres at the Queen Mary Hospital and the Prince of Wales Hospital respectively, both of which have excellent track record in conducting clinical trials and collaborating with multi-national pharmaceutical companies. Discoveries and publications of local researchers have won global recognition. The proposed research cluster for healthcare technologies will attract world-class scientific research teams to set foot in Hong Kong and collaborate with our local research teams, collectively promoting the thriving development of the life science and healthcare sector.

AI and Robotics Technologies

4. In recent years, with the swift development of digital economy, there is a significant increase in both the amount of data and the computational power to process them, which has spurred the rapid development of AI/robotics technologies, contributing to driving business transformation and better forecasting of trends and impacts and benefitting different economic sectors through their applications. It is expected that by 2022, the service robotics market will reach US\$23.9 billion². In terms of technologies, local universities and research institutions possess strong capabilities in AI/robotics and related fields (such as drones, advanced facial recognition systems, surgical robotic systems, etc.). Having a research cluster for AI/robotics technologies would provide strong impetus to the growth of this sector.

5. Capitalising on the strong research capability and international credibility of our universities in healthcare technologies and AI/robotics technologies, we propose to establish two world-class research clusters focusing on these two areas at the Science Park to attract institutions that are among the global top echelon in healthcare or AI/robotics

² Source: MarketsandMarkets, a global market research and consulting firm

technologies. Their global rankings³, performance in respect of publication of papers and citations, number of patents in these two areas, as well as track record or concrete plans in collaborating with local universities, research institutions or industry partners will be taken into consideration.

6. Our current plan is to admit around 4-5 research centres/laboratories in each cluster in the first year, gradually increasing to around 10 in the following few years. We believe this number is sufficient to create a synergy effect, while avoiding overstressing the resources as well as the planning and monitoring work involved. We will review the experience of the implementation of the two research clusters and global technology development etc. and consider in future whether to expand the scale of the two clusters and whether to establish new clusters.

7. We fully understand that substantial capital and operation costs may be entailed for non-profit-making institutions and universities to set up an outpost away from their home campus. We thus propose to set aside \$10 billion to provide financial support to research centres/laboratories operated by non-profit-making institutions at the two clusters. The financial support package consists of –

- (a) Capital Support: suitable support would be provided to each research centre to cover their capital expenditure for set-up, equipment and periodic renovation/upgrade etc.;
- (b) Operation Support: each research centre/laboratory's recurrent operating costs would be subsidised to cover rental, utilities, staff cost as well as other related expenses. In line with existing practice, funding will also be made available to cover the costs of secondment of staff and the on-cost incurred by the parent institution for its oversight of the concerned research centre/laboratory⁴; and
- (c) Research Support: research projects undertaken by research centres/laboratories within the clusters would be financed by the Innovation and Technology Fund (“ITF”).

³ For example, the QS World University Rankings, the Times Higher Education World University Rankings and Academic Ranking of World Universities (also known as Shanghai Ranking).

⁴ The Innovation and Technology Fund provides an administrative overhead of 15% of the R&D project funding to local research institutions.

8. When determining the exact amount of financial support for individual research centre/laboratory, we will draw reference from other research establishments with similar scale of operation and in similar fields⁵. Individual research centres/laboratories will be required to provide adequate proof to justify their cost proposals in order to ensure prudent use of public money.

9. To encourage public-private partnership in I&T development, we propose to allow flexibility for the research centres/laboratories to accept donation, and/or carry out fundraising drives, contract researches and other revenue generating activities.

Control Mechanism

10. We will work out a tripartite agreement for each research centre/laboratory to be signed between ITC, the centre's parent institution and the HKSTPC. The agreement will set out clearly the respective rights and obligations of different parties, including the modus operandi of the research centre, the area of research, sharing of intellectual property rights, the arrangement for and minimum number of research team leaders/members dispatched from the parent institution to the research centre, financial governance matters (e.g. open tender requirements) when public monies are involved, arrangement on hiring and training of local talents, etc.

11. To ensure strong governance and accountability, we will put in place a rigorous governance regime to ensure that the quality and focus of publicly-funded research activities at the two research clusters align with our expectations and overall directions. A Governing Committee will be set up to approve the admission of institutions and oversee the operation of the two clusters, including keeping track of key performance indicators.

Financial Implications

12. We intend to adopt an incremental approach and take in research centres/laboratories by phases. We envisage that the financial support

⁵ Healthcare technology researches normally entail higher set-up and operating costs due to the high cost of procuring biotechnology-related equipment and consumables. The exact amount would need to be assessed on a case-by-case basis.

package of \$10 billion should be sufficient to sustain the operation of the two research clusters for 10 to 15 years, with the following ballpark figures –

<u>Items</u>	<u>Estimated Cost (\$ million)</u>
(i) Capital set-up <i>(assuming 20 research centres/laboratories)</i>	800
(ii) Recurrent operation cost	8,000 <i>(800/yr × 10 yrs)</i>
(iii) Periodic equipment upgrade/refurbishment ⁶	1,200 <i>(400/four-yr cycle ×3)</i>
Total:	10,000

Expected Benefits

13. Setting up the two research clusters at the Science Park will bring about the following benefits –

- (a) leveraging our strong basic research capability to develop our own industries on healthcare technologies and AI/robotics technologies;
- (b) fostering more synergy and collaboration among top local, overseas and Mainland researchers and industry in Hong Kong;
- (c) encouraging public-private partnership in I&T development;
- (d) attracting top technology talents from all over the world to Hong Kong, while at the same time training and building up a pool of local talents; and

⁶ We envisage that there will be the need to upgrade the facilities and purchase new equipment in light of lapse of time and technological advancement.

- (e) reinforcing Hong Kong’s position as the major international I&T hub in the Guangdong-Hong Kong-Macau Bay area and putting Hong Kong on the global technology map.

14. We will set up key performance indicators to closely monitor and ensure the benefits accrued to Hong Kong. As illustration, the two research clusters, when in full operation, are expected to start about 100 research projects every cycle. Assuming each centre has a headcount of 60 (40 research staff and 20 support staff), the two clusters will provide around 1 200 technology-related job opportunities.

(B) ADDITIONAL RESOURCES FOR HKSTPC

Proposal

15. HKSTPC has been the Government’s major executive agent that manages our flagship I&T infrastructure i.e. the Science Park and industrial estates (“IEs”). Its mission is to create a dynamic ecosystem for technology companies to nurture ideas, innovate and develop. Besides physical space and infrastructural support, HKSTPC also provides a comprehensive package of support programmes to assist its tenants and incubatees to thrive, particularly in face of the stiff competition from our neighbours for talents, start-ups, and leading global corporations in key technology areas. We propose to provide a funding of \$10 billion to HKSTPC, of which \$3 billion is for providing key facilities and \$7 billion is for strengthening support for its tenants/incubatees.

Research-related Infrastructure and Facilities

16. We propose that \$3 billion out of the \$10 billion set aside for HKSTPC be used to make available a range of facilities to foster research work in healthcare and AI/robotics technologies. Key facilities include –

Laboratory and Work Spaces for Researches

17. HKSTPC is at the moment planning to⁷ –

⁷ Subject to further planning and possible changes, as the venue requirements are dependent on user needs and the feasibility of juggling existing tenants.

- (a) convert a building in the Science Park to make available about 178 000 ft² of laboratory space for healthcare researches. Our target is to commence renovation works within 2018, with a view to having the first batch of laboratory spaces available in 2019, and the remaining in 2020;
- (b) identify another 20 000 ft² of laboratory space with higher loading for setting up robotics laboratories; and
- (c) set aside additional floors in two new buildings for laboratory and work spaces for healthcare and AI/robotics technologies researches.

Facilities for Healthcare and AI/Robotics Technologies Researches

18. Healthcare researches require a host of bespoke facilities. At present, most of these facilities are only available in universities. They are small in scale and are only barely sufficient to cater for the needs of their own research teams. Many healthcare researchers need to source from/ outsource to overseas service providers, which is very costly and time-consuming. Besides, AI/robotics researches require facilities for standard testing. We therefore propose to provide ‘one-stop’ core facilities, including for example –

- (a) Pilot Batch Production Facilities for Good Manufacturing Practice (“GMP”) grade pilot batch production of pharmaceutical or biological products for clinical trial purposes;
- (b) Animal Research and Drug Testing Facilities which strictly comply with local legislation and international standards for pre-clinical trial tests, such as drug efficacy tests and toxicology studies, which are essential for verifying the safety and efficacy of new medicines or therapies;
- (c) Bio Bank and Medical Informatics to centrally house human and other biological samples and the associated clinical records, etc.;
- (d) GMP Production Facilities, which are specialised GMP grade facilities for various uses;

- (e) Robo Standard Testing Laboratory to measure the performance of robots, etc.; and
- (f) Robotics Catalysing Centre for solution providers and system integrators to carry out development work, integration, assembly processes, as well as validation and factory acceptance tests, etc.

Strengthening Support Measures for Tenants/Incubatees

19. In recent years, there has been keen competition from other jurisdictions in attracting technology enterprises. With a view to attracting more overseas and Mainland renowned technology enterprises to set up in Hong Kong, as well as to further assist local I&T start-ups to grow and expand, it is necessary for HKSTPC to provide more support measures and incentives to its tenants/incubatees. We propose that \$7 billion out of the \$10 billion be used to implement the following –

- (a) Expansion of Incubation Programme: Start-ups are vital to a strong I&T ecosystem. HKSTPC has in place an incubation programme that offers subsidised office space, financial assistance⁸, technical and development assistance, business matching etc. to technology start-ups. There are currently 263 incubatees⁹ in the Science Park. We propose to increase the number of incubatees to 500 by 2022-23. The additional resources will provide for increased subsidies and enhanced support to technology start-ups.
- (b) Expansion of the Corporate Venture Fund (“CVF”): HKSTPC established a \$50-million CVF in 2015 to co-invest, on a matching basis with private funds, in its tenants/incubatees. CVF has been effective in bridging the funding gap and in encouraging more private investment in early stage start-ups. By now, it has already committed the entire fund in nine investments, attracting more than \$550 million from co-investors. We propose to expand the CVF and introduce other investment programmes as appropriate such that HKSTPC can continue to catalyse the

⁸ The financial assistance varies among industries. The maximum amount (in kind and in cash) is \$240,000 over 4 years.

⁹ Figure as at end March 2018.

growth of more technology start-ups. Based on past experience¹⁰, we estimate that around 90-100 tenants/incubatees could benefit.

- (c) Development of a Smart Campus: to make the Science Park a living laboratory to try out innovative products and solutions that come under four themes, namely, smart mobility, smart environment, smart living and smart people. HKSTPC will set up the infrastructure necessary for testing smart solutions, including expanding the data platform, building sensor networks and connectivity system, and developing systems to upgrade data authentication and security. A governing committee has been set up to give recommendations on Smart Campus development. HKSTPC's initial plan is to work on over 40 smart projects in the coming five years.
- (d) Accommodation Support: The InnoCell, which will provide residential units and ancillary facilities for leasing to eligible tenants, incubatees and Mainland/overseas visitors of the Science Park, is targeted for operation in 2021. To address the imminent accommodation needs of start-ups and to attract and retain I&T talents, we propose providing funding to enable HKSTPC to offer accommodation in the interim.
- (e) Support for tenants: In view of the aggressive incentives that neighbouring cities are offering, we propose to enable HKSTPC to offer incentives for targeted companies to set up operations at the Science Park and IEs and to continue support current tenants. To allow flexibility for HKSTPC to achieve the best commercial outcomes in offering incentives, we propose that the form and level of support may vary with the size and nature of the companies concerned. Possible options include capital or operation cost support on a dollar-to-dollar matching basis, rental concession and/or equity acquisition and other targeted support measures, which are subject to the scrutiny of the Board of Directors of HKSTPC in accordance with its internal corporate governance procedures.

¹⁰ The average size of investment for each CVF case in the past years is around \$5.5 million.

- (f) Ancillary Facilities: To cater for the sharp rise in the working population in the Science Park, HKSTPC will need to enhance the ancillary facilities therein to improve accessibility and efficiency such as improving transportation infrastructure and energy efficiency.
- (g) Manpower Support: HKSTPC will need additional manpower to focus on the two research clusters and to implement the above support measures. We propose to provide funding for HKSTPC to recruit additional manpower for this purpose.

Control Mechanism

20. Established under the HKSTPC Ordinance (Cap. 565), the HKSTPC has in place well-established procedures and guidelines in assessing applications for admission, which is subject to the monitoring of its Board of Directors. The mechanism has been effective in ensuring a fair and transparent selection of technology companies of potential into the Park. Building on the existing mechanism, HKSTPC will put in place a proper control mechanism to monitor the use of fund based on its current mechanism and corporate governance procedures. The Government will also monitor the implementation of the measures through HKSTPC's Board of Directors.

Financial Implications

21. The total funding required for the above measures is \$10 billion. HKSTPC will not be able to meet such level of funding needs on its own because (a) HKSTPC has over the past two decades shouldered over \$6 billion of debts¹¹ for its Phases 2 and 3, as well as the development of the Advanced Manufacturing Centre, Data Technology Hub and InnoCell, to be repaid within the next 20 years; and (b) HKSTPC does not have any major financial reserves as its operation surplus has always been deployed for the development, improvement and maintenance of premises and facilities managed by HKSTPC and its operations.

¹¹ Including the principal loans and interests arising therein.

22. A rough indicative estimate of the various facilities and measures is set out below. It must be emphasised that the estimates are only ballparks at this juncture. Given the specialised and evolutionary nature of the two clusters, further discussions with experts in the field and prospective research centre operators would be needed to determine the scale of the facilities, their business/operation mode, as well as the associated costs.

<u>Items</u>	<u>Estimated Cost (\$ million)</u>
<u>Research-related Infrastructure and Facilities</u>	
(i) Provision of lab spaces for healthcare and AI/robotics technologies researches	500
(ii) Facilities for healthcare and AI/robotics technologies researches	2,500
<u>Support Measures to Support the Overall I&T Community</u>	
(iii) Expansion of Incubation Programme	2,400
(iv) Expansion of CVF	500
(v) Smart Campus	300
(vi) Accommodation Support	100
(vii) Support for tenants	3,000
(viii) Ancillary Facilities and Manpower Support	700
Total:	10,000

23. With the fast-changing and dynamic technology scene, we foresee that changes to the above proposals may be required in terms of their scope and scale. We propose to allow flexibility in the deployment of resources between the expenditure items to best fit HKSTPC's needs. The actual deployment would however need to be scrutinised and agreed by the Government.

Expected Benefits

24. The infrastructure and facilities outlined in paragraphs 17 and 18, and the enhanced support measures described in paragraph 19 will strengthen the I&T ecosystem and research capability of Hong Kong. In addition, it will help build up linkages between technology companies and researchers, attract more foreign investment and talents, nurture I&T talents and start-ups, create more high value-added jobs for our youngsters and foster the development of Hong Kong as a knowledge-based economy. The expansion of CVF will also help build a vibrant venture capital investment market.

(C) CREATION OF A PERMANENT POST OF AOSGC (D2) IN ITC

Proposal

Increasing Workload in ITC

25. Since 2015, we have put in place a series of new policy initiatives and support programmes to strengthen the I&T ecosystem in Hong Kong, without any increase in the directorate establishment of the ITC. These new initiatives include –

- (a) infrastructure projects including the Science Park Expansion Programme Phase 1, the Advanced Manufacturing Centre, the Data Technology Hub, the InnoCell and the Hong Kong-Shenzhen Innovation and Technology Park at the Lok Ma Chau Loop;
- (b) new funding programmes including the Midstream Research Programme, the Technology Voucher Programme, the Enterprise Support Scheme, the Innovation and Technology Venture Fund (“ITVF”);
- (c) manpower programmes including the Technology Talent Scheme (comprising the Postdoctoral Hub Programme and the Re-industrialisation and Technology Training Scheme) and the Technology Talent Admission Scheme; and
- (d) financial incentive i.e. the enhanced tax deduction for R&D activities.

As a result, the portfolio and policy content of our directorate echelon have expanded significantly.

Need for Strengthening Directorate Support

26. In addition, preparation for the two research clusters will entail substantive work. The two clusters will involve both local and non-local parties of high international standing and require high level liaison and negotiation. Substantial policy steer is also needed for the strategy to attract the right mix of renowned institutions, the governance structure and legal issues involved, as well as oversight of their operation. It is necessary to have an officer at directorate level with strong policy formulation and communication skills to negotiate with potential partners and strike a delicate balance among different stakeholders to achieve the intended objectives.

27. As ITC continues to play an important role in delivering and managing the new initiatives launched in CE's Policy Address announced in October 2017 as well as the 2018-19 Budget, we see a need to strengthen our directorate staff by creating a permanent AOSGC (D2) post, to be designated as Assistant Commissioner (Infrastructure) ("AC(Infrastructure)"), to head the new Infrastructure Division underpinned by 20 non-directorate officers, among which 11 are new posts to be created, and to reshuffle the existing duties of the post of AC (Infrastructure and Quality Services), ranked at Assistant Commissioner for Innovation and Technology ("AC") (D2).

28. The incumbent AC(Infrastructure and Quality Services) is responsible for overseeing the work of the Hong Kong Accreditation Service, the Product Standards Information Bureau, the Standards and Calibration Laboratory as well as all matters relating to HKSTPC, including a number of new capital works projects undertaken by the company. In the past year, he took up the duties in respect of the capital works, establishment and operation of the Hong Kong-Shenzhen Innovation and Technology Park, as well as the new initiatives concerning R&D enhanced tax deduction and the ITVF. His plate is already more than full given the magnitude of the works projects concerned and the substantial policy and legal matters involved in their delivery. Under our proposal, the post will be retitled as AC(Finance and Quality Services). On the other hand, the new AC(Infrastructure) post will, on top of duties relating to the two technology clusters, take over matters relating to the Science Park.

29. The job description of the proposed AC(Infrastructure) post is at **Annex A**, whereas the revised job description of the existing AC(Infrastructure and Quality Services), to be re-designated as AC(Finance and Quality Services), is at **Annex B**. The proposed organisation chart of the new Infrastructure Division is at **Annex C**. The existing and proposed organisation charts of ITC are at **Annexes D** and **E** respectively.

Alternatives Considered

30. We have critically assessed if the additional workload as explained above can be absorbed by existing manpower at the directorate level within ITC. ITC is headed by the Commissioner for Innovation and Technology (D6), who is assisted by an Administrative Officer Staff Grade B (D3) as Deputy Commissioner of Innovation and Technology, three AOSGCs (namely AC(Funding Schemes), AC(Policy and Development) and Secretary-General (Testing and Certification) (“SG(TC)”), one ACIT (i.e. existing AC(Infrastructure and Quality Services)) and two D2-equivalent staff designated as Science Advisor and Biotechnology Director who are appointed on non-civil service terms. These officers are already fully engaged with their own heavy portfolio and workload. It would not be viable for any one of them to absorb or share the additional duties without adversely affecting the quality and efficiency of their work.

31. SG(TC), in addition to her original portfolio of promoting the testing and certified industry and serving the HKCTC, has taken up responsibilities for the oversight of the Hong Kong Applied Science and Technology Research Institute and the Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies. Recently, the relevant officer has also assumed the responsibility for the Technology Talent Admission Scheme, a new initiative involving extensive co-ordination with Immigration Department, Security Bureau and Labour and Welfare Bureau. As the new scheme will be rolled out in June 2018, it will require continuous reviews and close monitoring to keep track of the proper usage of quota and local employment situation. This new initiative has significantly expanded the portfolio and workload of SG(TC), making it impossible for the officer to take on any further responsibilities.

32. AC(Funding Schemes) and AC(Policy and Development) have taken up and absorbed the work on seven new/enhanced funding schemes since 2015, including the Technology Voucher Programme, the Midstream Research Programme for Universities, and the Enterprise Support Scheme and various collaboration projects with the Mainland. It is not feasible for them to take on any further additional responsibilities.

Financial Implications

33. The proposed creation of one AOSGC post will require an additional notional annual mid-point salary of \$2,094,600. The additional full annual average staff cost, including salaries and staff on-cost, is \$2,916,000.

34. The notional annual salary cost at mid-point for the 11 additional non-directorate posts¹² mentioned in paragraph 27 is \$8,226,960 and the full annual average staff cost, including salaries and staff on-cost, is \$11,965,000. We have earmarked the necessary provision in the Estimates of ITC of the relevant financial years to meet the cost of this proposal.

ADVICE SOUGHT

35. Members are invited to comment on the proposals. Subject to Members' views, we will seek the necessary funding approval from the Legislative Council in accordance with established mechanism.

Innovation and Technology Bureau
Innovation and Technology Commission
May 2018

¹² Including 1 CEO, 2 SEO (one to be created in 2019-20), 2 EO I, 1 STA, 1 AOI, 1 CO, 1 ACO, 1 PS I and 1 WM II posts.

Job Description of Assistant Commissioner (Infrastructure)

Division	: Infrastructure
Post title	: Assistant Commissioner (Infrastructure)
Post title abbreviation	: AC(I)
Rank	: Administrative Officer Staff Grade C (D2)
Responsible to	: Deputy Commissioner for Innovation and Technology

Main duties and responsibilities: –

1. To devise strategic plans for the establishment and oversee the operation of research clusters as key technology platforms for the promotion of innovation and technology.
2. To oversee policy, resources and housekeeping matters relating to Hong Kong Science and Technology Parks Corporation.
3. To oversee the development of physical technological infrastructure.

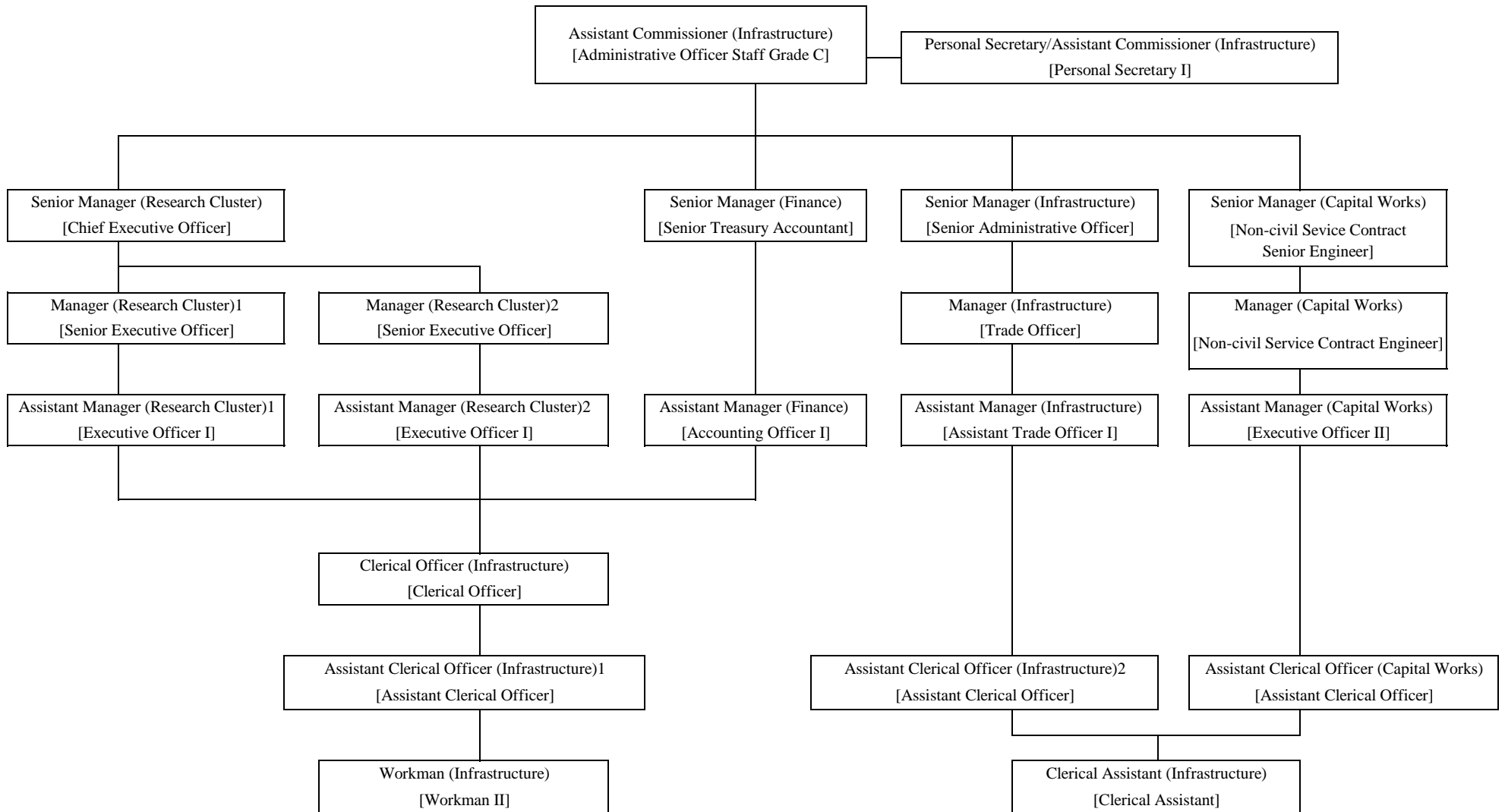
Job Description of Assistant Commissioner (Finance and Quality Services)

Division	: Finance and Quality Services
Post title	: Assistant Commissioner (Finance and Quality Services)
Post title abbreviation	: AC(F & Q)
Rank	: Assistant Commissioner for Innovation and Technology (D2)
Responsible to	: Deputy Commissioner for Innovation and Technology

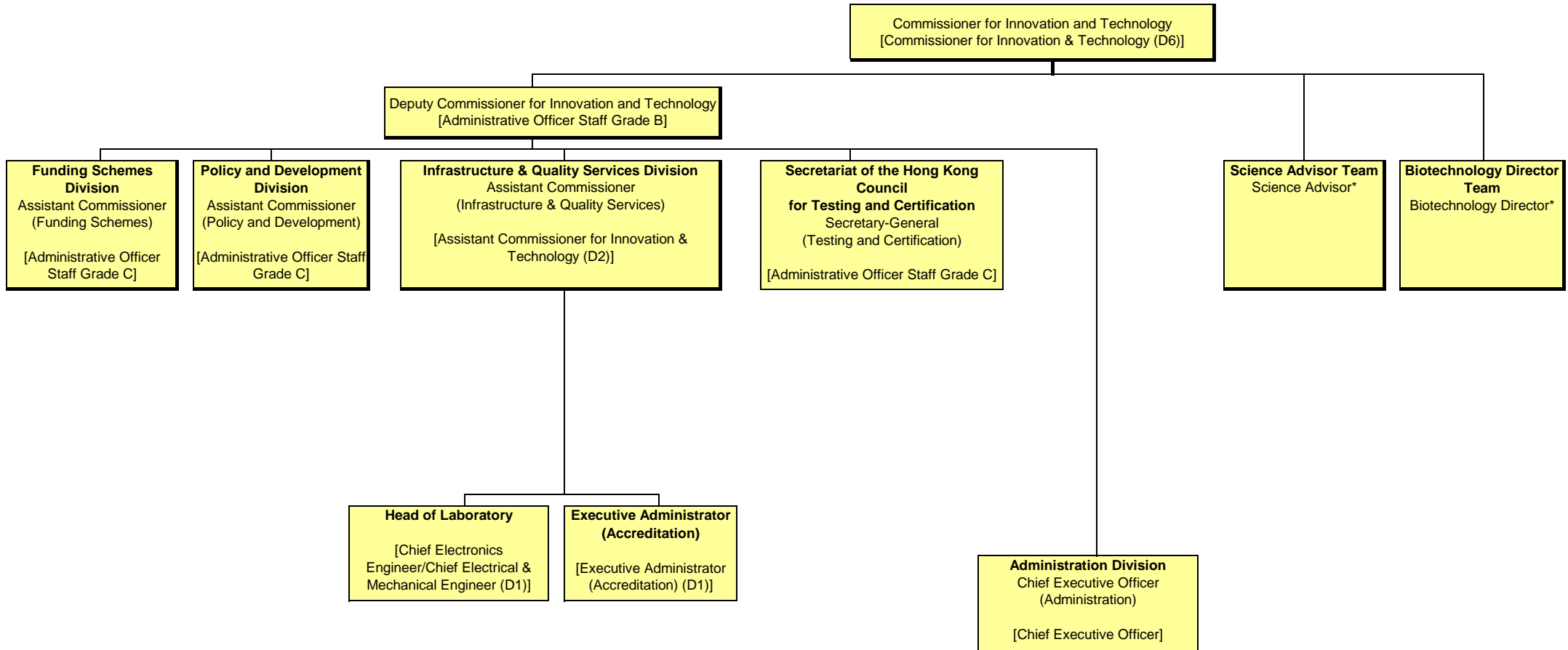
Main duties and responsibilities: –

1. To oversee policy and manage housekeeping issues relating to Quality Services Division.
2. To formulate policies to implement the enhanced tax deduction for qualifying research and development expenditure.
3. To oversee the assessment and monitoring of designated R&D institutions under enhanced tax deduction.
4. To deal with matters relating to the capital works, establishment and operation of the Hong Kong Shenzhen Innovation and Technology Park.
5. To manage the Innovation and Technology Venture Fund.

Proposed Organisation Chart of Infrastructure Division

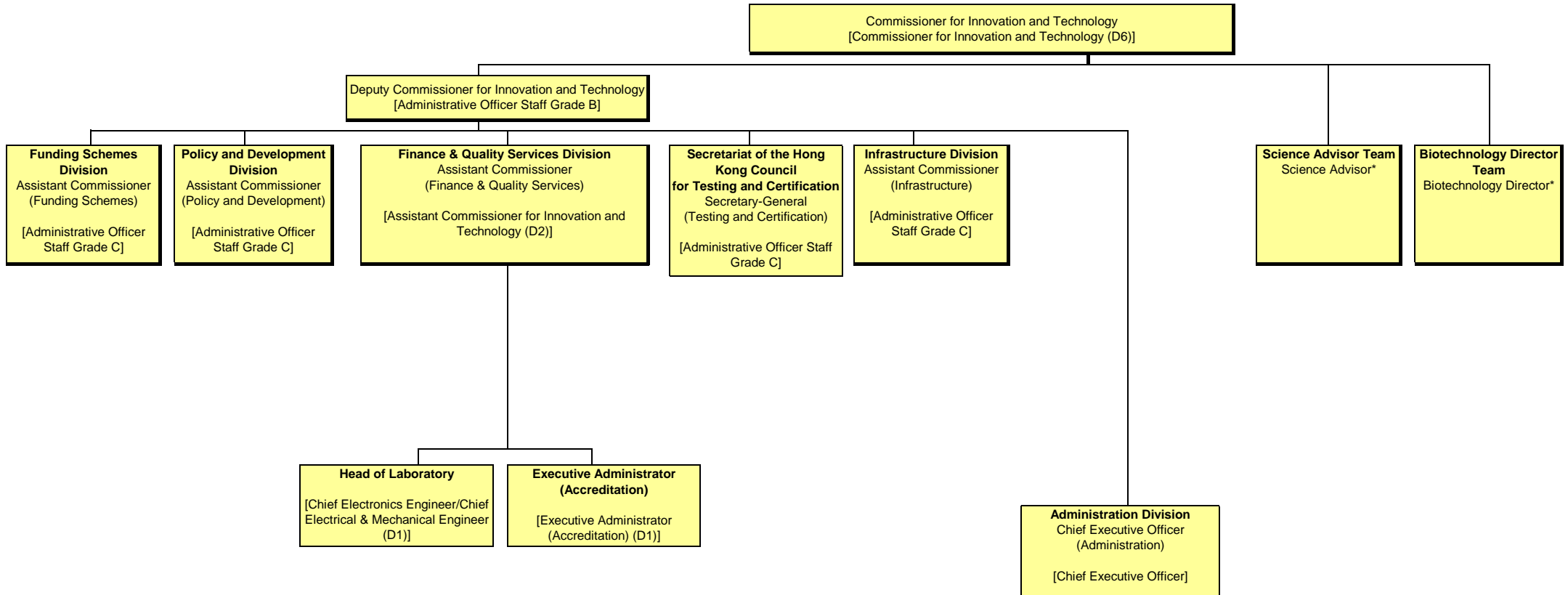


Organisation Chart of Innovation and Technology Commission - Existing



* NCS positions equivalent to D2

Organisation Chart of Innovation and Technology Commission - Proposed



* NCS positions equivalent to D2