Consultancy for Drawing Up a Talent List

Final Report

December 2018

Submitted to:

The Government of the Hong Kong Special Administrative Region, represented by the Labour and Welfare Bureau

10th Floor, West Wing, Central Government Offices, Tamar, Hong Kong

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Final Report

A report submitted by ICF Consulting Services Hong Kong Limited
in association with Policy 21 and Signium
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Executive Summary

ES1 Introduction

This "Consultancy for Drawing Up a Talent List: Final Report" (the Report) was prepared by ICF, in association with Policy 21 and Signium (the Consultant), in the scope of the "Consultancy for Drawing Up a Talent List" (the Service). It is the final deliverable of the Service coordinated by the Labour and Welfare Bureau (LWB) of the Government of the Hong Kong Special Administrative Region (HKSAR Government) in April 2016.

The aim of the Service is to assist the Working Group on Talent List (TLWG) convened by LWB to study, with regard to overseas experience, the feasibility of drawing up a talent list to attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy.

For the fulfilment of this purpose, the Consultant was engaged to:

- Study the overseas experience, mainly through literature review, with the support of stakeholder consultations in seven selected countries (i.e. Australia; Canada; New Zealand; Singapore; South Korea; the United Kingdom; and the United States);
- Conduct a range of stakeholder consultations in Hong Kong, including focus groups and in-depth interviews, with human resources (HR) agencies and HR staff, businesses and industry professional bodies, government bureaux and departments, as well as academics; and
- Draw up a Talent List and recommend mechanisms to review and update the Talent List.

ES2 Strategic context

Five schemes are set up to attract professionals or talented persons to Hong Kong[1]. Most talents and professionals are admitted through the General Employment Policy (GEP) and the Admission Scheme for Mainland Talents and Professionals (ASMTP), which require applicants to have a confirmed employment offer, with a remuneration package broadly commensurate with the prevailing market level of Hong Kong. Persons who wish to enter and stay in Hong Kong to establish or join businesses in Hong Kong may apply for the Investment as Entrepreneurs under GEP.

Three other talent admission schemes, which do not require applicants to first secure an employment offer, have been introduced since 2006: the Quality Migrant Admission Scheme (QMAS), implemented in 2006; the Immigration Arrangements for Non-local Graduates (IANG), implemented in 2008; and the Admission Scheme for the Second Generation of Chinese Hong Kong Permanent Residents (ASSG), implemented in 2015.

Hong Kong is willing to accept foreign skilled professionals, and the overall admission rate is high. In 2015, there were 59,831 applications received and 54,217 applications approved[2] across the five schemes, giving an overall admission rate of 91%. The Talent List is potentially useful in providing reference for various talent admission schemes including QMAS, GEP and ASMTP.

[1] This does not include the Technology Talent Admission Scheme which has been launched in June 2018 to implement a fast-track arrangement for the admission of overseas and Mainland technology talents.

[2] Figures under the QMAS denote the number of quotas allotted.

ES 2.1 Quality Migrant Admission Scheme in Hong Kong

QMAS has an annual quota of 1,000 places and is operated under two points-based tests. An employment offer is not required.

The objective of the scheme is to attract highly skilled or talented persons to settle in Hong Kong and enhance Hong Kong's economic competitiveness. The selection process is undertaken on a regular basis, normally quarterly.

The selection process follows a three-step approach:

Step 1: Prerequisites

An applicant must fulfil a set of prerequisites to be eligible to apply to the scheme.

Step 2: Points-based test

An applicant satisfying the above prerequisites can choose to be assessed under the General Points Test or Achievement-based Points Test.

Step 3: Further assessment of shortlisted candidates by the Advisory Committee on Admission of Quality Migrants and Professionals (the Advisory Committee)

Currently, around 80% of applicants with quota allotted are Mainland Chinese, and the remaining 20% are from around the world.

By sector, some 29% of admitted talents over the 2011-15 period were in the information technology and telecommunications sector, followed by talents in the financial and accounting industry (18%), as well as architecture, surveying, engineering and construction (11%).

Currently, QMAS's annual quota has not been fully utilised.

ES 2.2 Policy context

The process of drawing a Talent List is a result of the 2015 Policy Address (Paragraph 139) and the Population Policy Strategies and Initiatives Report (Paragraph 58) in which the HKSAR Government announced to "Study, with regard to overseas experience, the feasibility of drawing up a talent list to attract, in a more effective and focused manner, high-quality talent to support Hong Kong's development as a diversified and high value-added economy".

The TLWG was set up in April 2015 to take forward this policy initiative. The TLWG is convened by the LWB and comprises representatives of thirteen government bureaux and departments.

ES3 Review of overseas experience

Most developed economies view skilled labour immigration as part of a wider strategy to support economic growth. Three approaches to labour immigration are apparent:

- **Demand-driven models** see skilled immigration as a way to match labour shortages in specific occupations or regions;
- **Supply-driven, or human capital models**, aim to attract and admit high-skilled immigrants based on the assumption that their talent will put them in a favourable position in the labour market and they will therefore be an asset for the economy; and
- **Hybrid models** combine features of both demand-driven and supply-driven models.

Six out of seven reviewed economies make use of, or have used, skill shortage lists: Australia; Canada; New Zealand; Singapore; South Korea; and the United Kingdom. The United States does not use a list of shortage professions.

Skill shortage lists aim to identify foreign medium- or high-skilled talents (occupations) that would benefit the local economy. The basic idea behind skill shortage lists is that there is a shortage of local labour in occupations that are in high demand by employers and that foreign workers are well-placed to meet this labour shortage.

In order to analyse the selected overseas skill shortage lists, labour market shortages are categorised according to the following typology:

- **Current or short-term shortages:** Existing and expected labour market shortages over the next 2 years;
- **Medium-term shortages:** Expected labour market shortages over the next 3 to 5 years; and
- **Long-term shortages:** Expected labour market shortages over the next 5 to 10 years.

Skill shortage lists aim to address current (0 to 2 years) to medium-term (3 to 5 years) shortages on labour markets in Canada, New Zealand and the United Kingdom. The reasons for focusing on current to medium-term shortages are:

- The applicant needs to find a position in the labour market at the time of application, hence the need to capture current needs;
- To avoid that persons come in and find themselves unemployed in medium-term, countries aim to identify those professions where the current shortage is likely to last over the forthcoming years; and
- It is very difficult to make long-term forecasts in this area, particularly at the level of individual professions. That is why most countries do not aim to capture long-term trends, except New Zealand and Australia.

The purpose and focus of the skill shortage lists in the six identified countries is summarised in Table ES1.1.

Table ES1.1 Country, skill shortage list under review and its aim and focus

Country	Name of the skill shortage list under review	Aim of the list	Focus of the list in terms of labour market shortages
Australia	Skilled Occupations List (SOL)	To identify occupations that would benefit from independent skilled immigration to meet the medium to long-term skill needs of the Australian economy	Medium to long-term shortages
Canada	Revoked Priority Occupational List (POL)	To better align the labour market needs with the immigration system and to reduce the overall number of new applicants	Current to medium-term shortages
New Zealand	Essential Skills In Demand Lists (ESIDs): ■ Long-term Skill Shortage List (LTSSL); ■ Immediate Skill Shortage List (ISSL) ■ Canterbury Skill Shortage List	To align immigration policy to labour market demand	Current shortages (ISSL), Long-term shortages (LTSSL), Geography specific shortages (Canterbury List)

Country	Name of the skill shortage list under review	Aim of the list	Focus of the list in terms of labour market shortages
Singapore	Revoked Strategic Skills-in-Demand List (SSL)	To signal strategic and/or in-demand occupations in Singapore to locals and foreigners.	
South Korea	List of occupations eligible under E-7 visa scheme	To meet changing demand from employers for foreign professional workers	Current shortages
United Kingdom	Shortage Occupation List (SOL)	To encourage immigration from skilled professionals worldwide in occupations where the UK faces shortages	Current shortages, Geography specific shortages (Scotland only)

Note: For shaded areas information is not available

A series of analyses has been undertaken to understand differences in context and use of these skill shortage lists, how they are drawn up and updated, and who is involved in this process, as well as what kind of professions feature on the lists. Based on the comparative analysis of the overseas experience and Hong Kong context, it is concluded that drawing up a Talent List could bring potential benefits to Hong Kong with a number of lessons for Hong Kong identified. First, Table ES1.2 gives a headline overview. This is followed by 13 lessons learned for the Hong Kong Talent List.

Table ES1.2 Headline overview of Hong Kong context versus overseas trends and experience

	Hong Kong	Overseas trends and experience
Strategic Context	■ Open economy ■ Ageing population ■ Low unemployment rate (around 3%)	■ Open economies ■ Ageing population ■ Low to medium unemployment rates (between 3% in Singapore to 6.3% in the UK). Varying labour market structures.
Type of Talent Schemes where the shortage list is used	■ Potentially useful for QMAS, which does not require an employment offer (and as a reference to other admission schemes)	■ Major routes to employment/residence permits with the exception of the UK ■ Some schemes require employment offer, others do not
Aim of Shortage List	■ To attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy ■ To increase transparency of the labour market situation or opportunities for potential talent	■ To address current and medium-term labour market shortages that cannot be addressed locally ■ A gatekeeping mechanism to make sure that immigration is controlled – it is a way of restricting access
Focus of the list in terms of labour market shortages	■ Constraints exist in terms of data availability for forecasting medium- and long-term skills shortages quantitatively	■ Mainly short-term and medium-term shortages in existing sectors ■ Medium- and long-term structural shortages in existing sectors

	Hong Kong	Overseas trends and experience
Drawing up / updating of Shortage List	■ Current feasibility for a quantitative top-down approach is limited as the available territorial labour force data are not at a sufficiently-granular occupational level. There is limited regular data on vacancies or forecasts on the evolution of employment at detailed occupational level; ■ Qualitative bottom up approach could be conducted through stakeholder consultations with relevant policy bureaux, enterprises and professional bodies	■ Quantitative top-down approach - all reviewed countries have good national labour force data and use it as one of the main sources of evidence to draw up shortage lists; ■ Qualitative bottom-up approach complements the quantitative approach. These are based on stakeholder consultations
Characteristics of the Shortage Lists	■ Hong Kong does not have a standard occupational classification for use across government bureaux/departments	■ All final lists of reviewed shortage professions are based on the respective national occupational classifications ■ Main professions on the lists include health care, engineering, ICT and science professionals

Lesson 1: Some occupational shortage lists overseas aim to indicate existing and medium-term structural labour shortages of the economy based on past trends in employment and recruitment

Skill shortage lists in Canada, New Zealand (ISSL) and the UK focus on existing and medium-term structural labour market shortages. Since the applicant needs to find a position in the labour market at the time of application, there is a need for the lists to capture current shortages. At the same time, to avoid that persons come in and find themselves unemployed in medium-term, the identified current shortages are likely to last for the next two to five years. As it is very difficult to make long-term forecasts in this area, particularly at the level of individual professions, most countries do not aim to capture long-term trends (i.e. 5 to 10 years), except New Zealand's LTSSL and Australia's SOL.

One disadvantage of lists focusing on current labour shortages is that it is difficult for them to be sufficiently responsive to changes in the labour market. There is a lag between identifying current shortages and attracting potential immigrants to fill those shortages. However, it seems that this disadvantage can be addressed by focusing on structural and medium-term shortages of the economy (i.e. shortages that are persistent and have been there for a long time).

Lesson 2: Some occupational shortage lists take into account the territory's strategic environment/development during the selection of occupations

Two reviewed lists (Australia's SOL and Singapore's SSL) include occupations that are put forward by the government for screening in order to align the lists with the territory's strategic environment/development or policy priorities:

- In Singapore, strategic occupations were based on input from various economic sector agencies who put forward strategic occupations for economic growth (i.e. occupations that were of high value-added, required specific skill sets and where the local workforce pipeline was not adequate);
- In Australia, the Department of Education and Training, responsible for managing and updating the occupational shortage list, reviews government department submissions and budget papers to determine government policy priorities.

Lesson 3: Some occupational shortage lists identify and signal foreign medium- or high-skilled talents (occupations) that would benefit the local economy. They aim to ensure that immigrants who enter the country meet the labour market needs and thus have higher chances of contributing to the economy and growth

Skill shortage lists identify and signal foreign medium- or high-skilled talents (occupations) that would benefit the local economy. They aim to align immigration policy with labour market demand and sustainable economic development. Similarly, one of the aims of the Hong Kong Talent List is to identify and attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy.

To further attract professionals in specific high-priority occupations on the list, overseas recruitment campaigns can be organised by specialised recruitment bodies. However, such outreach methods were not covered by the case studies.

Lesson 4: In practice, occupational shortage lists are most often used in three different ways

Normally occupational shortage lists are used in one of the three different ways:

- As the primary eligibility criterion before an application is processed for a work or residency permit and where no employment offer is required
- As a criterion to assign bonus points under a points-based system
- As a replacement for labour market tests.

In several of the overseas cases analysed, occupational shortage lists are used as a gatekeeping mechanism to control and to at least partially restrict immigration (Australia, Canada, the UK and New Zealand) to ensure only the applicants who would highly probably contribute to the targeted fields of the economy would be selected.

Lesson 5: Updating mechanisms of occupational shortage lists overseas always include quantitative analysis based on national labour force data and existing analysis of labour market shortages. Often, quantitative analysis presents a first step towards drawing up occupational shortage lists

All reviewed countries have good detailed national labour force data and existing analysis of labour market shortages, including forecasts down to 4, 5 or even 6-digit occupational levels. Such detailed quantitative analysis is an important component of drawing up a list of shortage professions and often presents a first step of the process (e.g. the UK and Canada). Quantitative analysis is the main source of data on medium- to long-term trends.

However, Hong Kong lacks existing and relevant labour market data or/and analysis on skill shortages. Based on reviewed territorial statistics of Hong Kong and an interview with the Office of the Government Economist (OGE) (formerly known as the Economic Analysis and Business Facilitation Unit), current statistics and forecasts on the Hong Kong economy and labour force are mainly conducted on a macro level and does not provide too much micro-level insight on occupations. Hence, existing territorial statistics are too broad to be used in a way observed in overseas case studies to devise the Talent List.

Lesson 6: The quantitative analysis of the updating mechanisms of occupational shortage lists is always combined with qualitative evidence from stakeholders or judgements made by the government about the suitability of a given occupation to figure on the list. Usually, the government sets up a formal consultation process and invites stakeholders to nominate occupations and provide evidence of shortage. The method observed in New Zealand may serve as a relevant reference for Hong Kong

In many cases studied, qualitative analysis and data gathering are conducted to narrow down the first list based on quantitative analysis of national data (i.e. Australian SOL, Canadian POL and UK SOL). However, a different method, which might fit the Hong Kong context, is observed in New Zealand. In

New Zealand, the Ministry initiates a so-called Occupation Nomination Procedure where industry stakeholders (i.e. employers' groups, trade unions and industry training bodies) are invited to submit proposals for an occupation to be included, removed or moved between the lists. After the proposals are received, the Department of Labour prepares a Preliminary Indicator Evidence Report which draws together evidence of skill level, scale and shortage for each occupation under review.

Lesson 7: Occupational shortage lists are drawn up based on indicators of level of skill and shortage. However, occupations are not automatically added or removed from the list. The final decision is commonly taken by the government based on a range of factors

All reviewed methods of drawing up occupational shortage lists assess occupations against two main criteria: skill and shortage. But the indicators used to assess these two criteria differ based on available evidence:

- Skill is usually measured by the time required to train or get educated in the occupation. If it takes significant time to train or get educated in the occupation, then investment in local talent is less likely to be able to meet the shortage in the short to medium-term (1 to 5 years). In some cases (i.e. the UK) salary levels are also used to indicate the level of skill;
- Shortage is measured by recent and estimated future development of local labour supply (i.e. the number of local workers and recent graduates in the occupation) versus local labour demand (i.e. employment growth, number of vacancies and number of people that will soon retire from the occupation). In some cases (i.e. New Zealand), trends in foreign supply are also considered (i.e. the number of immigrants already working in the country).

However, occupations are not automatically added or removed from the list even if there is evidence of both skill and shortage. The final decision to include or remove an occupation from the list is commonly taken after an assessment of sensibility. The criteria for such an assessment vary, with no common definition being apparent across the different countries. This provides the government with discretion in relation to removing or adding particular occupations on the grounds of the occupations' development potential, the territory's strategic considerations (e.g. whether the occupations to be included are beneficial to the sustainable development of the economy), protecting local workers or other territorial interests. Most of these grounds and criteria are explicitly set out for public inspection and discussion.

Lesson 8: Final lists of shortage professions under review are based on the respective national occupational classifications

Final lists of shortage professions are generally based on the respective national occupational classifications. Only in the case of UK SOL does the list go beyond the level of detail included in the national occupational classification to reference specific job titles that sit within each occupation. These are established in consultation with stakeholders, but the approach has been criticised by some employers as being too detailed. As a result, it seems that the Talent List should make use of the Occupation Index, but whether or not the granularity of occupations is fit for purpose should be further assessed.

Lesson 9: Final lists of reviewed shortage professions include a wide range of occupations. Health and engineering occupations feature on all lists

Overseas lists of shortage professions include a wide range of occupations and all industry sectors are considered in the process of drawing up the lists. Engineering and health occupations feature among the top ten professions on all reviewed lists. For instance, the prominence of the health sector indicates the longer-term structural problems of the economies: all are subject to an ageing population with an increasing demand for health services. At the same time, the inclusion of arts and cultural professions on the lists is rare.

Lesson 10: Occupational skill shortage lists are updated regularly, either annually or at least every two to three years

The occupational skill shortage lists in Australia, Canada and New Zealand have been updated each year, while those in the UK and Singapore have been updated every two to three years. The updating process usually comprises a review of all occupations on the list to ensure the list is up to date. If the occupations are not removed from the lists during the updating process, the list can become outdated. However, the removal of occupations from the list can create negative feedback from the industry, as noted in New Zealand and South Korea.

Lesson 11: Occupational shortage lists overseas are normally used within major routes to residency permits to justify the cost of the process

Most shortage lists analysed (except the SOL in UK) are used for immigration schemes that receive high numbers of applicants. Given the complexity of processes to design and update these lists, the cost effectiveness will be low if it is applied in small schemes with limited numbers of applicants.

The Hong Kong Talent List may be applied mainly on the QMAS, which is a minor route to a residency permit (around 2,000 applicants submit their application each year to QMAS). In comparison, the scale of application in Hong Kong is relatively smaller than the overseas examples that we have studied, where the skill shortage lists usually benefit 18,000-70,000 applicants that are admitted every year.

Lesson 12: Updating and maintaining a list of shortage professions can be resource intensive

A resource intensive updating mechanism was specifically noted in the case of New Zealand. Currently, the management of the updating process requires 0.5 FTE[3] of resources from the Ministry of Business, Innovation and Employment at a senior level and additional input from the labour market analysis, employers and other stakeholders involved spend additional resources to update the list through the public submission process. Lack of data and analysis at the required detailed level indicates that the process to draw up and update the Talent List would need to be based on primary data collection. This process would need to be either qualitative in nature (similar to New Zealand) or/and would be very resource intensive and time consuming (in case surveys and forecasting methodologies are developed to monitor and predict labour market shortages).

Lesson 13: Some overseas economies also target foreign exceptional talents or professionals in strategic sectors through immigration policy, but use other approaches rather than occupational shortage lists

Two other approaches to attract overseas talent were identified: a separate visa scheme targeting exceptional talents similar to QMAS and bonus points for professions falling within future growth areas.

[3] Full-time equivalent.

ES4 Summary of stakeholder consultations

The aim of the stakeholder consultation was to collect feedback on the Suggested List of Industry Segments and Occupations[4] and to gather evidence of talent shortage. Stakeholders including HR firms, business associations, professional bodies and employers were invited to comment and add professions on the list and to provide detailed descriptions of professions deemed in shortage (e.g. main skills and competences expected, tasks carried out, and remuneration). In total, more than 240 individuals participated in these consultations.

A number of industry segments consulted, both HR firms and industry stakeholders including business associations, professional bodies and employers, were quite open to the idea of recruiting foreign talents and were sceptical of the idea of compensating specific knowledge shortages by accessing local labour supply. In addition, the industry segments agreed that there was an acute demand for talents which had to be met by recruiting talent from outside Hong Kong for the occupations presented below.

In the ***arts and culture and creative industries sector***, stakeholders consulted noted that the industry had very diversified views over the need to recruit foreign talent. They pointed out that although the Hong Kong creative industries have great potential, there is a risk that there would not be sufficient job opportunities to absorb the supply of local talent who had to look for employment elsewhere (e.g. Mainland China). Nevertheless, it was noted that the design, arts, cultural and communications sectors were popular among young people, and were also a powerhouse that would drive the economy, add value and make Hong Kong a more attractive international city.

More specifically, demand for high quality music was increasing. This in turn had created a strong demand for top notch talent in the field of recording engineering and master engineering. Furthermore, as games become available on mobile phones, the growth potential for the game industry was expected to be significant. In addition, although it was recognized that a number of local talents are going to the Mainland to work on film production, there is still a shortage of talent to support the film industry in Hong Kong. Accordingly, the following categories were proposed to be included in the Talent List:

- **Music**: Recording Engineers; Mastering Engineers; and Cutting/Pressing Engineers for Vinyl LP
- **Digital Entertainment**: Game Development Experts (Game Designers, Game Programmers, Game Graphic Designers); and Game Producers
- **Film**: Various roles in pre-production, production and post-production and winners of designated renowned international film festivals.

In the ***environmental technology services sector***, stakeholders consulted noted that the talent requirements for professionals within environmental industries are dependent on the Government's policy direction. While there was a strong demand for professionals in the field, the search for them varies locally and internationally, though most recruits were trained overseas. In light of future developments in the sustainable use of resources, they agreed that the environmental industries in Hong Kong would benefit from attracting **experienced waste treatment specialists or engineers**. In particular, there is acknowledged shortage in advanced waste treatment and engineering expertise.

In the ***financial services sector***, stakeholders consulted agreed that, in general, the industry was experiencing shortages in middle to back office talent. In particular, asset management and wealth management were expected to be key growth areas in the future, and the supply of talent in asset management was very limited. Furthermore, fintech appears as an emerging sector in the 21st century. In addition, the insurance sector is experiencing growth due to an increase in the purchase of products in Hong Kong. Insurance companies had difficulties in recruiting actuarial and compliance

[4] The list excludes healthcare industry and occupations given these are the subject of a separate study in parallel.

professionals, especially marine insurance professionals. Accordingly, the following professions were proposed for inclusion in the Talent List:

- **Experienced management professionals in asset management, including but not limited to trust fund management;**
- **Experienced professionals in marine insurance;**
- **Actuaries**; and
- **Experienced professionals in fintech**.

In the ***information and communications technology (ICT) services sector***, stakeholders consulted considered that despite the potential for the outsourcing of ICT projects, demand for local and foreign ICT talent was likely to increase as more business corporations adopt ICT in their business operations. They emphasized that foreign talents to be recruited into Hong Kong should shoulder the responsibility of upskilling local talent. To take into account the rapidly-changing technology, stakeholders noted that while the occupations on the Talent List should not be too narrowly defined, two specific occupational shortages could, however, be identified, namely **experienced data scientists** and **experienced cyber security specialists.**

In the ***innovation and technology (I&T) sector***, stakeholders consulted noted a shortage of professionals engaged in research and development (R&D) in many sectors in Hong Kong. While there are various STEM (science, technology, engineering and mathematics)-related university programmes in Hong Kong, few graduates from these programmes pursue a relevant R&D career. It was suggested that I&T experts should be covered in the Talent List, including but not limited to:

- **Experts in pharmaceutical and life science / biotechnology**;
- **Experts in data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.**; and
- **Experts in materials science / nanotechnology**.

In the ***maritime services sector***, stakeholders consulted noted that current superintendents of ships were foreign professionals (e.g. from India), because it was difficult to recruit locally to fill positions such as ship superintendents or technical officers of ocean-going vessels and superyachts. They also noted that naval architects are an important engineering profession in the maritime industry, dealing with ship design process, shipbuilding, ship surveying, as well as ship maintenance and safety. Despite the limited growth potential for the traditional shipping industry including ship building, it was pointed out that Hong Kong has a world class port, is the fourth largest ship register, and is the largest third-party ship management centre. Hong Kong's competitiveness lies in ship management, ship broking and chartering, liner and cargo agency and some intermediary services. It was recommended that **naval architects**, **marine engineers** and **superintendents of ships** be included in the Talent List.

In the ***legal and dispute resolution services sector***, several stakeholders consulted were of the view that there would be increasing demand for arbitration services in Hong Kong, and there is still a continuing need to appoint dispute resolution services providers from outside Hong Kong in order to realise the government aspiration to develop Hong Kong as an international legal and dispute resolution services centre in the Asia Pacific region. As noted by the Department of Justice (DoJ), a large pool of highly-skilled legal and arbitration talent with international exposure is conducive to achieving this policy vision. Also, in the context of the Belt and Road Initiative as well as the Guangdong-Hong Kong-Macao Bay Area Development, it is necessary to encourage transactional lawyers from the Belt and Road countries or the Guangdong-Hong Kong-Macao Bay Area jurisdictions, especially those acting for businesses who will set up their corporate vehicles in Hong Kong for their inbound or outbound investments to be familiar with Hong Kong, and provide a good bridge for such cross-border transactions generated by the businesses or governments from those countries or jurisdictions to be based in Hong Kong. For the above reasons, it has been proposed to consider the inclusion of **dispute resolution professionals** and **transactional lawyers** on the Talent List.

ES5 Conclusions and recommendations

ES5.1 The need and justifications for drawing up a talent list for Hong Kong

Being a small city with limited natural resources, it is necessary for Hong Kong to attract the best talent from around the world to maintain Hong Kong's competitiveness in the global market and to enhance knowledge and professional exchanges with the local talent.

Based on the overseas experience and the Hong Kong context there are several potential benefits for drawing up and using a Talent List in Hong Kong:

- A Talent List would be a first consolidated indicator of current to medium-term (0 to 5 years) territorial skill shortages and foreign talent needs;
- A Talent List could be used to signal the type of talent Hong Kong needs;
- An occupation on the Talent List could be used as the primary eligibility criterion or a prioritised matter of consideration and could improve the efficiency of the QMAS application process; and
- A Talent List could be of reference to GEP and ASMTP.

ES5.2 Approach to drawing up and updating the Hong Kong talent list

The adopted methodology is the result of the preliminary output of the TLWG produced prior to this Service. It follows the lessons learned and recommendations from the Literature Review and Overseas Experience.

In summary, the methodology followed the three-stage approach:

- **Stage 1 – Top-down evidence gathering:** The Government suggested the potential industry segments and occupations for the Talent List for further study;
- **Stage 2 – Bottom-up evidence gathering:** more than 240 individuals from 20 HR companies and recruitment professionals and more than 70 industry stakeholders commented on and provided evidence relating to the professions on the list; and
- **Stage 3 – Assessment:** Each of the suggested industry segments and occupations to be covered by the Talent List was cross-checked against three criteria: high skill requirement, evidence of shortage, and sensibility. The Talent List was drawn up based primarily on qualitative information gathered in Stage 1 and Stage 2.

ES5.3 Recommended talent list

It is recommended to include the following 11 Industry Segments and Occupations (ISO) in the proposed Talent List. With the agreement in principle by the Government, the respective bureaux and departments have consulted their relevant advisory and statutory bodies (ASBs) and other stakeholders –

1. Environmental technology services - experienced **waste treatment specialists/engineers** (Environmental Protection Department);
2. Financial services - experienced **management professionals in asset management** including but not limited to trust fund management (Financial Services and the Treasury Bureau (FSTB));

3. Financial services and maritime services - experienced **professionals in marine insurance** (FSTB and Transport and Housing Bureau (THB));
4. Financial services - **actuaries** (FSTB);
5. Financial services - experienced **professionals in fintech** (FSTB);
6. Information and communications technology services - experienced **data scientists** and experienced **cyber security specialists** (Innovation and Technology Bureau (ITB));
7. **Innovation and technology (I&T) experts** in, but not limited to, the following fields: (i) pharmaceutical and life science/biotechnology; (ii) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (iii) materials science/nanotechnology (ITB);
8. Maritime services - **naval architects** (THB);
9. Maritime services - **marine engineers** and **superintendents of ships** (THB);
10. Legal and dispute resolution services - (i) **dispute resolution professionals** specialising in resolving international financial and investor-state disputes; and (ii) **transactional lawyers**, in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states (DoJ); and
11. Creative industries professionals, including: (i) **music**: recording engineers, mastering engineers, cutting/pressing engineers for Vinyl LP; (ii) **digital entertainment**: game development experts (game designers, game programmers, game graphic designers), game producers; and (iii) **films**: various roles in pre-production, production and post-production and winners of designated renowned international film festivals (Commerce and Economic Development Bureau).

To ascertain that only high quality talents are covered, detailed descriptions and specific qualification/experience requirements/proof of achievements that are commensurate with the market standards would need to be set out for every proposed ISO, known as “fiches”.

ES5.4 Updating mechanism

Key considerations and proposed options for updating the Hong Kong Talent List are set out based on the experiences of the initial Talent List development and the lessons from the international examples. The key areas that underpin the development of an agreed updating process are:

- **Data availability:** Understanding how wider policy developments, especially with regard to the collection of quantitative data, may inform the Talent List updating process; resourcing and proportionality of approach.
- **International evidence:** Reflection on how other countries have approached the updating of their equivalent talent lists.
- **Establishing parameters for updating the Talent List:** Agreeing the purpose and general principles for updating the Talent List; the timescale for updating the Talent List; sources of evidence that can be incorporated.

It is assumed that Talent List updating would be periodic. There is potentially a trade-off between how regularly the Talent List is updated and the ability to effectively establish it, so that stakeholders are aware of and familiar with it. Given the time taken to develop the initial list, it is suggested that an annual review is both unnecessary and impractical for Hong Kong. Some industries change rapidly, but a key learning point from the initial Talent List development is that stakeholders often note that the case for inclusion of emerging needs is not always backed up by actual demand (especially with technology-driven demand). Ultimately, the timetable for updating the Talent List has to be informed by data availability. Based on the international evidence, it is suggested that two years is the minimum timescale to consider, and that three years may be towards the upper limit for updating the Talent List

– especially as the list is only newly-established. It may be possible to consider a process by which the Talent List has a scheduled update, but there is still scope for adding new occupations in exceptional situations.

Also, it has been suggested that **during the periodic Talent List updating, *all* current occupations are reviewed to check their continuing eligibility/relevance**.

It may be important to ensure consistency with the initial process to develop the Talent List so as not to unnecessarily reinvent the process, while learning lessons from the initial exercise. One lesson could be the value in having, as far as possible, objective measures to support occupational selection for inclusion on the Talent List. There is a set of descriptive and broadly comparable indicators that have been used to shape the initial Talent List and which provide broadly comparable measures of eligibility for inclusion: Employment and salary data; Qualification level and professional experience required; and Labour supply/education and training pipeline.

Descriptive occupational information generated as part of the initial Talent List development, such as job roles and professional requirements, can be developed over time and used for updating the Talent List, as required (e.g. adding new occupations; checking to ensure that the information remains current). It is likely that alongside more descriptive and 'objective' information, **any process to update the Talent List will still require consultation with industry and gathering qualitative intelligence on shortages and the nature of current/future demand**.

We propose three options for updating the Talent List, taking account of the key considerations. The review process would draw on the key judgement criteria used for the initial list to support comparability (salary data; qualification level and professional experience required; labour supply).

- Option 1: Light touch periodic updating
- Option 2: In-depth periodic updating
- Option 3: Continuous updating

All three options are feasible next steps for the Hong Kong Talent List. Given that it is unlikely that new quantitative data will become available within the likely timescale for updating the Talent List, the recommended updating mechanism will largely follow a qualitative approach. International evidence indicates that talent lists operating with similar approaches tend to focus on addressing structural labour market weaknesses. As such, it is suggested that a degree of rigour is retained by following a more in-depth periodic updating model (i.e. Option 2), which starts with a wider engagement with industry to identify occupations for potential inclusion in an updated Talent List. Nominated occupations would then be checked to ensure that they comply with the judgement criteria – with follow-up consultation/clarification with stakeholders as necessary. This approach is more systematic and enables wider stakeholder engagement. It also best supports comparability with the initial Talent List.

ES5.5 Application of the Hong Kong Talent List

Preparation of the Talent List has completed. The Talent List would highlight to world talents which specific ISO are needed most for Hong Kong's further economic development, and would help attract them to come to Hong Kong. This should help Hong Kong gain competitive advantage in attracting international talents vis-à-vis other economies, creating cluster effects, and stimulating the development of local talents. The Talent List would also provide useful reference for the Government, training institutions and professional bodies in various aspects of manpower planning.

QMAS seeks to attract highly skilled or talented persons to settle in Hong Kong in order to enhance Hong Kong's economic competitiveness. It is noted that the Government considers it appropriate to apply the Talent List to the QMAS to provide immigration facilitation for eligible applicants.

1 Introduction

This "Consultancy for Drawing Up a Talent List: Final Report" (the Report) was prepared by ICF, in association with Policy 21 and Signium (the Consultant), in the scope of the "Consultancy for Drawing Up a Talent List" (the Service). It is the final deliverable of the Service coordinated by Labour and Welfare Bureau (LWB) of the Government of the Hong Kong Special Administrative Region (HKSAR Government) in April 2016.

1.1 Study objective and scope

The aim of the Service is to assist the Working Group on Talent List (TLWG) convened by LWB to study, with regard to overseas experience, the feasibility of drawing up a talent list to attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy.

For the fulfilment of this purpose, the Consultant was engaged to:

- Study the overseas experience, mainly through literature review, with the support of stakeholder consultations in seven selected countries (i.e. Australia; Canada; New Zealand, Singapore; South Korea; the United Kingdom (the UK); and the United States);
- Conduct a range of stakeholder consultations in Hong Kong, including focus groups and in-depth interviews, with human resources (HR) agencies and HR staff, businesses and industry professional bodies, government bureaux and departments, as well as academics; and
- Subject to the result of the feasibility study, draw up a Talent List and recommend mechanisms to review and update the Talent List.

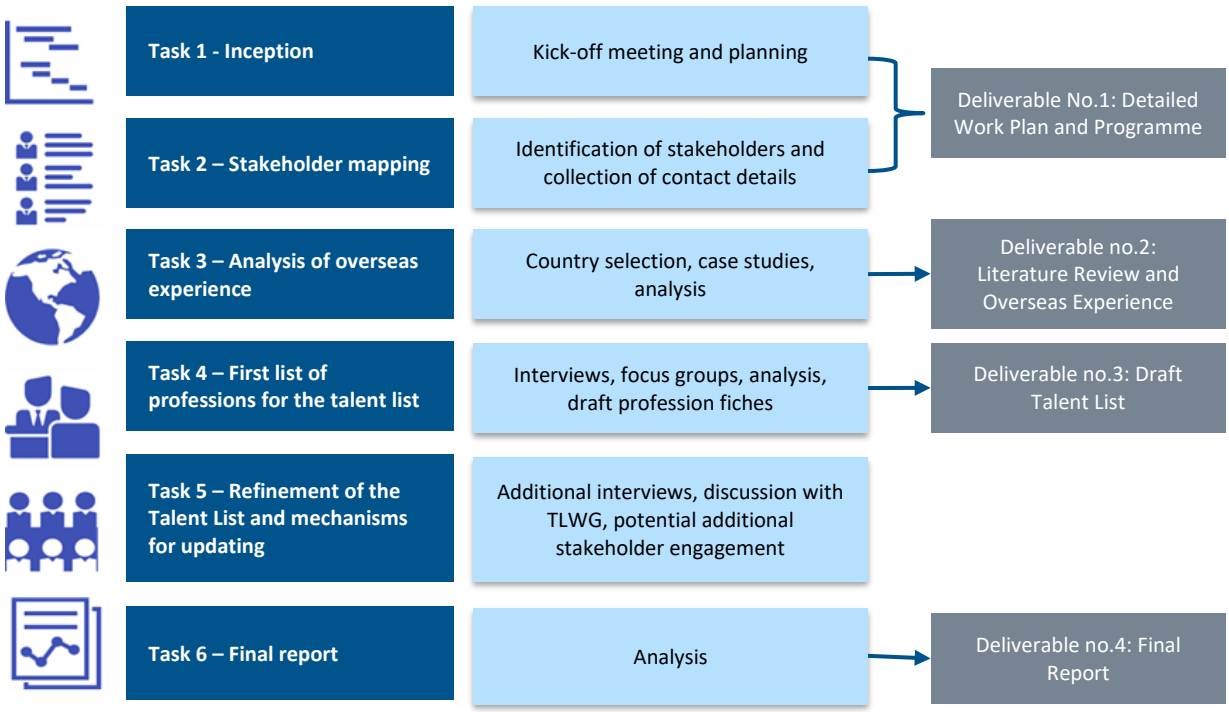
1.2 Methodology

The Work Plan and Programme for this Service has been organised into six tasks.

- Task 1 – Inception
- Task 2 – Stakeholder mapping
- Task 3 – Analysis of overseas experience
- Task 4 – Drawing up a first list of professions for the talent list
- Task 5 – Refinement of the talent list and of the mechanisms for its updating
- Task 6 – Final report

This deliverable marks the end of Task 6. This section presents the summary of all of the previous Tasks, based on the refined approach set-out in our proposal and incorporating the changes suggested by the LWB since the Kick-off Meeting.

Table 1.1 Overview of the Methodology



The Study has been conducted based on a case study approach. Overseas case studies conducted in 2016 and Hong Kong research and stakeholder interviews conducted in 2016 to 2018 serve as the main evidence base for the analysis in this Report. All information and views collected were valid at the time of collection. This Report presents more updated information if data are made available to the Consultant.

Case studies covered overseas experience in seven selected economies including: Australia; Canada; New Zealand; Singapore; South Korea; the United Kingdom; and the United States.

The case studies followed a two-step research approach:

- **Step 1**: Desk research – This included, but was not limited to, review of websites for immigration services and other government units, as well as published research and evaluation reports. There are significant differences in the level of publicly-available information between the case study economies. Whereas desk research provided a good insight on immigration schemes and the use of skill shortage lists in Australia, Canada, New Zealand, the UK, and the United States, information on Singapore and South Korea was limited.
- **Step 2**: Stakeholder interviews – 12 interviews were held with public officials that are knowledgeable about the skill shortage lists of interest or other relevant stakeholders. The amount of information obtained through interviews also varied. Whereas public officials or stakeholders of some countries responded to a majority of questions asked (i.e. New Zealand, Australia, Canada and the United Kingdom), officials of other countries such as Singapore and South Korea could not share more detailed information with researchers. No interviews were conducted for the United States as it does not use a list of shortage professions.

This variation of depth and breadth of information collected among different case studies is reflected in the subsequent analysis. Whereas several lessons can be learned from Australia, Canada, New Zealand and the United Kingdom, limited ability to collect information in Singapore and South Korea also limits the analysis and lessons learned from these cases.

1.3 Report structure

The Report is structured as follows:

- **Executive Summary;**
- **Section 1**: Introduction;
- **Section 2:** Strategic context;
- **Section 3:** Review of overseas experience;
- **Section 4:** Talent List for Hong Kong;
- **Section 5:** Conclusions and recommendations;
- Annexes:
  - **Annex 1:** Fiches for the 11 Industry Segments and Occupations (ISO) Recommended for Inclusion into the Talent List
  - **Annex 2:** Consulted HR agencies and recruitment practitioners
  - **Annex 3:** Consulted Industry Stakeholders

2 Strategic context

Hong Kong has always adopted an open immigration policy[5]. Professionals and business(wo)men are welcome to work and invest in Hong Kong, and every effort is made to facilitate the entry of visitors and those who contribute to Hong Kong's development and prosperity. Persons applying for permission to live, work or study in Hong Kong are required to obtain visas or entry permits before arrival.

As at the time of study, five schemes have been set up to attract professionals or talented persons to Hong Kong[6]. Most talents and professionals are admitted through the General Employment Policy (GEP) and the Admission Scheme for Mainland Talents and Professionals (ASMTP), which require applicants to have a confirmed employment offer, with a remuneration package broadly commensurate with the prevailing market level of Hong Kong. Persons who wish to enter and stay in Hong Kong to establish or join a business in Hong Kong may apply for the Investment as Entrepreneurs under GEP.

Three other talent admission schemes, which do not require applicants to first secure an employment offer, have been introduced since 2006: the Quality Migrant Admission Scheme (QMAS), implemented in 2006; the Immigration Arrangements for Non-local Graduates (IANG), implemented in 2008; and the Admission Scheme for the Second Generation of Chinese Hong Kong Permanent Residents (ASSG), implemented in 2015.

Hong Kong is willing to accept foreign skilled professionals, and the overall admission rate is high. In 2015, there were 59,831 applications received and 54,217 applications approved[7] across the five schemes, giving an overall admission rate of 91%. The following table summarises the target groups, eligibility criteria, and the admission rates of the different talent admission schemes.

[5] "Hong Kong Immigration Factsheet"; http://www.gov.hk/en/about/abouthk/factsheets/docs/immigration.pdf

[6] The five talent admission schemes (namely GEP, ASMTP, QMAS, IANG and ASSG) are entry arrangements for talents and professionals to come to Hong Kong. In addition, the Technology Talent Admission Scheme (which was launched in June 2018, implements a fast-track arrangement for the admission of overseas and Mainland technology talents) was not covered in this study. Unlike these schemes, the Supplementary Labour Scheme (SLS) and Employment of Foreign Domestic Helpers (FDHs) aim to import labour to meet local shortage instead of attracting talents and professionals. By way of background, it is the HKSAR Government's policy that priority of employment will be accorded to local employees; importation of labour will be considered only if employers have genuine difficulties in recruiting suitable workers locally. The SLS and importation of FDHs are run according to the aforementioned cardinal principle. The SLS allows employers with genuine difficulties in finding suitable staff locally to import workers at technician level or below. Imported workers under the SLS are required to be paid at least median monthly wages of local workers in comparable positions, accorded no less favourable treatment as that enjoyed by local workers under the labour laws of Hong Kong, and further protected by a Standard Employment Contract (SEC) prescribed by the Government. The importation of live-in FDHs to Hong Kong has been allowed to meet the acute and long-standing shortage of full-time live-in domestic helpers locally. Employers and FDHs are required to enter into a government-prescribed SEC, in which the salary stated therein should be no less than the prevailing Minimum Allowable Wage at the time of signing the contract. The SEC also requires employers to be responsible for the passage for the FDHs to come from, and return to their home countries, and that the employers have examined the medical report showing the FDHs are fit for employment as domestic helpers in the HKSAR. In 2015, there were 3,852 and 97,936 admissions under SLS and FDH respectively.

[7] Figure under the QMAS denotes the number of quotas allotted.

Table 2.1 Overview of Schemes to Attract High Skilled Workers to Hong Kong (as at the time of study)

Scheme	Target Group	Eligibility criteria/Annual Quota	Number of Admissions in 2015 (% admitted)
General Employment Policy (GEP)	Professionals and entrepreneurs from overseas (excluding Mainland)	■ Good education background, normally a first degree in the relevant field of employment ■ Confirmed employment offer for jobs that cannot be readily filled by local professionals ■ Remuneration is broadly on par with the local market rate ■ No quota nor any restrictions on employment sector	34,403 (94%)
The Admission Scheme for Mainland Talents and Professionals (ASMTP)	Professionals from Mainland	■ Same criteria as GEP ■ No quota nor any restrictions on employment sector	9,229 (84%)
The Quality Migrant Admission Scheme (QMAS)	Talents from overseas and Mainland	■ Employment offer is not required ■ Annual quota of 1,000 ■ No sector restriction ■ The applicant must have a good educational background, normally a first degree from a recognised university or a tertiary education institution[8] ■ Applicants are assessed based on one of the two points-based tests: General Points Test and Achievement-based Points Test	208[9] (11%)
The Immigration Arrangements for Non-local Graduates (IANG)	Non-local graduates who have obtained an undergraduate degree or higher qualification in a full-time and locally-accredited programme in Hong Kong	■ Allows non-local graduates to stay in Hong Kong for up to a year after finishing their degrees and seek employment ■ Non-local graduates who submit applications beyond six months after the date of their graduation may apply to return to work	10,269 (99%)
The Admission Scheme for the Second Generation of Chinese Hong Kong Permanent Residents (ASSG)	Second generation of emigrated Chinese Hong Kong permanent residents from overseas	■ Employment offer is not required ■ Aged between 18-40 ■ Have at least one parent who holds a Hong Kong Identity Card (HKID) who had settled overseas at the time of the applicant's birth ■ Good education background, normally a first degree ■ Proficient in written and spoken Chinese or English	108 (51%)

[8] In special circumstances, good technical qualifications, proven professional abilities and/or experience and achievements with supporting documents may be considered.

[9] Figure under the QMAS denotes the number of quotas allotted.

Note: Schemes shaded in grey are expected to benefit from the Talent List

Five industry sectors received 71% of the admitted foreign talents in 2015: the financial services sector (9,427 or 18%); academic research and education (7,869 or 15%); recreation and sports (7,436 or 14%); arts and culture (6,497 or 12%); and commerce and trade (6,148 or 12%).

2.1 Quality Migrant Admission Scheme in Hong Kong

The Talent List is potentially useful as a general reference for schemes such as QMAS, GEP and ASMTP. This section provides a more detailed description of QMAS.

QMAS has an annual quota of 1,000 and is operated under two points-based tests. An employment offer is not required. The objective of the scheme is to attract highly-skilled or talented persons to settle in Hong Kong and enhance Hong Kong's economic competitiveness. The selection process is undertaken on a regular basis, normally quarterly. It follows a three-step approach:

Step 1: Prerequisites
An applicant must fulfil a set of prerequisites to be eligible to apply to the scheme: age (18 or above); proof of financial capability to support and accommodate him/herself and dependants; no criminal record or adverse immigration record in Hong Kong; proficient in written and spoken Chinese (Putonghua or Cantonese) or English; a good educational background, normally a first degree from a recognised university; good technical/professional abilities and/or experience and achievements supported by documentary evidence may be considered.

Step 2: Points-based test
An applicant satisfying the above prerequisites can choose to be assessed under the General Points Test or Achievement-based Points Test:

- General Points Test scores (maximum 195 points): age (maximum 30 points); academic/professional qualifications[10] (maximum 70 points); work experience (maximum 55 points); language proficiency (maximum 20 points); and family background (maximum 20 points). The prevailing minimum pass mark as of May 2016 was 80[11]. This mark is subject to change from time-to-time without prior notice.
- The Achievement-based Points Test awards an applicant a full 195 points or 0 point. Points may be awarded if: the applicant received an award of exceptional achievement (e.g. Olympic medals, Nobel prize, national/international awards) and/or if his/her work has been acknowledged by industry peers or has contributed significantly to the development of his/her field (e.g. lifetime achievement award from industry).

Step 3: Further assessment of shortlisted candidates by the Advisory Committee on Admission of Quality Migrants and Professionals (the Advisory Committee)
The Advisory Committee currently comprises 22 official and non-official members appointed by the Chief Executive, including industry and government representatives:

- The Advisory Committee meets quarterly to recommend to the Director of Immigration how best to allocate the available QMAS quota by considering the sectoral mix of the shortlisted candidates, the socio-economic needs of Hong Kong and other relevant factors.
- The Advisory Committee is structured into 4 panels covering 15 industry sectors, with applications being reviewed by the relevant panel[12].

[10] Immigration Department may request an applicant to have his/her academic qualifications assessed by the Hong Kong Council for Accreditation of Academic and Vocational Qualifications at the applicant's own expense where necessary.
[11] Hong Kong Immigration Department http://www.immd.gov.hk/eng/services/visas/points-based-tests.html#lowest_pass
[12] The 4 panels of the Advisory Committee are: Panel 1, manufacturing, architecture, surveying, engineering and construction, information and technology and telecommunications sectors; Panel 2, financial and accounting services, legal services, logistics and transportation, and commerce and trade sectors; Panel 3, broadcasting and entertainment, catering and tourism, arts and culture, and sports sectors; and Panel 4, business support and human resources, academic research and education, human health and veterinary services and other sectors.

In recent years, QMAS quotas have been under-utilised. Since its introduction in 2006, only around 30% of the quota is used annually. Quite some applications simply did not meet the eligibility criteria; meanwhile, there have been enquiries to Immigration Department (ImmD) as to which types of talent and professionals are in shortage in Hong Kong (and applicants from such background would likely be admitted).

2.2 Policy context

The process of drawing a Talent List is a result of the 2015 Policy Address (Paragraph 139) and the Population Policy Strategies and Initiatives Report (Paragraph 58) in which the HKSAR Government announced to "*Study, with regard to overseas experience, the feasibility of drawing up a talent list to attract, in a more effective and focused manner, high-quality talent to support Hong Kong's development as a diversified and high value-added economy*".

The TLWG was set up in April 2015 to take forward this policy initiative. The TLWG is convened by the LWB and comprises representatives of thirteen government bureaux and departments.

3 Review of overseas experience

3.1 Skill shortage lists as a tool for labour immigration – reviewed overseas experience

Most developed economies view skilled labour immigration as part of a wider strategy to support economic growth. Three types of models to labour immigration are apparent[13]:

- **Demand-driven models** see skilled immigration as a way to match labour shortages in specific occupations or regions. The selection is driven by employers who select the workers they need and cannot recruit domestically. Only those persons who meet the specific demand in the country are admitted as part of these schemes. For immigration schemes of this type, an offer from an employer is typically required in order to obtain a work permit (or equivalent). The main advantage of this model is that immigrants meet specific needs of local employers. A disadvantage of the model is the risk that employers manipulate the system and use it to access cheaper labour. At the same time, immigrants might not be able to respond to labour market changes (their skills are relevant to one employer, but might not be portable).
- **Supply-driven, or human capital models,** aim to attract and admit high-skilled immigrants based on the assumption that their talent will put them in a favourable position in the labour market and they will therefore be an asset for the economy. The selection is driven by governments and aims to attract immigrants that 'add value' and 'innovation' to the economy. The applicants are not necessarily linked to one employer and, in theory, have the capacity to adapt to the evolving needs of the economy. For immigration schemes of this type, an employment offer is not necessary. The main disadvantage of traditional human capital models is that the immigrants arrive without job offers and there is no guarantee they will find jobs relevant to their skills.
- **Hybrid models** combine features of both demand-driven and supply-driven models. Hybrid models prioritise employer demand while assessing the skills and added value that immigrant brings to the wider economy (not only relevant to one employer). The majority of countries under review use some version of a hybrid model, but the balance between supply and demand elements differs (i.e. the United Kingdom and New Zealand).

Skills shortage lists can be used as a policy tool for selection of immigrants. They can be seen as a gatekeeping mechanism. Their purpose is to ensure that people who do not relate to one of the occupations on the list have to satisfy more stringent conditions to be admitted to the country, thus encouraging employers to seek domestic labour first. This seems to alleviate the fear of misusing the systems for cheaper labour common to pure demand driven models. Such lists can also be one way of narrowing down the broad category of 'highly qualified', which in itself does not guarantee that the applicant who holds qualifications is relevant to the economy. This corrects for the disadvantage of the traditional human capital model by bringing in the demand component (i.e. relevance to the local labour market).

Six out of seven reviewed economies make use of, or have used, such skill shortage lists: Australia; Canada; New Zealand; Singapore; South Korea; and the United Kingdom. The United States does not use a list of shortage professions.

Skill shortage lists aim to identify foreign medium- or high-skilled talents (occupations) that would benefit the local economy. The basic idea behind skill shortage lists is that there is a shortage of local labour in occupations high in demand by employers and that foreign workers are well placed to meet

[13] Based on EMN Focussed Study. Determining labour shortages and the need for labour immigration from third countries in the EU, 2015. Accessed at http://ec.europa.eu/dgs/home-affairs/what-we-do/networks/european_migration_network/reports/docs/emn-studies/emn_labour_shortages_synthesis__final.pdf and 2011 Rethinking Points System and Employer-Selected Immigration, accessed at http://www.migrationpolicy.org/research/rethinking-points-systems-and-employer-selected-immigration

this labour shortage. For immigration applicants who qualify for one of the professions, the conditions for entry are facilitated (either for the individual or for the employer wishing to employ the person). It is further assumed, that only a market driven approach, based on job offers to foreign employees that pass labour market tests[14], is not effective or fit for the purpose of the scheme. In economic terms, skills shortage lists aim to correct for some imperfect information on the labour market. They compile information and prioritise labour demand shortages that cannot be solved locally. This information is also available to potential labour supply (workers in relevant occupations worldwide).

In order to analyse the selected overseas skill shortage lists, the labour market shortages are categorised according to the following typology:

- **Current or short-term shortages:** Existing and expected labour market shortages over the next 2 years;
- **Medium-term shortages:** Expected labour market shortages over the next 3 to 5 years; and
- **Long-term shortages:** Expected labour market shortages over the next 5 to 10 years.

Skill shortage lists aim to address current (0 to 2 years) to medium-term (3 to 5 years) shortages on labour markets in Canada, New Zealand and the UK. The reasons for focusing on current to medium-term shortages are:

- The applicant needs to find a position in the labour market at the time of application, hence the need to capture current needs;
- To avoid that persons come in and find themselves unemployed in medium-term, countries aim to identify those professions where the current shortage is likely to last over the forthcoming years; and
- It is very difficult to make long-term forecasts in this area, particularly at the level of professions. That is why most countries do not aim to capture long-term trends, except New Zealand and Australia.

Based on the case studies, one disadvantage of lists focused on current labour shortages is that they are not sufficiently responsive to changes in the labour market. There is a lag between identifying current shortage and attracting potential immigrants to fill this shortage. Australia first piloted a skill shortage list (Migration Occupations in Demand List (MODL)) with a short-term focus in 1999. The list was revoked in 2010 after a review concluded that it was an inefficient tool to address short-term (0 to 2 years) skill shortages, because of the lag time between identifying the skill shortage and the decision making of the potential immigrants. Australia's reintroduced Skilled Occupations List (SOL) since 2010 now has a medium- to long-term (5 to 10 years) focus.

One way that administrations try to tackle the time lag drawback is by focusing on continuity (i.e. no big changes in occupations from year-to-year). The UK administration[15] notes that its SOL is an objective representation of national shortages, but that the shortages may develop rapidly in unforeseen ways and that using the shortage list as the only route for skilled immigration (i.e. removing the option based on employment offer and labour market test) may cause insufficient supply of skilled labour in certain, unforeseen and local situations.

Some skill shortage lists aim to address medium- (3 to 5 years) to long-term (5 to 10 years) or strategic labour market shortages, such as the lists used in Australia, New Zealand, and Singapore. The strategic component of such lists seems to be achieved by allowing different government bureaux to propose occupations/professions to feature on the lists based on policy priorities (i.e. in the case of Australia and Singapore). This provides the government with some discretion and ability to align its national interest and strategic considerations with the policy tool. Whereas these long-term or strategic labour market shortages lists seem to correct for some disadvantages of short- to medium-term focused lists

[14] Labour market tests normally determine whether suitably qualified local workers are available, or could be easily trained to do the work and should be offered the employment rather than an overseas worker.

[15] Views represented by The Migration Advisory Committee (MAC) who administrates and updates the UK SOL.

(i.e. the problem of lag), there is currently little evidence on their effectiveness (such evidence could not be collected).

Based on the above, we may conclude that the lists seem to tackle structural shortages of the economy (i.e. shortages that are persistent and have been there for a long time) but are not a good tool to tackle seasonal, short-term or new shortages of the economy.

Other potential disadvantages of skill shortage lists are:

- Developing a list of shortage professions at the federal or national level in large countries with highly-diversified labour markets might not be relevant to local labour markets. The immigration schemes are typically a federal competence, however in large countries there may be very different shortages from one territory to another.
- The resources needed to administer and update the shortage list compared to the volume of applications that go through the list. Several of the shortage lists analysed are underpinned by sophisticated analytical and consultation processes (e.g. Australia, the UK and New Zealand) which are justified by the high number of applicants that go through these schemes (e.g. Australia, New Zealand), the economic situation of the countries (i.e. local population facing unemployment – e.g. UK) and the choice of political priorities (more restrictive system versus an open system).

Alternative approaches to shortage lists are:

- Labour market tests are used as an alternative – making sure that the employers provide evidence of having advertised the position for a certain period of time before making an offer to a foreign candidate. The problem is that this can be quite a lengthy process and mean that employers have to carry out additional procedures. Furthermore, this approach is not applicable in case the country wishes to have a more human capital-based policy and admit immigrants without a job offer.
- A pure supply-driven human capital approach based on level of qualification and other criteria related to excellence. Countries adopting a human capital approach focus on highly-qualified or highly-achieving individuals rather than persons in specific professions. The challenge with this approach is that level of qualification is a very broad criterion and it can be insufficient to ensure that the applicants actually find employment.

Some of the analysed countries (Canada, Singapore and South Korea) have moved away from the use of a shortage list (or are considering a revision) and prefer a combination of the above approaches.

The remaining sub-sections will analyse differences in context and use of skill shortage lists, how they are drawn up and updated, and who is involved in this process, as well as what kind of professions feature on these lists. Six skill shortage lists identified in the six countries provide the focus of the review (see Table 3.1).

Table 3.1 Country, skill shortage list under review and its aim and focus

Country	Name of the skill shortage list under review	Aim of the list	Focus of the list in terms of labour market shortages
Australia	Skilled Occupations List (SOL)	To identify occupations that would benefit from independent skilled immigration to meet the medium to long-term skill needs of the Australian economy	Medium to long-term shortages
Canada	Revoked Priority Occupational List (POL)	To better align the labour market needs with the immigration system and to reduce the overall number of new applicants	Current to medium-term shortages
New Zealand	Essential Skills In Demand Lists (ESIDs): ■ Long-term Skill Shortage List (LTSSL); ■ Immediate Skill Shortage List (ISSL) ■ Canterbury Skill Shortage List	To align immigration policy to labour market demand	Current shortages (ISSL), Long-term shortages (LTSSL), Geography specific shortages (Canterbury List)
Singapore	Revoked Strategic Skills-in-Demand List (SSL)	To signal strategic and/or in-demand occupations in Singapore to locals and foreigners.	
South Korea	List of occupations eligible under E-7 visa scheme	To meet changing demand from employers for foreign professional workers	Current shortages
United Kingdom	Shortage Occupation List (SOL)	To encourage immigration from skilled professionals worldwide in occupations where UK faces shortages	Current shortages, Geography specific shortages (Scotland only)

Note: For areas shaded, information is not available.

3.2 Brief context and history of skill shortage lists

The skill shortage lists in scope of the review were introduced from 2003 to 2010. They can be described as 'second wave' skill shortage lists, since similar lists were used in, for instance, Canada and New Zealand in the 1970s and 1980s before these countries moved towards a human capital model until the late 1990s and finally adopted the hybrid models observed today.

Most of the lists are used in the context of schemes that are one of the main routes for labour immigration into the country. As such, the lists are used in the context of large-scale schemes that admit some 18 to 70 thousands immigrants per year.

Skill shortage lists are used within both temporary and long-term work/residency schemes.

Table 3.2 Skill shortage list, year of introduction, name and characteristic of the immigration scheme where the list is used

Country (List)	Year of introduction	List is used as part of Scheme	Number of persons who have been admitted by the Scheme (last year available)	The Scheme is the main route for labour immigration in the country	The Scheme is a route to long-term/ permanent work permit /residence
Australia (SOL)	(1999 – 2010) 2010	The Skilled Independent Migration Scheme	44,000 (2014/15)	✓	✓
Canada (POL)	2008 to 2014	Federal Skill Worker Program	67,485 (2014)	✓	✓
New Zealand (ESIDs)	2003	Essential Skills Stream, Skilled Migrant Category, Work to Residence	30,687 (2015)	✓	o
Singapore (SSL)	2007 to 2013				
South Korea (E-7)		E-7 Scheme for high Skilled Foreign Talent in Targeted Occupations	17,451 (2012)	✓	×
United Kingdom (SOL)	2008	Tier 2 (General)	17,375 (2014) Of which through the shortage list 8% (2015)	×	o

Note: For areas shaded, information is not available.

Legend: ✓Yes, × No, o both Yes and No

3.3 How are skill shortage lists used in practice

The overseas skill shortage lists are/were used in three different ways:

1. As the primary eligibility criteria before an application is processed for a work or residency permit for applicants and no employment offer is required;

   This approach is more typically used in countries with an open approach to immigration and which are traditionally actively 'recruiting' labour from abroad. It also seems to be used in the context of permanent immigrations schemes.

2. Practicing an occupation on the list gives bonus points under a points-based system with or without an employment offer;

3. As a replacement for labour market tests for applicants with employment offers. Labour market tests are usually used in demand-led systems in countries that, at the same time, face unemployment among certain parts of the population. The test determines whether suitably-qualified local workers are available, or could be easily trained to do the work and should be offered the employment rather than an overseas worker.

Table 3.3 Skill shortage lists and how are they used in practice

Country (List)	Is a primary eligibility criteria for applicants **and no employment offer is required**	Gives bonus points under a points based system to applicants **with or without** an employment offer	Is substitute for labour market test for applicants **with** an employment offer
Australia (SOL)	✓		
Canada (POL)	✓		
New Zealand (ESIDs)		✓	✓
Singapore (SSL)			
South Korea (E-7)		✓	
United Kingdom (SOL)			✓

Note: For areas shaded, information is not available

3.4 Applied methodologies to draw up and update lists of shortage professions

Lists of shortage professions are drawn up and updated based on a combination of quantitative and qualitative methods. The process involves close collaboration between public authorities and employers:

- Quantitative top-down methods of labour market shortages provide the starting point for drawing up the lists of shortage professions in the case of the UK SOL and Canadian revoked POL. In the case of New Zealand's ESIDs and Australia's SOL, quantitative methods complement the identified occupations put forward by employers or the government. Quantitative analysis consists of available secondary data sources. Common analysis includes: educational requirements and trends in employment, earnings and other indicators of labour shortages. This analysis is usually based on national-level census or (labour force) survey data and is performed at the most detailed level available (4 or 5 digit level) of the respective national occupational classification. All countries under review have good national labour force data, which is occasionally complemented by quantitative data provided by stakeholders.

While quantitative analysis is often the first level of analysis, or is performed early on in the process of drawing up skill shortage lists, none of the countries under review consider it sufficient alone.

- Qualitative bottom-up methods complement the quantitative analysis. In the case of New Zealand's ESIDs, the preliminary list of shortage professions is initially drawn up based on occupations put forward by employers or employers' representatives. In the case of Australia's SOL, the first screening includes submissions from Government departments based on their policy priorities. In the cases of the UK SOL and the Canadian revoked POL, the preliminary list of shortage professions drawn through a quantitative top-down approach is adjusted (occupations are removed or added) if stakeholders provide sufficiently strong qualitative evidence. Examples of qualitative information used to generate the list of shortage occupations are formal licencing requirements, judgements of work experience and innate ability to perform the occupation.

Qualitative data is mostly gathered through a stakeholder consultation process. In an effort to standardise the stakeholder consultation process and to collect tailored data, all countries under analysis invite stakeholders to provide evidence of shortages during formal calls for evidence using pre-defined templates.

- Qualitative top-down methods enable the government and its different policy ministries to propose strategic, policy driven occupations/professions to feature on the lists of shortage professions. The responsible government agency or ministry for drawing-up shortage lists invites the government agencies/ministries to submit their proposals for further assessment. Such top-down qualitative methods are observed in Australia and Singapore.

In order to be in consideration for inclusion on the list, occupations need to be skilled and there needs to be evidence of a shortage. This is the case in all countries under analysis. What differs across countries are the indicators used to assess these two criteria, as shown in Table 3.4.

Indicators used to determine whether an occupation is in shortage tend to focus on recent and estimated future development of local labour supply (i.e. number of local workers and recent graduates in this occupation) versus local labour demand (i.e. employment growth, number of vacancies and number of people that will soon retire from occupation). They also take into account trends in foreign supply – number of immigrants that are already working in the country and meeting the local demand in this occupation. Taken together these indicators can show if there is indeed a gap between local supply and local demand, whether that gap is likely to persist in the future, and whether foreign workers can meet the gap.

Indicators used to determine whether an occupation is skilled, tend to focus on the time required to train or get educated in the occupation and value added (as proxied by salary level). If it takes significant time to train or get educated in the occupation, then investment in local talent cannot meet the shortage in short- to medium-term (1 – 5 years). In other words, increasing the number of local students that pursue education or training in the shortage professions will not meet the local demand in time. Salary level helps measure the value added of the occupation to the economy and some countries use it to measure if the occupation is skilled.

Table 3.4 Indicators used to identify skilled shortage occupations by country

Country	Indicators measuring shortage of occupation	Indicators measuring skilled occupation
Australia (SOL)	Historical employment growth, Projected employment growth, Proportion of workers aged 55+, Labour turnover, Occupational unemployment rate, 12 month change in internet vacancies, University Graduate earnings, Graduate earnings growth, Employed graduates working full-time (proportion), Employed graduates working full-time growth (%), University graduate full-time hours worked per week, Change in university graduate full-time hours worked per week, Domestic student completion growth[16]	Long lead time, high skill use
Canada (POL)	Shortage occupations according to the Canadian Occupational Projection System (COPS) are those occupations for which projected demand (estimated on the basis of increase in labour demand retirements, emigration, and projected job openings) is higher than supply (school leavers, immigration, projected job seekers)	Skill level A (management occupations and occupations usually requiring university education) and B (occupations usually requiring college education or apprenticeship training) according to National Occupational Classification (NOC)
New Zealand (ESIDs)	Estimated NZ job seekers (supply), Annual increase in vacancies, Work visa approvals in previous 12 months, Employment growth in last 5 years and last 12 months, employment forecast and forecast of net replacement demand, Likelihood of the shortage being long-term: i) annual average employment growth in last 5 years; ii) training time required; iii) United Kingdom and Australian listings (the occupation is listed on both the	Level 1-3 on ANZSCO skill level classification

[16] Per cent average annual change in domestic bachelor completions towards this occupation.

Country	Indicators measuring shortage of occupation	Indicators measuring skilled occupation
	Australian (competitor) and United Kingdom (source of immigration) lists)	
Singapore (SSL)		
South Korea (E-7)		
United Kingdom (SOL)	Employer-based indicators (e.g. reports of shortage), price-based indicators (e.g. earnings growth), volume-based indicators (e.g. employment or unemployment), and other indicators of imbalance based on administrative data (e.g. vacancy duration or vacancy/unemployment ratios)	Typical earnings or ranges of earnings in the job title, proportion of workforce qualified at various levels (particularly at NQF6+), compulsory level or duration of on-the-job training or experience to become a skilled practitioner, required level of innate ability

Note: For areas shaded, information is not available.

Occupations are not necessarily automatically added or removed from the lists if there is evidence of a skill shortage. The final decision to include or remove an occupation from the list is commonly taken after an assessment of sensibility – providing the government with discretion in relation to removing or adding particular occupations on the grounds of strategic considerations, protecting national workers or other national interest, as shown in Table 3.5.

Table 3.5 Discretion with regard to occupations' final inclusion in the list

Country	Criteria/considerations NOT to include occupations
Australia (SOL)	■ The occupation is likely to be in surplus in the medium- to long-term; ■ There are other more appropriate and/or specific visa options
Canada (POL)	■ Occupation requires specific Canadian experience, e.g. for jobs in public sector management, judge, etc.
New Zealand (ESIDs)	■ List needs final confirmation by Minister who partly bases his or her decision on employers' commitment to fully use domestic workforce first
Singapore (SSL)	
South Korea (E-7)	■ The Ministry of Justice has the statutory authority in deciding which occupation should be listed under the E-7 visa scheme
United Kingdom (SOL)	■ There are feasible alternatives to employing immigrants in response to shortages, such as: – training of existing workforce, – innovation and productivity growth

Note: For areas shaded, information is not available.

Lists of shortage professions are updated regularly: once every year in the case of Australia, Canada and New Zealand and once every two to three years in the case of the UK and Singapore, following the availability of new labour market data and enabling the government to set new priorities or to react to new political realities. The updating process usually comprises a review of all occupations on the list. However, partial reviews were noted in the UK, where the government commissioned several ad hoc reviews targeting specific industries with a risk of sudden shortages.

Table 3.6 provides a comprehensive overview of the methodologies used by different economies for drawing up their lists of shortage professions.

Table 3.6 Descriptive overview of methodologies to draw up and update lists of shortage professions

Country	Quantitative analysis	Qualitative analysis	Criteria and indicators used to add occupations/professions on the list	Data sources	Main actors	Final decision of inclusion	Updating frequency
Australia (SOL)	Yes	Yes	**First step:** Long lead time, high skill use, high risk for economy,[17] high quality information available **Second step (if high quality information plus two out of long lead time, high skill use, and high risk apply):** Historical employment growth, Projected employment growth, Proportion of workers aged 55+, Labour turnover, Occupational unemployment rate, 12 month change in internet vacancies, University Graduate earnings, Graduate earnings growth, Employed graduates working full-time (proportion), Employed graduates working full-time growth (%), University graduate full-time hours worked per week, Change in university graduate full-time hours worked per week, Domestic student completion growth	Quantitative: ■ Census ■ Labour Force Survey ■ Graduate survey ■ Department of Employment projections ■ Department of Employment Internet Vacancy Index Qualitative: ■ Stakeholder input ■ Government data on licence requirements, etc.	■ Department of Education and Training ■ Stakeholders	■ Indicators are considered together rather than separately; ■ Benchmarks are used as reference only, but do not strictly need to be passed; ■ Occupation NOT included if: – The occupation is likely to be in surplus in the medium- to long-term; or – There are other more appropriate and/or specific visa options	Annually
Canada (POL)	Yes	Yes	List of occupations projected to be at risk of shortage by Canadian Occupational Projection System (COPS) Results from forecasting activities of the provinces and territories using different methodology Analysis of the Citizenship and Immigration Canada (CIC) backlog of applications whether supply of	COPS: ■ Labour Force Survey Other: ■ Regional forecasts ■ Pre-2008 Application data	■ Department of Employment and Social Development (producing COPS) ■ Citizenship and Immigration Canada (CIC)	■ The stronger the evidence from the provinces, the more likely the federal forecasts (the list) will be adjusted ■ As a final step, the 'sensibility' criteria is applied, withdrawing from the POL particular occupations that required	Annually

[17] "High risk for economy" means "*where disruption caused by skills being in short supply imposes a significant risk to the Australian economy and/or community. This criteria looks at: whether the occupation has licensing and registration requirements; if the absence of a particular occupation means that a business cannot operate legally; or if the occupation is of particular importance in meeting government policy priorities*".

Country	Quantitative analysis	Qualitative analysis	Criteria and indicators used to add occupations/professions on the list	Data sources	Main actors	Final decision of inclusion	Updating frequency
			occupations in the applications inventory could meet the projected labour market demand		■ Governments of the Provinces and Territories	specific Canadian experience (e.g. public sector management, judge, etc.)	
New Zealand (ESIDs)	Yes	Yes	Employers are invited to propose changes to the list. Proposed occupations must meet three requirements: Occupation must be skilled: Level 1-3 on ANZSCO skill level classification Occupation must have sufficient scale: 2,000 workers in occupation or at least 50 visa approvals in previous 12 months Occupation must have shortage: Estimated New Zealand job seekers (supply), Annual increase in vacancies, Work visa approvals in previous 12 months, Employment growth in last 5 years and last 12 months, employment forecast and forecast of net replacement demand, Likelihood of the shortage being long-term: i) annual average employment growth in last 5 years; ii) training time required iii) United Kingdom and Australian listings (the occupation is listed on both the Australian (competitor) and United Kingdom (source of immigration) lists	Quantitative: ■ Labour Force Survey ■ Jobs Online Index (Monitor of 3 major online vacancy databases) Qualitative: ■ Employer/ stakeholder evidence (incl. surveys)	■ Ministry of Business, Innovation and Employment ■ Stakeholders	■ A Preliminary Indicator Evidence Report (PIER) is drawn up on the basis of initial evidence ■ The MBIES then invites stakeholders to comment on the PIER and provide further evidence ■ The final decision is taken by the Minster of Immigration for long-term shortages (permanent residency) and Department of Labour for short-term shortages (temporary work visa) ■ A new occupation is only added to the lists after confirming not only the labour shortages in that occupation, but also that the industry has committed to fully utilise the domestic labour force first	Annually
Singapore (SSL)	Yes	Yes	The Ministry of Manpower (MOM) received inputs from various industry bodies which frequently consulted industry. Industry would assess shortage skills and skills that were strategic for economic growth and propose them to MOM MOM would then shortlisted occupations based on: high value added, specific skill set requirements and existing local workforce gap		■ MOM is the main body in charge of monitoring, updating and managing the list ■ Industry bodies	■ MOM relied on inputs from various industry bodies which frequently consulted industry. They would assess shortage skills and skills that were strategic for economic growth and propose them to MOM	2 – 3 years

Country	Quantitative analysis	Qualitative analysis	Criteria and indicators used to add occupations/professions on the list	Data sources	Main actors	Final decision of inclusion	Updating frequency
South Korea (E-7)					■ Ministry of Justice administrates the scheme; ■ Inter-ministerial advisory committee	■ The Ministry of Justice has the statutory authority in deciding which of the occupations is included in the E-7 visa scheme and is not obliged to follow the recommendations of the inter-ministerial advisory committee	Not clearly defined
United Kingdom (SOL)	Yes	Yes	Indicators that occupation is skilled: Typical earnings or ranges of earnings in the job title, proportion of workforce qualified at various levels (particularly at NQF6+), compulsory level or duration of on-the-job training or experience to become a skilled practitioner, required level of innate ability Indicators that occupation has shortage: employer-based indicators (e.g. reports of shortage), price-based indicators (e.g. earnings growth), volume-based indicators (e.g. employment or unemployment), and other indicators of imbalance based on administrative data (e.g. vacancy duration or vacancy/unemployment ratios)	Quantitative: ■ Annual Survey of Hours and Earnings (ASHE) ■ Labour Force Survey (LFS) ■ Job Centre Plus (JCP) vacancy claimant data ■ Employer Skills Survey (ESS) ■ Any quantitative data provided by stakeholders Qualitative: ■ Any qualitative data provided by stakeholders	■ The Migration Advisory Committee (MAC) comprised of economists and immigration experts ■ Home Office	For each of the occupations which fulfil the skilled and shortage criteria, the MAC considers the sensibility of including them on the list by asking whether there are feasible alternatives to employing immigrants in response to shortages (e.g. training of existing workforce, innovation and productivity growth). This decision is supported by contextual quantitative indicators, for example on employers' investment in training, extracted from national data sources or provided by stakeholders	Upon request by the government. MAC recommends bi-annually

Note: For the purpose of this section, quantitative analysis refers to the analysis of quantitative indicators using large scale national census or survey data. Qualitative analysis comprises both the analysis of qualitative information such as occupations' formal licencing requirements and the analysis of indicators similar to quantitative indicators (e.g. average earnings) but based on less robust, small scale data, e.g. provided by stakeholders

For areas shaded, information is not available.

Source: ICF on the basis of desk research and interviews

3.5 Characteristics of final lists of shortage professions

All final lists of shortage professions under review are based on the respective national occupational classifications, as relevant data is readily available from national labour force surveys. Only in the case of UK SOL does the list go beyond the level of detail included in the UK Standard Occupational Classification (SOC 4 digit level). Job titles within SOC 4 digit level professions eligible for skilled immigration are established by gathering detailed information from stakeholders.

The level of detail of information on the occupation provided to applicants differs across countries, but so does the level of detail of national occupational classifications (5-digit level in Australia and New Zealand, 4-digit level in Canada and UK) and the resulting need for clarifications.

Table 3.7 suggests that information on educational requirements and remuneration requirements are used as substitutes.

Table 3.7 Overview of final set-up of lists of shortage professions

Country	Number of professions on the list	Classification used	Description of profession	Includes information on remuneration	Includes information on qualification requirements
Australia (SOL)	190	Australian and New Zealand Standard Classification of Occupations (ANZSCO)	A one-sentence ANZSCO definition is provided	No	Yes, mentions skill level and licencing/ registration requirements
Canada (POL)	50[18]	National Occupational Classification (NOC)	The NOC definition is provided, consisting of a 4 to 5 line definition, example job titles, a list of main duties and employment requirements	No	Yes, lists employment requirements including licencing requirements, and degree and years of work experience usually required
New Zealand (ESIDs - LTSSL)	77	Australian and New Zealand Standard Classification of Occupations (ANZSCO)	Only occupational title	No	Yes, lists name of NZ qualification (or equivalent) and level of NZ qualification framework which enables applicant to claim bonus points. For example: Bachelor of Forestry Science with Honours (NZQF Level 8)
Singapore (SSL)	99		Only occupational title	No	Yes, lists applicable degrees and professional certificates
South Korea (E-7)	82	Korean Standard Classification of Occupations	Only occupational title		No
United Kingdom (SOL)	130 job titles within 35 professions	UK Standard Occupational classification	Name of SOC 4 digit level and precise job title	Yes, separate for new entrant and experienced worker	No

[18] In 2014, each year has a different number of professions.

Note: LTSSL = Long-term Skill Shortage List. For areas shaded, information is not available

Source: ICF on the basis of desk research and interviews.

Occupations are not fully comparable across different lists since they are defined based on different classifications. However, some degree of comparison is possible when aggregating occupations to occupational groups at the 2-digit level of national classifications[19] as presented in Table 3.8. The table indicates that occupations related to health and engineering occupations feature on all lists, often at both the professional and associate professional/skilled trade level, but that shortages also exist in a wide range of other occupational groups.

The reason for health occupations to feature on top of all reviewed lists seems to indicate longer-term structural problems associated with these economies. All are subject to an ageing population with an increasing demand for health services.

Table 3.8 Top 10 occupational groups according to number of occupations, by country

Country (List)	2-digit level occupational group (no. of occupations/% of total)[20]
Australia (SOL)	1. Health Professionals (61 occupations - 32%) 2. Design, Engineering, Science and Transport Professionals (35 occupations – 18%) 3. Automotive and Engineering Trades Workers (15 occupations – 8%) 4. Construction Trades Workers (15 occupations – 8%) 5. Specialist Managers (9 occupations – 5%) 6. Electrotechnology and Telecommunications Trades Workers (9 occupations – 5%) 7. Business, HR and Marketing Professionals (8 occupations – 4%) 8. ICT Professionals (8 occupations – 4%) 9. Legal, Social and Welfare Professionals (8 occupations – 4%) 10. Engineering, ICT and Science Technicians (8 occupations – 4%)
Canada (POL)	1. Professional occupations in natural and applied sciences (9 occupations – 18%) 2. Technical occupations related to natural and applied sciences (6 occupations – 12%) 3. Professional occupations in health (except nursing) (6 occupations – 12%) 4. Specialised middle management occupations (5 occupations – 10%) 5. Professional occupations in business and finance (5 occupations – 10%) 6. Technical occupations in health (5 occupations – 10%) 7. Middle management occupations in trades, transportation, production and utilities (4 occupations – 8%) 8. Senior management occupations (2 occupations – 4%) 9. Administrative and financial supervisors and administrative occupations (2 occupations – 4%) 10. Professional occupations in nursing (2 occupations – 4%)
New Zealand (ESIDs)	1. Design, Engineering, Science and Transport Professionals (25 occupations – 32%) 2. ICT Professionals (25 occupations – 27%) 3. Health Professionals (16 occupations – 21%) 4. Engineering, ICT and Science Technicians (4 occupations – 5%) 5. Specialist Managers (4 occupations – 5%) 6. Electrotechnology and Telecommunications Trade Workers (2 occupations – 3%) 7. Automotive and Engineering Trades Workers (2 occupations – 3%) 8. Legal, Social and Welfare Professionals (1 occupation – 1%) 9. Business, HR and Marketing Professionals (1 occupation – 1%) 10. Food Trade Workers (1 occupation – 1%)
Singapore (SSL)	1. Information Communication and Digital Media (34 occupations – 34%)

[19] National classifications organise occupations into a clearly defined set of groups according to the tasks and duties undertaken in the job. The highest grouping or 1-digit level usually referred to as major group breaks down to categories such as 1-Managers, 2-Professionals, 3-Technicians and associate professionals etc. 2-digit level grouping is a further breakdown of a major group into sub-major groups. For instance major group 2-Professionals breaks down to 21 – Science and engineering professionals, 22 – Health professionals, 23 – Teaching Professionals etc. It is not clear if occupations on the SSL list followed a national classification – occupations were aggregated into eight key industries.

[20] Except for Singapore where occupations were aggregated into eight key industries.

Country (List)	2-digit level occupational group (no. of occupations/% of total)[20]
	2. Healthcare (18 occupations – 18%) 3. Construction (13 occupations – 13%) 4. Finance (9 occupations – 9%) 5. Tourism / Retail (9 occupations – 9%) 6. Manufacturing-Aerospace and Marine & Offshore (6 occupations – 6%) 7. Manufacturing-Chemicals and Biomedical (5 occupations – 5%) 8. Manufacturing-Electronics and Precision Engineering (5 occupations – 5%)
South Korea (E-7)	
United Kingdom (SOL)	1. Science, Research, Engineering and Technology Professionals (67 job titles – 52%) 2. Health Professionals (21 job titles – 16%) 3. Culture, Media and Sports Occupations (17 job titles – 13%) 4. Health and Social Care Associate Professionals (8 job titles – 6%) 5. Corporate Managers and Directors (5 job titles – 4%) 6. Textiles, Printing and Other Skilled Trades (4 job titles – 3%) 7. Business, Media and Public Service Professionals (2 job titles – 2%) 8. Skilled Metal, Electrical and Electronic Trades (2 job titles – 2%) 9. Science, Engineering and Technology Associate Professionals (2 job titles – 2%) 10. Teaching and Educational Professionals (1 job title – 1%) and Business and Public Service Associate Professionals (1 job title – 1%)

Note: Percentages are calculated using the number of listed occupations of this occupational group out of total number of occupations on the list. Health includes medicine and nursing. For areas shaded, information is not available.

Source: ICF based on desk research

3.6 What works well and challenges encountered

Regular, clear and robust methods to draw up and update lists of shortage professions are reported to work well:

- Stakeholders in Australia, New Zealand and the UK noted that having a clear and transparent methodology and the most up-to-date information to determine labour market shortages made the approaches effective;
- In addition, consultation with external stakeholders (i.e. employers) when drawing up and updating lists of shortage professions ensures stakeholder buy-in.

However, some challenges are encountered:

- Updating lists of shortage professions can be resource intensive, as noted in the cases of Australia and New Zealand;
- The removal of occupations from the list can create negative feedback from industry. If occupations are not removed, the lists can become outdated, as noted in the case of South Korea;
- Canada reportedly faced difficulties in ensuring that immigrants admitted through POL met the labour market demand in practice;
- Stakeholders in South Korea noted that many of the workers entering through E-7 scheme are ordinary workers rather than high-skilled experts in specific fields; and
- In the UK, the SOL is not widely used, which consequently impacts its effectiveness in steering immigration towards listed occupations.

Table 3.9 Identified strengths and weaknesses on overseas occupational shortage lists

Country	What works well	Challenges encountered
Australia (SOL)	■ Clear and transparent methodology to identify occupations that would benefit from migration to meet medium- to long-term skill needs in Australia ■ Employer views can be put forward through stakeholder consultation	■ Annual reviews may be a cumbersome exercise - the review process typically begins three months after the last list is published
Canada (POL)	■ The visa eligibility was limited to sectors with specific demands which reduced the number of new visa applicants and freed capacity	■ Difficult to ensure that admitted immigrants met the labour market demand in practice. The CIC could not guarantee that a skilled immigrant would necessarily find a job/employer in the sector needed ■ Lack of transparency on how the final selection of candidates scoring high in the ranking system is done
New Zealand (ESIDs)	■ Annual review and updating of the lists works well and ensures ESIDs are based on the most up-to-date information ■ Consultation with external stakeholders also allows for sector input and ensures buy-in for the lists from important sector groups. Industry stakeholders are reportedly very active and satisfied with the list as it provides certainty and speed with respect to work visa applications	■ The removal of occupations from the lists often attracts negative feedback from employer groups ■ The lists could be better used for the purpose of training and education policy ■ The assessment process can be difficult and time-consuming if applicant profile does not directly align with occupations on the lists; and ■ Updating of the lists is resource intensive
Singapore (SSL)		
South Korea (E-7)		■ Many of the workers entering through E-7 scheme are ordinary workers rather than high-skilled experts in specific fields ■ The number of occupations included in the E-7 visa scheme increases over time as new occupations are added and occupations cannot be removed
United Kingdom (SOL)	■ Robust methodology to determine national shortages	■ Low use and, consequently, not an effective mechanism to steer immigration towards listed occupations

Note: For areas shaded, information is not available.

3.7 Other approaches to target foreign exceptional talent or professionals in strategic sectors

Two other approaches are identified within the case studied economies which aim to target foreign exceptional talent or professionals in strategic sectors:

- **Visa category targeting exceptional talents:** Tier 1 of the UK immigration scheme is a visa category targeted at exceptional talents. Applicants under Tier 1 need to be endorsed as an exceptional talent (or emerging talent) by an accredited organisation in the UK (e.g. the Arts Council England) but do not need a job offer. The Tier 1 visa is restricted to certain fields such as science, engineering, humanities, medicine, digital technology, and arts but those fields are kept broad and are not regularly updated.

- **Future growth areas:** Under the Skilled Migrant Category scheme in New Zealand applicants can receive up to 10 bonus points if they qualify in one of the identified future growth areas. Future growth areas are industry areas that offer New Zealand considerable opportunity to increase its prosperity. Currently, New Zealand recognises three broad areas: Biotechnology; Information Communications Technology; and the Creative industries (Advertising, Software & Computing Services, Publishing, TV and Radio, Film and Video, Architecture, Design, Designer Fashion, Music and Performing Arts, Visual Arts). These identified future growth areas were included in the scheme in the early 2000s by the government based on economic analysis about growth industries that may give New Zealand a competitive advantage. They have not been reviewed since then and there is no updating mechanism in place to review these areas.

3.8 Lessons for Hong Kong

This section describes lessons for Hong Kong in light of the overseas experience. First, Table 3.10 gives a headline overview. This is followed by 13 preliminary lessons learned for the Hong Kong Talent List.

Table 3.10 Headline overview of Hong Kong context versus overseas trends and experience

	Hong Kong	Overseas trends and experience
Strategic Context	■ Open economy ■ Ageing population ■ Low unemployment rate (around 3% in recent few years)	■ Open economies ■ Ageing population ■ Low to medium unemployment rates[21] (from 3% in Singapore to 6.3% in the UK), but labour market structures vary
Type of Talent Schemes where the shortage list is used	■ Potentially useful for QMAS, which does not require an employment offer (and as a reference to other admission schemes)	■ Major routes to employment/residence permits with the exception of the UK[22] ■ Some schemes require an employment offer, others do not
Aim of Shortage List	■ To attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy ■ To increase transparency of the labour market situation or opportunities for potential talent	■ To address current and medium-term labour market shortages that cannot be addressed locally ■ A gatekeeping mechanism to make sure that immigration is controlled – it is a way of restricting access
Focus of the list in terms of labour market shortages	■ Constraints exist in terms of data availability for forecasting medium and long-term skills shortages quantitatively	■ Mainly short-term and medium-term shortages in existing sectors ■ Medium and long-term structural shortages in existing sectors

[21] Ibidem. Australia 6%, US 6.2%, New Zealand 5.6%, Korea 3.5% in 2014.

[22] In theory the SOL is used within the UK major route to employment (Tier 2) as one option but in practice less used than the labour market test.

	Hong Kong	Overseas trends and experience
Drawing up / updating of Shortage List	■ Current feasibility for a quantitative top-down approach is limited as the available territorial labour force data are not at a sufficiently granular occupational level. There is limited regular data on vacancies or forecasts on the evolution of employment at detailed occupational level; ■ Qualitative bottom up approach could be conducted through stakeholder consultations with relevant policy bureaux, enterprises and professional bodies	■ Quantitative top-down approach - all reviewed countries have good national labour force data and use it as one of the main sources of evidence to draw up shortage lists; ■ Qualitative bottom-up approach complements the quantitative approach. These are based on stakeholder consultations
Characteristics of the Shortage Lists	■ Hong Kong does not have a standard occupational classification for use across government bureaux/departments	■ All final lists of reviewed shortage professions are based on the respective national occupational classifications ■ Main professions on the lists include health care, engineering, ICT and science professionals

Lesson 1: Some occupational shortage lists overseas aim to indicate existing and medium-term structural labour shortages of the economy based on past trends in employment and recruitment

Skill shortage lists in Canada, New Zealand (ISSL) and the UK focus on existing and medium-term structural labour market shortages. Since the applicant needs to find a position in the labour market at the time of application, there is a need for the lists to capture current shortages. At the same time, to avoid that persons come in and find themselves unemployed in medium-term, the identified current shortages are likely to last for the next two to five years. As it is very difficult to make long-term forecasts in this area, particularly at the level of individual professions, most countries do not aim to capture long-term trends (i.e. 5 to 10 years), except New Zealand's LTSSL.

One disadvantage of lists focusing on current labour shortages is that it is difficult for them to be sufficiently responsive to changes in the labour market. There is a lag between identifying current shortages and attracting potential immigrants to fill those shortages. However, it seems that this disadvantage can be addressed by focusing on structural and medium-term shortages of the economy (i.e. shortages that are persistent and have been there for a long time).

Lesson 2: Some occupational shortage lists take into account the territory's strategic environment/development during the selection of occupations

Two reviewed lists (Australia's SOL and Singapore's SSL) include occupations that are put forward by the government for screening in order to align the lists with the territory's strategic environment/development or policy priorities:

- In Singapore, strategic occupations were based on input from various economic sector agencies who put forward strategic occupations for economic growth (i.e. occupations that were of high value-added, required specific skill sets and where the local workforce pipeline was not adequate);
- In Australia, the Department of Education and Training, responsible for managing and updating the occupational shortage list, reviews government department submissions and budget papers to determine government policy priorities.

Lesson 3: Some occupational shortage lists identify and signal foreign medium or high-skilled talents (occupations) that would benefit the local economy. They aim to ensure that immigrants who enter the country meet the labour market needs and thus have higher chances of contributing to the economy and growth

Skill shortage lists identify and signal foreign medium- or high-skilled talents (occupations) that would benefit the local economy. They aim to align immigration policy with labour market demand and sustainable economic development. Similarly, one of the aims of the Hong Kong Talent List is to identify and attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy.

To further attract professionals in specific high-priority occupations on the list, overseas recruitment campaigns can be organised by specialised recruitment bodies. However, such outreach methods were not covered by the case studies.

Lesson 4: In practice, occupational shortage lists are most often used in three different ways

Normally occupational shortage lists are used in one of the three different ways:

- As the primary eligibility criterion before an application is processed for a work or residency permit and where no employment offer is required
- As a criterion to assign bonus points under a points-based system
- As a replacement for labour market tests.

In several of the overseas cases analysed, occupational shortage lists are used as a gatekeeping mechanism to control and to at least partially restrict immigration (Australia, Canada, the UK and New Zealand) to ensure only the applicants who would highly probably contribute to the targeted fields of the economy would be selected.

Lesson 5: Updating mechanisms of occupational shortage lists overseas always include quantitative analysis based on national labour force data and existing analysis of labour market shortages. Often, quantitative analysis presents a first step towards drawing up occupational shortage lists

All reviewed countries have good detailed national labour force data and existing analysis of labour market shortages, including forecasts down to 4, 5 or even 6-digit occupational levels. Such detailed quantitative analysis is an important component of drawing up a list of shortage professions and often presents a first step of the process (e.g. the UK and Canada). Quantitative analysis is the main source of data on medium- to long-term trends.

However, Hong Kong lacks existing and relevant labour market data or/and analysis on skill shortages. Based on reviewed territorial statistics of Hong Kong and an interview with the Office of the Government Economist (OGE, formerly known as the Economic Analysis and Business Facilitation Unit), current statistics and forecasts on the Hong Kong economy and labour force are mainly conducted on a macro level and does not provide too much micro-level insight on occupations. Hence, existing territorial statistics are too broad to be used in a way observed in overseas case studies to devise the Talent List.

Lesson 6: The quantitative analysis of the updating mechanisms of occupational shortage lists is always combined with qualitative evidence from stakeholders or judgements made by the government about the suitability of a given occupation to figure on the list. Usually, the government sets up a formal consultation process and invites stakeholders to nominate occupations and provide evidence of shortage. The method observed in New Zealand may serve as a relevant reference for Hong Kong

In many cases studied, qualitative analysis and data gathering are conducted to narrow down the first list based on quantitative analysis of national data (i.e. Australian SOL, Canadian POL and UK SOL). However, a different method, which might fit the Hong Kong context, is observed in New Zealand. In New Zealand, the Ministry initiates a so-called Occupation Nomination Procedure where industry stakeholders (i.e. employers' groups, trade unions and industry training bodies) are invited to submit

proposals for an occupation to be included, removed or moved between the lists. After the proposals are received, the Department of Labour prepares a Preliminary Indicator Evidence Report which draws together evidence of skill level, scale and shortage for each occupation under review.

Lesson 7: Occupational shortage lists are drawn up based on indicators of level of skill and shortage. However, occupations are not automatically added or removed from the list. The final decision is commonly taken by the government based on a range of factors

All reviewed methods of drawing up occupational shortage lists assess occupations against two main criteria: skill and shortage. But the indicators used to assess these two criteria differ based on available evidence:

- Skill is usually measured by the time required to train or get educated in the occupation. If it takes significant time to train or get educated in the occupation, then investment in local talent is less likely to be able to meet the shortage in the short to medium-term (1 to 5 years). In some cases (i.e. the UK) salary levels are also used to indicate the level of skill;
- Shortage is measured by recent and estimated future development of local labour supply (i.e. the number of local workers and recent graduates in the occupation) versus local labour demand (i.e. employment growth, number of vacancies and number of people that will soon retire from the occupation). In some cases (i.e. New Zealand), trends in foreign supply are also considered (i.e. the number of immigrants already working in the country).

However, occupations are not automatically added or removed from the list even if there is evidence of both skill and shortage. The final decision to include or remove an occupation from the list is commonly taken after an assessment of sensibility. The criteria for such an assessment vary, with no common definition being apparent across the different countries. This provides the government with discretion in relation to removing or adding particular occupations on the grounds of the occupations' development potential, the territory's strategic considerations (e.g. whether the occupations to be included are beneficial to the sustainable development of the economy), protecting local workers or other territorial interests. Most of these grounds and criteria are explicitly set out for public inspection and discussion.

Lesson 8: Final lists of shortage professions under review are based on the respective national occupational classifications

Final lists of shortage professions are generally based on the respective national occupational classifications. Only in the case of UK SOL does the list go beyond the level of detail included in the national occupational classification to reference specific job titles that sit within each occupation. These are established in consultation with stakeholders, but the approach has been criticised by some employers as being too detailed. As a result, it seems that the Talent List should make use of the Occupation Index, but whether or not the granularity of occupations is fit for purpose should be further assessed.

Lesson 9: Final lists of reviewed shortage professions include a wide range of occupations. Health and engineering occupations feature on all lists

Overseas lists of shortage professions include a wide range of occupations and all industry sectors are considered in the process of drawing up the lists. Engineering and health occupations feature among the top ten professions on all reviewed lists. For instance, the prominence of the health sector indicates the longer-term structural problems of the economies: all are subject to an ageing population with an increasing demand for health services. At the same time, the inclusion of arts and cultural professions on the lists is rare.

Lesson 10: Occupational skill shortage lists are updated regularly, either annually or at least every two to three years

The occupational skill shortage lists in Australia, Canada and New Zealand have been updated each year, while those in the UK and Singapore have been updated every two to three years. The updating process usually comprises a review of all occupations on the list to ensure the list is up to date. If the occupations are not removed from the lists during the updating process, the list can become outdated. However, the removal of occupations from the list can create negative feedback from the industry, as noted in New Zealand and South Korea.

Lesson 11: Occupational shortage lists overseas are normally used within major routes to residency permits to justify the cost of the process

Most shortage lists analysed (except the SOL in UK) are used for immigration schemes that receive high numbers of applicants. Given the complexity of processes to design and update these lists, the cost effectiveness will be low if it is applied in small schemes with limited numbers of applicants.

The Hong Kong Talent List may be applied mainly on the QMAS, which is a minor route to a residency permit (around 2,000 applicants submit their application each year to QMAS). In comparison, the scale of application in Hong Kong is relatively smaller than the overseas examples that we have studied, where the skill shortage lists usually benefit 18,000-70,000 applicants that are admitted every year.

Lesson 12: Updating and maintaining a list of shortage professions can be resource intensive

A resource intensive updating mechanism was specifically noted in the case of New Zealand. Currently, the management of the updating process requires 0.5 FTE[23] of resources from the Ministry of Business, Innovation and Employment at a senior level and additional input from the labour market analysis, employers and other stakeholders involved spend additional resources to update the list through the public submission process. Lack of data and analysis at the required detailed level in Hong Kong indicates that the process to draw up and update the Talent List would need to be based on primary data collection. This process would need to be either qualitative in nature (similar to New Zealand) or/and would be very resource intensive and time consuming (in case surveys and forecasting methodologies are developed to monitor and predict labour market shortages).

Lesson 13: Some overseas economies also target foreign exceptional talents or professionals in strategic sectors through immigration policy, but use other approaches rather than occupational shortage lists

Two other approaches to attract overseas talent were identified: a separate visa scheme targeting exceptional talents similar to QMAS and bonus points for professions falling within future growth areas.

3.9 Potential Benefits of Setting up a Talent List for Hong Kong

The review of overseas experiences identified potential benefits of a Talent List for Hong Kong. Such Talent List could identify and signal foreign high-skilled talents that would benefit the Hong Kong economy and increase transparency and efficiency of some of the immigration schemes. The review also identified a number of challenges in the preparation, updating and implementation of a Talent List in Hong Kong. The Consultants recommend the HKSAR Government to consider adopting a Talent List in Hong Kong and to compare the potential benefits with the challenges and costs involved when the application of the Talent List is further defined.

[23] Full time equivalent.

4 Talent List for Hong Kong

4.1 The need and justifications for drawing up a Talent List for Hong Kong

Being a small city with limited natural resources, talent is one of the most important assets for the economic development of Hong Kong in the context of worldwide competition. On top of grooming local talent, it is necessary for Hong Kong to attract the best talent from around the world to maintain Hong Kong's competitiveness in the global market and to enhance knowledge and professional exchanges with the local talent.

Based on the overseas experience and the Hong Kong context there are several potential benefits for drawing up and using a Talent List in Hong Kong:

- A Talent List would be a first consolidated indicator of current to medium-term (0 to 5 years) territorial skill shortages and foreign talent needs. It would complement the policy objective to attract high-skilled talent to support Hong Kong's development towards a diversified and high value-added economy;
- A Talent List could be used to signal the type of talent Hong Kong needs;
- An occupation on the Talent List could be used as the primary eligibility criterion or a prioritised matter of consideration and could improve the efficiency of the QMAS application process; and
- A Talent List could be of reference to GEP and ASMTP.

4.2 Methodology to drawing up the Hong Kong Talent List (Assessment Criteria)

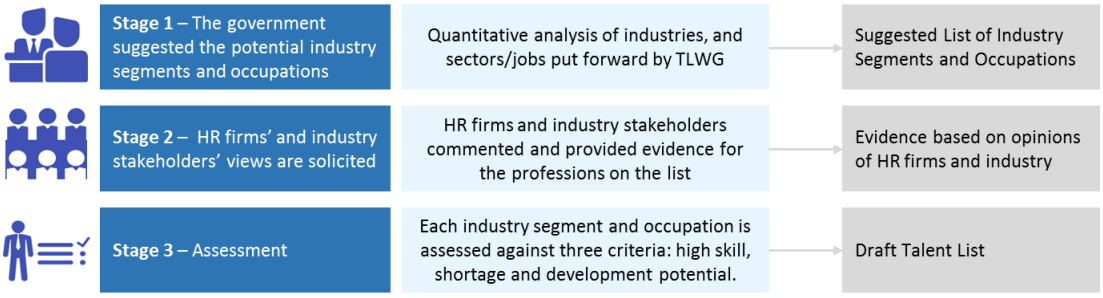
This section provides an overview of the methodology used to draw up the Draft Talent List presented in this Report.

The adopted methodology as endorsed by the TLWG was defined in Deliverable 1 – Detailed Work Plan and Programme of this Service. It also follows the Consultancy Brief, and the lessons learned and recommendations from Deliverable 2 – Report on Literature Review and Overseas Experience Study.

In summary, the methodology followed the three-stage approach presented in Figure 4.1:

- **Stage 1 – Top-down evidence gathering:** The Government suggested the potential industry segments and occupations for the Talent List for further study;
- **Stage 2 – Bottom-up evidence gathering:** more than 240 individuals from 20 HR companies and recruitment professionals and more than 70 industry stakeholders commented on and provided evidence relating to the professions on the list;
- **Stage 3 – Assessment:** Each of the suggested industry segments and occupations to be covered by the Talent List was cross-checked against three criteria: high skill requirement, evidence of shortage, and sensibility. The Talent List was drawn up based primarily on qualitative information gathered in Stage 1 and Stage 2.

Figure 4.1 Three stage approach for drawing-up a draft Talent List



Each of the three stages is further described in Sections 4.2.1 to 4.2.3.

4.2.1 Stage 1 – Top-down evidence gathering: The Government suggested the potential industry segments and occupations for the Talent List

As part of Stage 1, the TLWG identified a pool of potential professions and occupations to feature on the list. This stage was performed in three steps: quantitative analysis; qualitative analysis; and drafting of the Suggested List of Industry Segments and Occupations to be covered by the Talent List. Each of the three steps is described below.

4.2.1.1 Step 1.1 – Quantitative Analysis

Preliminary quantitative analysis was performed by the Office of the Government Economist based on the Census and Statistics Department(C&SD)'s territorial statistics on the value-added and vacancies in different industry segments for the year 2013. For each industry, average productivity was calculated as Value-Added divided by the Number of Persons Engaged (Employment). The average productivity of each industry segment was presented together with information on other indicators (vacancy rate, vacancy rate equal to or above the average, value-added growth equal to or above the average, whether it is a strategic sector).

Data sources used for the analysis were: the Annual Survey of Economic Activities (ASEA), the Quarterly Survey of Employment and Vacancies (SEV) and the Survey of Innovation Activities.

Table 4.1 below shows part of the quantitative analysis output – the top 20 ranked industry segments, based on average productivity. The main industry groups in the top 20 include financial services, information and communications, high value-added logistics, professional services, cultural and creative industries, and innovation and technology industries.

Table 4.1 Top 20 industry segments ranked by average productivity

Rank	Industry segment
1	1.1 Banking
2	1.3.1 Other financial services – Asset management
3	5.4.5 Cultural and creative industries – Television and radio
4	1.2 Insurance
5	7.4 Real estate activities
6	3.5.1 Shipbrokers
7	2.4 Convention and trade show organising services
8	5.2.3 Import/export trade – Other import/export trade
9	2.3 Inbound and outbound tourism – Cross boundary passenger transport services
10	3.1.3 Freight transport total – Air freight transport

Rank	Industry segment
11	1.3 Other financial services
12	6.1 Construction – Construction of buildings
13	5.4.7 Cultural and creative industries – Software, computer games and interactive media
14	5.4.1 Cultural and creative industries – Art, antiques and crafts
15	7.3 Information and communications
16	7.6 Accommodation services
17	4.2 Professional services – Legal activities
18	5.5.3 Innovation and technology – Public technology support organisations
19	2.1.2 Inbound tourism – Accommodation services
20	5.4.9 Cultural and creative industries – Architecture

Source: TLWG

4.2.1.2 Step 1.2 – Qualitative Analysis

In addition to the quantitative analysis, different policy bureaux put forward sectors/jobs based on their overall policy direction and industry insights to the attention of TLWG. A few **new/emerging sectors/occupations** were highlighted, such as substantive examination of patent applications (patent examination), arbitrators, environmental industries, fintech, arts administrators and ship surveying / naval architecture and high value-added maritime services.

4.2.1.3 Step 1.3 – Suggested List of Industry Segments and Occupations to be covered by the Talent List

At the end of the process, the TLWG drafted a Suggested List of Industry Segments and Occupations[24] to be covered by the Talent List. Specific industry segments were shortlisted for further study, namely: cultural and creative industries; arts and culture; environmental services; financial services; information and communications technology; innovation and technology; intellectual property; legal and arbitration services; and maritime services. The Suggested List is shown in Table 4.2.

Table 4.2 Suggested List of Industry Segments and Occupations to be covered by the Talent List

Sector	Subcategory
Cultural and Creative Industries	Film, Television, Video and Music, Architecture (i.e. architectural design service, town planning and urban design activities)
Arts and Culture	Performing Artists, Visual Artists, Arts Administrators
Environmental Services	Environmental Technology Services
Financial Services	Asset Management, Fintech
Information and Communications Technology	IT services, Software Publishing
Innovation and Technology	Business Technology Innovation
Innovation and Technology	Higher Education Research
Innovation and Technology	Public Technology Support
Innovation and Technology	Testing and Certification Services
Intellectual Property	Patent Examination
Legal and Arbitration Services	Arbitrators, Legal Practitioners
Maritime Services	Maritime Law/Arbitration, Marine Insurance, Ship Broking/Chartering/Finance
Maritime Services	Ship Agency/Management, Ship Surveying

[24] The list excludes healthcare industry and occupations given these are the subject of a separate study in parallel.

4.2.2 Stage 2 – Bottom-up evidence gathering: more than 240 individuals from 20 HR companies and recruitment professionals and over 70 industry organisations commented on and provided evidence for the professions on the list

In Stage 2, the Consultant carried out interviews and focus groups. A full list of the recruitment professionals interviewed is shown in Annex 2 and industry stakeholders interviewed in Annex 3.

The aim of this stage was to collect feedback on the Suggested List of Industry Segments and Occupations and to gather further evidence of shortages. Stakeholders were also invited to suggest other professions for the list and to provide detailed descriptions of professions deemed to be in shortage (e.g. main skills and competencies expected, tasks carried out, and remuneration).

This bottom-up evidence gathering approach is comparable to overseas practice. For instance, face-to-face engagement with stakeholders is also undertaken in the UK, where representatives of the Migration Advisory Committee undertake regional visits to consult employers, their representative bodies, unions and employees regarding the occupations to be included in the skill shortage lists. In New Zealand and Australia, formal calls for submission from stakeholders based on a pre-defined questionnaire are used instead of interviews. These two countries adopt a slightly different approach, but the key is that they also involve stakeholder inputs and explore similar issues to the questions put to stakeholders in Step 2 of this stage during the interviews and focus groups.

In summary, the following data was collected in Stage 2 of the Study:

- Names/descriptions of occupations for which consulted employers are experiencing and expect imbalances in the demand for and supply of skills in the current to medium-term (0-5 years);
- Reasons for identified imbalances based on industry trends and reflections on wider economic factors;
- Employers' comments on the appropriate skill level, salary level and the number of people employed in the relevant occupations.

Through focus group sessions and in-depth interviews, the Consultant spoke to 244 different individuals representing a wide range of stakeholders in each of the identified sectors as well as HR companies. Some consultees were employers, while others were professionals, committee members of industry associations or professional bodies. The stakeholders consulted provided views in their own personal capacity. As such, the expressed views are not representative of their firms or organisations, which need to undertake an elaborated procedure among their members to provide official stance and views on the Talent List.

The Consultant circulated a consolidated summary of the views of stakeholders for individual sectors back to the respective sectors for review and comment to ensure accuracy.

4.2.3 Stage 3 – Assessment: Each of the suggested industry segments and occupations to be covered by the Talent List was assessed against three criteria: high skill, shortage and sensibility

Based on the evidence gathered during Stage 1 and Stage 2, the Consultant assessed each of the industry segments and occupations suggested by the TLWG, representatives of HR companies and industry stakeholders to be included in the Talent List.

The assessment was based on the lessons learned from the overseas experience and the Consultant's proposed recommendations for the immediate development of the Hong Kong Talent List included at section 3 above. Box 1 below gives a high-level summary of the lessons learned and the proposed recommendations.

Box 1 Key lessons learned from the overseas experience[25]

All of the overseas mechanisms reviewed that were used to draw up and update occupational shortage lists adopted a combination of quantitative and qualitative data to assess which occupations/professions should feature on the lists:

- Quantitative analysis is normally based on national labour force data and existing analysis of labour market shortages.
- Qualitative analysis is based on evidence from stakeholders or judgements made by the governments about the suitability of a given occupation to be included on the list. Usually, the governments would set up a formal consultation process and invite stakeholders to nominate occupations and to provide evidence of shortages.

In Hong Kong, there is a lack of quantitative data on labour shortages at the level of professions/occupations. As a result, the method to develop a draft Talent List in Hong Kong mainly relied on qualitative approach. Similar qualitative approaches are used in New Zealand, the UK and Australia.

Three assessment criteria are commonly adopted for occupations/professionals to feature on occupational shortage lists: high skill, shortage and sensibility. The table below shows that all of the overseas case studies with transparent methodologies for drawing up and updating occupational shortage lists use these three criteria for the assessment.

Table 4.3 The use of high skill, shortage and sensibility assessment criteria in overseas case studies

Assessment Criteria	Australia	Canada	New Zealand	UK
High Skill	✓	✓	✓	✓
Shortage	✓	✓	✓	✓
Sensibility	✓ [e.g. whether skills in short supply imposes a significant risk to economy / community]	✓ [e.g. to withdraw occupations that required specific Canadian experience from the list]	✓ [e.g. requires sufficient scale in terms of visa application numbers to warrant a listing]	✓ [e.g. the test on "feasible alternatives in response to shortage"]

The assessment was conducted based on qualitative evidence gathered in Stages 1 and 2. The Consultant considered two approaches when consolidating the views of stakeholders:

- The first approach would cover all occupations mentioned by stakeholders (including those mentioned just once). However, this would have led to a large number of occupations being proposed for inclusion in the Talent List. Furthermore, views of one stakeholder may not be shared by others. This approach was not adopted.
- The second approach covered only those occupations more commonly mentioned by stakeholders. While this seems a more plausible approach in theory, in practice it is difficult to identify occupations more commonly mentioned by stakeholders, as the views expressed are qualitative in nature, with different stakeholders putting different emphasis on the same occupations. Stakeholders sometimes express conflicting views on whether a specific occupation should be included in the Talent List or not. However, some common trends were identified. The views of industry stakeholders were given greater weight since they understand the industry sectors or professions better, as compared to representatives of HR companies and recruitment professionals. **This approach was adopted**.

While the evidence collected at focus groups and interviews were largely qualitative in nature, and the proposed Talent List is based on views of representatives of HR companies and industry stakeholders, the Consultant made reference to quantitative data gathered. This quantitative data included manpower demand and supply, which were used to check against the qualitative information

[25] Please refer to Section 3 above for details.

gathered. It is acknowledged that the available quantitative data are not detailed enough to provide sufficient information for detailed analysis of specific high-skilled talents in a particular occupational group. Nonetheless, it is justifiable to draw up the Talent List based mainly on qualitative information, because such information helps point to imminent shortages in high skill occupations without specifying the scale. After all, it is the interplay of market forces – demand from the employers and the willingness of talents to work in Hong Kong – that determines the final number of such foreign talents required to be imported into Hong Kong.

As a final validation, the occupations commonly proposed to be included in the Talent List were assessed against three criteria, namely high skill, shortage and sensibility. The criteria were adopted from the overseas experience to the Hong Kong context:

High Skill – The purpose of the Talent List will be to 'attract highly-skilled talent to support Hong Kong's development towards a diversified and high value-added economy'. A measurement of the required skill level to qualify occupations onto the list is therefore required.

During the stakeholder consultation process, stakeholders had different interpretations of what constitutes 'high skill'. For example, several stakeholders suggested that developers of e-commerce platforms for companies are highly-skilled, while others, particularly IT professionals, pointed out that most e-commerce platforms can be developed using off-the-shelf software. In contrast, they considered occupations such as enterprise (IT) architect, data scientist, network administrator and security administration as high skill.

However, based on the Report on Literature Review and Overseas Experience Study, overseas economies do use an agreed set of indicators to determine whether an occupation is high skill. Overseas examples tend to focus on indicators such as level and type of qualification needed for the occupation/profession and/or salary level. Information on educational requirements (type and level of education) and remuneration requirements are used as substitutes to indicate level of skill.

Based on the overseas experience and the Hong Kong context, the Consultant assessed three indicators to measure high skill:

- **Skill level of occupation according to the International Standard Classification of Occupations as a primary indicator** (i.e. the main indicator used for the assessment). The Consultant recommended that a profession or occupation needs to be listed under Skill Level 4 according to the International Standard Classification of Occupations (ISCO) in order to be considered as high skill (Box 2). The knowledge and skills required for competent performance in occupations at Skill Level 4 are usually obtained as the result of study at a higher educational institution for a period of 3 – 6 years. Two relevant ISCO-08 major groups fall within Skill Levels 4: 1 Managers and 2 Professionals.

  A similar indicator is used in New Zealand, where the criterion for high skill is met if the occupation is classified under Skill Levels 1 to 3 in the Australian and New Zealand Standard Classification of Occupations (ANZSCO). In Canada, occupations qualified as high skilled if they are categorized as Skill Level A (management occupations and occupations usually requiring university education) or B (occupations usually requiring college education or apprenticeship training) according to their National Occupational Classification (NOC).

  Given that Hong Kong territorial statistics cannot provide quantitative evidence down to professional and occupation level, an Occupation Index is compiled by the C&SD to facilitate the Population Census. The Occupation Index is based on ISCO-08 with local adaptation for Hong Kong. Given that ISCO-08 organises the occupations based on skill levels, high skill assessment can be done in a similar way as observed in New Zealand and Canada. The box below describes the typical requirements that need to be met for an occupation to be classified under ISCO-08 Skill Level 4.

  This was the primary criteria used to assess skill level because of the existing standardized classification and categorization of occupations according to the ISCO-08. If the profession or

occupation under consideration was not categorized as high skill under this criterion, the occupation was removed from the list. The Consultant did not undertake any further counter-checking.

Box 2 ISCO Skill Level 4[26]

Occupations at Skill Level 4 typically involve the performance of tasks that require complex problem-solving, decision-making and creativity based on an extensive body of theoretical and factual knowledge in a specialised field. The tasks performed typically include analysis and research to extend the body of human knowledge in a particular field, diagnosis and treatment of disease, imparting knowledge to others, and design of structures or machinery and of processes for construction and production.

Occupations at this skill level generally require extended levels of literacy and numeracy, sometimes at a very high level, and excellent interpersonal communication skills. These skills usually include the ability to understand complex written material and communicate complex ideas in media such as books, images, performances, reports and oral presentations.

The knowledge and skills required for competent performance in occupations at Skill Level 4 are usually obtained as the result of study at a higher educational institution for a period of 3 – 6 years leading to the award of a first degree or higher qualification (ISCED-97 Level 5a or higher). In some cases, extensive experience and on-the-job training may substitute for the formal education, or may be required in addition to formal education. In many cases, appropriate formal qualifications are an essential requirement for entry to the occupation.

ISCO-08 major groups	Skill level
1 Managers	3 + 4
2 Professionals	4
3 Technicians and Associate Professionals	3
4 Clerical Support Workers	2
5 Services and Sales Workers	2
6 Skilled Agricultural, Forestry and Fishery Workers	2
7 Craft and Related Trades Workers	2
8 Plant and Machine Operators, and Assemblers	2
9 Elementary Occupations	1
0 Armed Forces Occupations	1 + 2 + 4

Source: ILO 2012 p.14

- **Salary level of occupation as an auxiliary indicator** (i.e. a supportive indicator providing further information on the level of skill). To assess whether the profession or occupation under consideration is high skill, the Consultant also compared the reported salary levels from stakeholders to C&SD statistics on median monthly income by ISCO-08 based on 2016 Population By-census (2016 By-census). Salary levels served only as an auxiliary indicator and did not determine the final assessment of whether or not the occupation is high skill.

  In the UK, the identification of skill level through earnings compares the mean or median UK earnings of each of the 4-digit occupations based on its Standard Occupational Classification (SOC), which maps to the ISCO classification. By looking at the distribution of these means or medians across the 353 4-digit occupations (SOC2008), an appropriate threshold of mean or median earnings is selected such that a "reasonable" number of occupations, perhaps half, score as skilled.[27]

  Whereas Hong Kong currently does not have similar statistics produced down to the ISCO-08 4-digit level, a UK type method was adopted for the available ISCO-08 data from 2016 By-census, for reference. In the 2016 By-census, the median monthly income was HK$15,000 whereas the 90th percentile income was HK$45,000 a month. It is noted that other percentiles (such as the 80th or 95th percentiles) could also be considered, and it is not meant to filter the demand solely by the

[26] ILO (2012) International Standard Classification of Occupations. Structure, group definitions and correspondence tables, p.13

[27] (2010) Migration Advisory Committee. "Skilled Shortage Sensible Review of Methodology", p. 30.

salary levels. Many other factors are also considered, and salary level is only one of the reference points.

The two salary level figures served as indicative benchmarks for the assessment of skill level, but the Consultant did not follow an absolute threshold.

As reiterated by stakeholders consulted, there are significant variations in the wage levels of the same skilled professionals and managers depending on the industry sector and whether the enterprise is large or small. For this reason, the use of average salary level as an indicator of skill has limitations.

- **Years to complete education and training as an auxiliary indicator.** To assess whether the profession or occupation under consideration is high skill, the Consultant also assessed educational and training requirements (including years of job experience needed) for each of the occupations on the draft Talent List. The assessment was based on reported educational and training requirements by stakeholders and desk research. An indicative benchmark of 5 years of training to constitute a high skill occupation was followed.

  In Australia, for example, the number of years to complete education and training are assessed through the "long lead time" criteria:

  – Number of years needed for apprentice and trainee training (with a benchmark of 3 years);
  – Number of hours needed for vocational education and training (with a benchmark of 1,000 hours); and
  – Number of years in university education leading to the occupation (with a benchmark of 4 years).

  At least one of the benchmarks need to be met for the occupation to qualify on the shortage list. The assessment is based on the analysis of higher education courses and stakeholder input regarding occupational requirements.

  During consultations, stakeholders noted that the standard for years to complete education and training, including years of experience, may not be applicable to emerging occupations. Industry sectors such as ICT are undergoing rapid technological change, and the best skill sets may not be acquired through the traditional education system and a simple measure of the number of years of experience. As a result, the number of years to complete education and training as an indicator of skill has limitations for certain sectors (which are flagged up in the Talent List).

Shortage – To assess whether a profession or occupation under consideration is in current to medium-term shortage, two qualitative benchmarks were followed:

- *Local labour demand for the occupation or the sector concerned is growing and will continue to grow:* The assessment is based on discussions of industry outlook and the underlying drivers generating demand for a specific profession. The information was primarily sourced from stakeholder consultations and desk research. In limited cases, the evidence includes statistics on employment growth.
- *Recent and estimated future local labour supply for the occupation or the sector concerned is limited:* The assessment is based on the discussion of the size and suitability of currently available local talent, mainly sourced from stakeholder consultations and desk research. In limited cases, data on the number of recent graduates and immigrants supports the assessment.

The profession or occupation under consideration was removed for further assessment if there was strong evidence that local demand is decreasing or that there is sufficient local labour supply.
Overseas assessments used to determine whether an occupation is in shortage focus mainly on quantitative indicators of recent and estimated future local labour supply (i.e. the number of local workers and recent graduates in this occupation, and number of people who will soon retire from work) versus local labour demand (i.e. employment growth, number of vacancies). However, as noted

in the Report on Literature Review and Overseas Experience Study, in the absence of territorial wide statistics at occupational level, such information could only be gathered qualitatively through existing industry statistics or focus groups and face to face interviews. This method was adopted for the draft Talent List in this Service.

For instance, some industries (e.g. the financial services industry) have conducted recent industry-wide surveys on their talent needs. Other industries (e.g. ICT) were part of the recent manpower surveys conducted by the Vocational Training Council (VTC). Those statistics were reviewed and used for the assessment. Territorial statistics at less detailed levels (i.e. industry-wide trends only) were also used as a general reference for the assessment.

However, the current level of quantitative data is not comprehensive enough to form specific quantitative indicators and benchmarks that could apply to all of the industries and occupations under consideration. As such, the final assessment of shortage for the draft Talent List is primarily qualitative in nature and based on stakeholder perspectives.

Sensibility – To review whether foreign talent is best placed to fill in the identified shortage, an assessment of sensibility will be performed before finalising the Talent List.

As noted in Lesson 7 in the Literature Review and Overseas Experience Study (Section 3.8 above), occupations are not automatically added or removed from the list even if there is evidence of both high-skill and shortage, because the final decision is usually made after the Government assesses the sensibility based on a range of factors. For example, the development potential or strategic importance of the occupation (and/or the sector it belongs to) is usually considered in overseas examples. Most of the rationales of adopting these indicators are explicitly set out for public inspection and discussion.

The Consultant suggested at least one of the two qualitative benchmarks be followed:

- **Development potential:** The Government's policy objective for the Talent List is to support high value-added industries and industries with a potential to diversify the economy (i.e. to create new growth areas for Hong Kong). Therefore, the effectiveness and potential of a certain occupation to contribute to those industries can be assessed under this benchmark. This qualitative indicator takes into account, among other things, macro factors in relation to the specific sector, such as the occupation's development potential in the local economy/labour market, the territory's strategic considerations (e.g. whether the occupations to be included are beneficial to the sustainable development of the economy), or other public interests. Opinions of the stakeholders on the development potential and wider economic benefits of the occupation and industry concerned would be considered.
- The current assessment includes the Government's views on strategic and policy priority sectors as provided to the Consultant in June 2016. Where relevant, the assessment also makes reference to the preliminary **quantitative** analysis performed by the Office of the Government Economist in Stage 1 of drawing up the Talent List, based on territorial statistics available on the value-added in different industry segments. Stakeholders' views were also collected.
- **Need for foreign talent:** The Government or the industry can make a strong case to recruit such professions and occupations from overseas by setting out/evidencing why alternative approaches are not feasible or preferred.

  For instance, overseas examples make use of the following quantitative and qualitative indicators:

  - The number of immigrants that are already working in that specific occupation (showing the current immigration trends);
  - Opinions of employers or the Government on why the shortage needs to be filled with foreign talent (e.g. foreign talent brings innovation and enhances competitiveness of the sector); and
  - Explanations for why the alternatives are not feasible or preferred (e.g. increasing wages, improving working conditions to increase the productivity of the existing workforce, attracting more Hong Kong residents to join the occupations, and/or training and up-skilling the existing or potential workforces etc.).

The selection of qualitative or quantitative indicators depends on the occupation/industry assessed. Views of HR companies on the recruitment of foreign talents by their business clients, and views of industry stakeholders on the industry requirement for foreign talents provided evidence supporting the need for foreign talents. Qualitative analysis will be presented, noting that views cannot be quantified.

4.3 Analysis of Individual Industries and Recommended Talent List

4.3.1 Detailed analysis of industries, occupations and professions proposed for the Talent List

This section presents the detailed assessment of the industries and professions under study. The section is structured around the following industry sectors:

- Environmental technology services;
- Financial services;
- Information and Communications Technology (ICT) services;
- Innovation and technology;
- Logistics and transport services (including maritime and aviation);
- Patent Examination;
- Legal and dispute resolution services;
- Arts and Culture and Creative Industries

4.3.1.1 Environmental technology services

Hong Kong is one of the most densely populated territories in the world, with the majority of its inhabitants living in urban areas. Such population density can have enormous environmental consequences that need to be carefully managed. As a result, there is a strong policy focus on making the city clean, sustainable and more liveable. Environmental industries are a key contributor to achieving these objectives through each of the following six non-exhaustive core areas:

- Water conservation and pollution control;
- Air and odour pollution control;
- Energy conservation;
- Waste treatment, disposal and recycling;
- Noise control and mitigation; and
- Environmental consulting services.

It is noted, however, that additional areas / industries have a role to play alongside the six core areas stated above. For example, ecology, conservation, marine biology, landscaping, town planning, sustainability, sustainable and low-carbon transportation, energy conservation, renewable energies and low carbon technologies can each contribute to a cleaner, more sustainable, and more liveable environment. Some of these aspects are multi-disciplinary in nature, many of which are partially covered by at least one of the core areas stated above. According to the Green City Index produced by the Economist Intelligence Unit, in 2012 Hong Kong was rated as the second top performer in Asia, after Singapore, ranking much higher than Shanghai and Beijing.[28] In the long run, Hong Kong's proximity and close links to Mainland China provides an opportunity for the industry to expand beyond the Hong Kong territory.

[28] Source: Siemens & EIU, The Green City Index, 2012

The industry is shaped strongly by Government policy. Some of the current Government strategies relevant to the sector include the Action Blueprint on waste[29] and the Cleaner Production Partnership Programme (the Programme).[30] The Government directly supports industry sectors through several incentives:

- 20 ha of land for use by the recycling industry in EcoPark;
- Provision of waste-to-Energy facilities (e.g. Integrated Waste Management Facilities, O-Parks ("Organic Resources Recovery Centres"), T-Park ("Sludge Treatment Facility");
- Facilities and support services to environmental enterprises active in green technology through the Hong Kong Science and Technology Park; and
- Assistance to Hong Kong factories in the Hong Kong and Guangdong areas to adopt cleaner production technologies and practices through the Cleaner Production Partnership Programme, extended to 2020.

In 2015, the environmental industries employed some 43,750 persons and contributed a total of HK$7.9 billion to the local economy, a 1.1% increase from the previous year, according to publicly available industry research.[31] The industry is further characterized by some 300 small and medium-sized enterprises. The industry stakeholders and representatives of HR companies consulted both believe the industry in Hong Kong is still currently in its developmental stage.

One industry stakeholder and seven representatives of HR companies consulted also noted that the talent requirements for professionals within environmental industries are dependent on the Government's policy direction. With representatives of HR firms observing a strong demand for professionals in the field, the search for them varies locally and internationally. While local firms recruit locally and foreign firms recruit internationally, both tend to find that their recruits are trained overseas, according to industry stakeholders. In other words, while the decision of whether to recruit local talents or expatriates lies with the employers, in most cases the recruits received overseas training.

Three industry stakeholders reported experiencing no current talent shortages in the environmental industries. However, they also emphasised the growth potential, especially in areas such as renewable energy. For renewable energy, the talent required should have cross-discipline knowledge and expertise. There was a shortage of local talent in this industry sector. Two industry stakeholders added that what was lacking was not talent, but land – and that this could inhibit the growth of renewable energy, impacting on the demand for skills.

It was cautioned by another industry stakeholder that environmental industries cover a wide range of industrial activities, though in Hong Kong environmental industries are mainly confined to waste management, including for example waste recycling. Two industry stakeholders indicated that, in the context of waste management specifically, apart from chemical waste management, other forms of waste management did not involve high-levels of technology. If high technology was required in, say, incineration, business corporations could recruit experts required from overseas. However due to cost considerations, the waste recycling industry in Hong Kong is not likely to be sustainable without government subsidy. Nevertheless, for organic waste recycling, the industry is recruiting talents from overseas.

[29] "Hong Kong Blueprint for Sustainable Use of Resources 2013-2022" (Action Blueprint) which maps out a comprehensive strategy for waste management for the coming 10 years. A target to reduce the per capita disposal rate of municipal solid waste (MSW) by 40% by 2022 has been set. Waste-to-Energy (WtE) facilities are essential elements of the Action Blueprint.

[30] EPD launched the Cleaner Production Partnership Programme (the Programme) in April 2008 to encourage and facilitate Hong Kong-owned factories in Hong Kong and Guangdong to adopt cleaner production technologies and practices. The Chief Executive announced in his 2015 Policy Address to earmark HK$150 million to extend the Programme for five years until 31 March 2020.

[31] Source: C&SD http://www.censtatd.gov.hk/hkstat/sub/sp80.jsp?productCode=D5500001

Three industry stakeholders stressed that the focus of waste management currently is on recycling and re-use, rather than waste destruction. They were of the view that there is shortage of professionals and workers at all levels of expertise for the waste management sub-sector. In particular, for research and development to convert waste to energy, there is an acute shortage of talents, especially high calibre talents, not just in Hong Kong but also in Mainland China. Although there are training programmes offered by local universities, these programmes are pitched at an elementary level and are not advanced enough for the purposes of training professionals in the field of waste management. There are only a handful of local companies specialised in management waste involving high technology and these companies tend to recruit overseas talents.

Furthermore, for the waste management sub-sector, apart from research and development, there is also shortage of talents in the fields of experienced local waste treatment specialists/ engineers for the design, construction, operation and management of large scale multi-disciplinary waste facilities contracts. Those positions, which are in short supply, relate to advanced thermal waste treatment process or advanced chemical/physical/biological waste treatment process with relevant master or PhD degrees and around 10 years of on-the-job experience, especially in research and development and ongoing technology enhancement. The salary package is around HK$40,000 per month. However, companies are willing to pay much higher salaries if the candidates are of a high calibre.

It was also pointed out that there is no generally recognised professional qualification for environmental engineers. Furthermore, environmental experts are usually employed by NGOs. This might account for the lower salaries of staff working in environmental industries, which may not be attractive enough to lure graduates to join the profession. It was foreseen that when the Government puts more effort into promoting green buildings, there will be a need to recruit more talents, both locally and from overseas, driven by a need for building owners and management to increase the energy efficiency of buildings in Hong Kong.

In addition, the Environmental Protection Department (EPD) advised specific shortages in advanced waste treatment and engineering expertise in professions such as experienced thermal treatment experts and E&M engineering professionals for the design, construction and commissioning of advanced waste treatment facilities. The EPD notes that experienced engineering professionals in the operation and management of large-scale multi-disciplinary contracts are scarce.

Based on the current policy direction and opinion from the representatives of HR companies, recruitment professionals and industry stakeholders consulted, the environmental industries in Hong Kong would benefit from attracting experienced waste treatment specialists or engineers. It is noted that waste-to-energy facilities are essential elements of the "Hong Kong Blueprint for Sustainable Use of Resources 2013-2022". There is shortage in advanced waste treatment and engineering expertise in professions such as experienced thermal treatment experts and E&M engineering professionals for the design, construction and commissioning of advanced waste treatment and resource recovery facilities.

4.3.1.2 Financial services

Hong Kong has one of the largest and most sophisticated international financial service industries in the world. The industry plays an important role in the local economy. In 2016, the financial service industry accounted for 17.7% of Hong Kong's GDP, and the industry employed 253,100 persons (6.7%

of total employment).[32] Currently, some 265 institutions[33] from 36 countries[34] operate in Hong Kong's financial services sector.

Within the industry, asset management and wealth management are expected to be key growth areas in the future. Based on the industry survey report conducted by the Financial Services Development Council (FSDC) in 2015,[35] 90% of the surveyed asset and wealth management companies believed they would continue to hire more people in the next 3 years. This growth is based on the current fast economic development and wealth creation in Asia, as well as continued financial market liberalization in the Mainland. Simultaneously, the Government has been promoting the industry through various initiatives aimed to develop Hong Kong into a full-service asset management hub.

As noted in the 2015 FSDC report, the industry currently lacks transparency and information on various job types, including the required skills for different positions. Therefore, it is particularly difficult to make a consistent assessment of the professions and occupations in demand.

In general, the industry is experiencing shortages in middle to back office talent (i.e. those responsible for the administrative aspects of the front office; monitoring market risks; performing calculations and reporting; and accounting, valuation, and handling of legal formalities) and is also seeking to recruit English and Mandarin speakers for their front office work to serve the growing Mainland Chinese market.

Based on views from industry stakeholders and the 2015 FSDC report,[36] it is predominantly this middle to back office talent that is recruited from abroad (other than Mainland China) at present. In particular, risk and compliance professionals are recruited from the USA and Europe (e.g. France and Switzerland). Compliance is part of the banks' global risk management activities, which cover security, financial crime and fraud, geopolitical risks, assessment of operational, credit, pension and insurance risks, regulatory compliance and preparing for future changes in regulatory regimes, and assessing risks to market share and reputation.

The main trends and talent needs per industry sub-sector based on the reported talent shortages in 2015, current policy perspective, and additional interviews with HR companies and industry stakeholders within this Service are detailed below:

- **Asset management:** Asset management is expected to be a key area of future growth in Hong Kong, while fund administration/domicile activities are also expected to grow. While companies are typically looking to hire staff from the Mainland or Hong Kong for front office roles due to language proficiency and market knowledge, other foreign talent is often required for management positions and/or middle to back office work due to lack of qualified local talent.
  According to the 2015 FSDC industry report, front office asset management would be expecting a moderate increase in demand for talent in 2-4 years. According to one of representatives of the HR firms consulted, many clients, especially those from the Mainland, preferred to recruit in-house practitioners, rather than outsource their asset management tasks to external providers. This has resulted in growth in demand for these skills.

[32] Source: Census and Statistics Department, http://www.censtatd.gov.hk/hkstat/sub/sp80.jsp?tableID=188&ID=0&productType=8

[33] Banks, deposit-taking companies and local representative offices of overseas banking institutions.

[34] Source: Hong Kong: Fact Sheet Financial Services accessed at http://www.gov.hk/en/about/abouthk/factsheets/docs/financial_services.pdf

[35] Financial Services Development Council (FSDC), Report on Developing Hong Kong's Human Capital in Financial Services, 2015. The report can be accessed at http://www.fsdc.org.hk/sites/default/files/Paper%2013%20Developing%20HK%20financial%20talent%20%2823-1-2015%29_1.pdf

[36] Source: Based on information provided by Financial Services and the Treasury Bureau.

Another representative of HR firm pointed out that the supply of talent in asset management was very limited. With growing affluence in many Asian cities, especially cities in Mainland China, there is tremendous demand for investable assets and packaged investment products. There are also many investment opportunities in Asia, especially in Mainland China. The Belt and Road Initiative, for example, may result in significant opportunities for infrastructure finance. As a result, talent is required to identify investment opportunities and to package them into investment products.

Hong Kong is the leading asset management centre in Asia, and our asset and wealth management business reached HK$24.3 trillion at end-2017. Asset management professionals are therefore needed to sustain this growth and help Hong Kong tap into Asia's markets. The industry has reported that it is often difficult to hire asset management professionals, especially for mid-level and back office roles.

- **Alternative investment:** It was noted by three industry stakeholders that in recognition of the shortage of professionals in asset management, especially in alternative investment management, the Government and industry have started a financial incentive pilot scheme to train up local professionals. It was reported that university programmes do not generally have a substantial asset management and alternative investment component. As a result, professionals currently working on asset management are mainly trained on-the-job.
  Two industry stakeholders pointed out that alternative investment, as a subsector of asset management, has huge growth potential. Driven by capital from Mainland China, Hong Kong is now reportedly ahead of Singapore in terms of the provision of alternative investment activities. Changes to the regulatory regime in Singapore after the financial tsunami in 2008 have also led to an exodus of alternative investment firms from Singapore to Hong Kong. Historically, professionals working in the alternative investment industry were mainly expatriates trained in the USA and the UK. With increased capital from Mainland China, there is a growing need to train up local talents to manage the growing demand. As it takes time for local universities to train graduates with knowledge in asset management and alternative investment, as well as for these graduates to learn on-the-job, there is an acute shortage of professionals in alternative investment. In fact, there is a shortage of professionals in alternative investment globally.

  The profile of professionals that are in particular demand is alternative investment specialists with a degree in finance and around 5 years of relevant experience, especially in portfolio management. Their salary package comprises a basic salary and performance bonus. The basic salary ranges from HK$900,000 to HK$ 2 million per annum. In addition, the alternative investment industry is also experiencing shortage of IT expertise (especially on cybersecurity), compliance (to cope with regulatory requirements in Hong Kong and overseas) and quantitative analysis – reflecting a general demand among professional services industries in other countries. It was also pointed out that the high costs of office rental, and the availability and affordability of international school places are factors deterring foreign talents from working in Hong Kong.

- **Private banking:** Based on the 2015 FSDC report, the entrance of Chinese private banks into the Hong Kong market and the growth of small and medium businesses are expected to expand the private banking and wealth management industry. There is a current shortage of junior staff, which is expected to lead to a shortage of qualified managers with 3 - 5 years of experience in the future. The industry has reported challenges in recruiting experienced professionals. This was confirmed through interviews with HR firms who noted a shortage of experienced middle managers[37] in private banking, especially in areas of risk assessment, auditing and compliance (i.e. middle and back office managers). The 2015 FSDC report noted that Hong Kong should improve its training and qualifications for private banking to create a healthy pipeline of talent to serve the

[37] Middle management is the intermediate management level, with 3 – 5 years of experience accountable to top management and responsible for leading lower level managers. They are usually in charge of specific departments within the organization.

growing market (particularly from China). Based on the 2015 assessment, a significant increase in demand for front office employees would be expected in 2 - 4 years.
An industry stakeholder pointed out that there was also a shortage of professionals in a related sub-sector, namely trust fund management. The positions called for knowledge in finance, marketing, and experience working in international markets. An industry stakeholder commented that trust fund management was a fairly mature market in Hong Kong. The skills required for this sub-sector are acquired mainly from the training of lawyers and accountants.

- **Private equity:** As more Mainland companies seek to buy assets outside China using Hong Kong as their platform, an increased demand for private equity professionals is expected. It was suggested that there is a shortage of professionals in this area, from analysts to heads of departments. Another industry stakeholder noted that private equity in Hong Kong has been very successful, similarly to Singapore, and that many private equity firms use Hong Kong as their base. Given that private equity is a high value-added business, foreign talents who were in demand in Hong Kong should not have any problems coming to Hong Kong. For private equity professionals, according to an industry stakeholder, training in law, accounting and finance is required.
- **Retail and corporate banking**: Greater China is the geographical focus of retail and corporate banking in the upcoming 3 to 5 years. The sector is looking to increase staff with product knowledge (securities and equity products), cross-border networks, and better bilingual Mandarin and English language skills. Interviews with representatives of HR firms noted a shortage of experienced middle managers in corporate banking, especially in the areas of risk assessment, auditing, and compliance (i.e. middle and back office managers).
  According to the views of two industry stakeholders, compliance formed part of the banks' global risk management activities, covering security, financial crime and fraud, geopolitical risks, assessment of operational, credit, pension and insurance risks, regulatory compliance and preparation for future changes in the regulatory regimes, assessing risks to market share and reputation. Risk and compliance professionals were mainly recruited from the USA and Europe (e.g. France and Switzerland). There was an acute shortage of compliance and risk management professionals in Hong Kong. Regulatory authorities, banks, insurance companies and asset management companies were all looking for such professionals to cope with the increasingly complex regulatory regimes in Hong Kong and other countries.

  Three of the representatives of HR firms consulted indicated a strong demand for foreign professionals with experience in compliance, especially knowledge and experience in dealing with regulatory regimes in the USA and Europe. The occupation requires professionals with training in law, as well as knowledge and experience in finance, in addition to experience in compliance matters. Apart from banking and other financial services such as insurance that also have to deal with growing regulatory complexity imposed by other countries, publicly listed companies and the increasing number of initial public offerings (IPO) of Mainland companies launched in Hong Kong have also added to the growing demand for compliance professionals.

  Another representative of HR firm pointed out that there was shortage of experienced middle managers in corporate and retail banking, especially in areas of risk assessment, auditing and compliance. Three representatives of HR firms added that for experienced professionals with around 5 years of experience, the salary package could range from HK$35,000 to HK$60,000 per month. At directorate level, for professionals with 10 years of experience or more, the pay package could be around HK$100,000 per month.

  Nevertheless, a representative of HR firm cautioned that outlay for compliance was an expense item and would not be profit-generating. Finance firms, while recruiting compliance professionals to cope with regulatory requirements had to look for talents who could help generate income and profit. These professionals include those required for growth areas like asset management and Fintech.

An industry stakeholder commented that the requirement for compliance professionals to have a risk adverse mind-set and personality, means that they can be extremely cautious in handling risk, and often prefer lower return if the outcome is more certain. They also tend to have legal training and knowledge of particular legal systems, rather than any particular academic qualifications. Experience in and knowledge of regulatory regimes in other countries were an advantage. The salary package could be in the region of HK$1 million per annum. It was desirable that foreign talents were able and prepared to train up local talents.

- **Insurance:** Based on the 2015 FSDC report, the insurance sector is growing based on an increase in Mainland Chinese purchasing insurance products in Hong Kong. Insurance firms are facing challenges hiring staff with technical knowledge and knowledge of regulatory regimes that can serve Mainland clients.

  According to two representatives of HR firms consulted, there was a shortage of experienced professionals supporting the back-office operations of an insurance company, especially in areas of risk assessment and actuarial science. The shortage was applicable to both life and general insurance. Product development was usually not undertaken in Hong Kong due to the lack of experienced professionals. For experienced professionals with 5 – 8 years of experience, the salary package could range from HK$35,000 to HK$60,000 per month.

  An industry stakeholder cautioned that the insurance profession was not glamorous. The insurance industry has a vast asset base and has to be very cautious and stable in its investment strategies; as such, risk management is important. Legal and compliance departments of insurance companies hired a lot of lawyers and accountants, but had difficulties in recruiting actuarial and compliance professionals. There was a shortage of actuarial professionals who were aware of overseas regulations as well as accounting professionals who had experience working in the insurance business. Such professionals could be recruited from places like the UK, EU and Australia. For insurance accounting professionals, the salary package could be in the region of HK$1 million per annum.

  Actuaries carry out actuarial studies related to the establishment's operations, supervise the preparation of valuations and reports as required, and assist in the formulation of insurance policies. FSTB has consulted major industry stakeholders on the proposal to include experienced management professionals in actuarial science in the Talent List. In general, all consultees support the proposed inclusion. Feedback shows that there has been a manpower shortage of experienced professional actuaries. Consultees also expect that the demand for experienced management professionals in actuarial science is going to increase in the coming years in light of the development in the local regulatory regime and international standards of the insurance sector, in particular the implementation of the Risk-based Capital Regime, the International Financial Reporting Standards 17 – Insurance Contracts, etc. As it takes time for graduates to obtain qualifications and acquire adequate experience, industry stakeholders opine that the supply of local graduates (around 100 per year) cannot help alleviate the tight manpower situation facing the industry.

  Another specific area of demand relates to **maritime insurance professionals** which span across both financial and transport (maritime) sectors**.** Stakeholder interviews pointed out that there were few local students of marine insurance within the university undergraduate or master degree programmes. Local supply is limited as no systematic courses or certification programmes on marine insurance are being provided in Hong Kong. The discipline is challenging and involves a lot of legal content. In recent years, a number of multinational insurance companies have set up offices in Hong Kong to offer maritime insurance services. Many of these companies have in-house maritime insurance training. Despite the supply of local talent in the field of life and general insurance, there is a lack of interest among employees to enter the maritime insurance profession. Employers also indicated that the ideal candidates are experienced professionals in risk

management, with knowledge and relevant work experience related to regulatory regimes in other economies.

Marine insurance is one of the high-value added marine services sectors that Hong Kong is striving to develop. However, the sector in Hong Kong currently lacks experienced professionals in the marine insurance field, especially those who possess experience in finance, insurance, maritime or logistics, the legal field, as well as those with experience working in on-board roles.

Furthermore, Hong Kong is a leading international maritime centre in the region. In the National 13thFive-Year Plan, the Central People's Government has stated clearly for Hong Kong to reinforce and enhance its position as an international shipping centre. In the Policy Address in recent years, dedicated sections have been included to highlight the importance attached to the development of the maritime industry, including high value-added maritime services, such as marine insurance. The experienced management professionals in marine insurance are expected to help enhance the overall capacity of Hong Kong to provide high-quality maritime services (in particular, marine insurance). This would also further the development of specialised insurance services to support the sustainable growth of the insurance industry.

Due to the high demand for maritime insurance professionals, their pay package could be in the order of HK$1 million per annum.

- **Securities:** Based on the 2015 FSDC report, small and medium sized brokerages will struggle to compete with large companies and their staff have expressed keen demand for training and support to expand their service portfolio from securities to cover a wider range of wealth management products.
- **Investment banking:** In the 2015 FSDC report, investment banking was the sub-sector reporting the least problems in recruiting, due to its perceived attractiveness. The banks stated that the composition of their workforce has changed in recent years and a growing number of Mainland Chinese employees are now taking up junior and senior positions in international firms. The industry demand for talent is not expected to grow significantly.
- **Venture capital:** Two financial industry stakeholders pointed out that Hong Kong had a Venture Capital (VC) industry before any equivalent industry had been developed in Mainland China. However, based on their view today, there are few VC firms in Hong Kong. VC professionals had to find jobs or opportunities in Mainland China, rather than in Hong Kong. Given that start-ups in Mainland China required a lot of hand-holding in the initial stage, VC professionals had to be stationed in Mainland China. They advised that experienced VC professionals, with domain experience as well as training in a finance or legal discipline, could demand a pay package ranging from HK$800,000 per annum to as high as HK$80 million per annum.

  One of the representatives of HR firms consulted also shared similar views. It was pointed out that venture capitalists invested in start-ups or companies in their early stage of development. These companies had difficulties thriving in Hong Kong for reasons like high rental costs. The eco-system for start-ups in Hong Kong was not well developed. In contrast, there were many start-ups in Mainland China, notably in Shenzhen. As venture capitalists had to work hand-in-hand with start-ups, most of them were stationed in Mainland China. In some instances their finance offices might have remained in Hong Kong but these offices did not need to employ many talent.

  However, this view on the low potential for growth of the start-up industry was not shared by start-up entrepreneurs who were interviewed. They believe that start-ups will be important element of growth in Hong Kong in the future. Furthermore, another industry stakeholder pointed out that there has been a surge of support services provided to start-ups in Hong Kong. For instance, around 40-50 co-working spaces are available to start-ups. Apart from Venture Capital, other funding sources, such as the traditional family funds, are waking up to the huge potential offered by start-ups and offering support (financial and non-financial) to start-ups.

Although Hong Kong has a prudential regulatory framework, which might be seen by some as more stringent than those in, say, Singapore and Mainland China, this does not necessarily hinder the development of start-ups in Hong Kong. A number of start-ups, in places such as Singapore, having gone through seed-funding and reaching the financing stage of Series A or even Series B, are starting to move back to Hong Kong where the business environment is favourable to them in terms of financial and legal infrastructure and proximity to their consumers. For example, many of the major global finance companies are headquartered in Hong Kong.

In short, the potential for start-ups in Hong Kong is significant and would lead to great demand for experienced professionals in the long-term. However, based on the entirety of the evidence above, professionals in VC, securities and investment banking have not been added to the Talent List. It is recommended that, given the potential for start-ups in Hong Kong, as reported by several industry stakeholders, the justification for including professional in VC should be revisited again in future reviews.

- **Islamic finance:** No shortage issue has been raised as Hong Kong promotes the development of Islamic finance. The Government, as a Sukuk issuer in 2014, 2015 and 2017, has experienced no difficulty in engaging capital market, legal and accounting professionals with experience in Islamic finance to assist with issuances in Hong Kong. Meanwhile, FSTB has not received any feedback from the industry suggesting any talent shortage in developing Islamic finance in Hong Kong.

  As some of the respondents to the Consultant put it, development of Islamic finance is business-driven, not talent-driven.

  The knowledge required in the field might be acquired through education / training / market experience. There is thus no strong justification to indicate a significant shortage of talents in Islamic finance.

- **Fintech:** Fintech is an emerging field in the financial services sector. The term refers to any application of technology in financial services, including innovations in retail banking, investment, and a range of other areas such as peer-to-peer lending (P2P), and business-to-consumer (B2C) and business-to-business (B2B) financial services. The field is being developed through start-ups as well as within existing large banks and financial institutions. The development of the Fintech industry picked up momentum in recent years and is seen as both an alternative to and complementary to conventional banking.

  Since Hong Kong is one of the most developed financial centres in the world, there should be significant potential for the development of the Fintech industry. Specifically, Fintech can enhance operational efficiency and help foster new modes of development and service delivery for the financial services industry. Industry stakeholders noted that technology talent is important for the development of the industry and that it is specifically hard to recruit locally (e.g. talent with knowledge and expertise in designing IT applications such as natural language processing, artificial intelligence (AI) and big data analytics, as well as emerging technologies such as Blockchain and cybersecurity) as there is insufficient supply of experienced professionals in Fintech.

  At present, programmes related to science, technology and engineering are among the mainstream programmes offered by the local higher education institutions. Taking first-year first-degree (FYFD) programmes funded by the University Grants Committee (UGC) as an example, in the 2016/17 academic year, 17,411 students were admitted to FYFD places, of which 6,304 (36.2%) studied programmes related to Sciences and Engineering & Technology. Dedicated programmes related to Fintech have also been introduced by UGC-funded universities in recent years. The Chinese University of Hong Kong now offers a dedicated Bachelor of Engineering Programme in Financial Technology. The Government has also introduced the Study Subsidy Scheme for Designated Professions/Sectors (SSSDP) to subsidize students to pursue designated full-time, locally-accredited self-financing undergraduate programmes in selected disciplines that nurture talent in support of specific industries with keen demand for human resources.

In the 2017 Policy Address, it was announced that SSSDP would be regularized from the 2018/19 academic year and the number of subsidized places would be increased from around 1,000 per cohort to around 3,000 places. The Government will continue to identify suitable industries with keen manpower demand for inclusion in SSSDP.

Despite the supply of locally trained talents in the medium-term pipeline, this should not preclude experienced foreign talent in this globally-sought-after area. The growth potential of Fintech and the advanced level of skillset required suggest shortage in this industry. Indicated professions in shortage included website and application developers, systems analysts, and system auditors and assessors in the area of Fintech.

During discussions with two industry stakeholders, it was pointed out that although leapfrogging applications in the Fintech sector were more commonly observed in the Mainland China market, Hong Kong has greater potential for growth, partly due to its good banking and legal systems, and the fact that Hong Kong also served as a gateway to Mainland China. In Mainland China, on the other hand, the legal and regulatory requirements might not be very definite and clear. Occupations in the Fintech sector called for professionals with knowledge and expertise in IT applications, such as natural language processing, AI and big data analytics in addition to those in cutting edge technologies such as Blockchain and cybersecurity.

Another industry stakeholder commented that Fintech was also a technology within the banking and financial system. Nowadays, banking and financial services were technology driven and demand for professionals in this area was growing. Financial services relevant to the application of Fintech include wealth management and payments. It was pointed out that banks and other financial services providers had to invest heavily in IT because their clients were demanding more innovative ways of accessing their banking services, including convenience and increased security.

Two industry stakeholders also pointed out that local education in relation to Fintech was insufficient and inadequate. Hong Kong was reported as being at least 10 years behind the pace of western countries and some Asian countries, notably Singapore and India. Professionals in demand included website and application developers, system analysts and systems auditors in the area of Fintech. The pay package of heads of departments could be as high as HK$3 million to HK$4 million per annum plus bonus. Insurance companies also required Fintech professionals to handle tasks such as big data analytics. There is also emerging demand for new technologies, such as Blockchain and cybersecurity given their enormous potential application to financial services.

However, an industry stakeholder noted that the growth potential of Fintech has, in the past at least, been limited by a regulatory framework that might not be innovative enough for certain applications, in comparison with other Fintech centres such as Australia, Singapore and the UK. In Singapore, a “Sand Box” was run such that a “free regulatory” space was allowed for Fintech start-ups to test new solutions for some time without intervention from the regulatory authority. On the other hand, it is noted that the Hong Kong Monetary Authority (HKMA) launched its “Fintech Supervisory Sandbox” in September 2016. This allows banks and their partnering Fintech firms to conduct live tests of their new tech initiatives under a controlled environment, without the need to achieve full compliance with HKMA’s usual supervisory requirements. The lack of affordable office space was cited as another constraint.

Two industry stakeholders cautioned that it might not be desirable to adopt rigid delineation of the type of professionals, qualifications, and length and nature of working experience required in the Fintech industry. Fintech covers a broad range of innovative activities in leveraging technology to offer better financial products to consumers, investors and institutions.

A number of representatives of HR firms also indicated that there was a strong demand for Fintech professionals. The relevant occupation calls for professionals with training in IT, as well as knowledge and experience in finance. It was noted that Fintech in Hong Kong was relatively less developed than in Shenzhen in some areas. Hong Kong lacks talents experienced in developing

Fintech applications. The demand for experienced professionals would increase tremendously if/when the Fintech industry takes off in Hong Kong. It was cautioned nevertheless that professionals required for Fintech should not be confined narrowly to existing occupations. With rapidly changing technology, it called for ability to leverage new technology (such as Blockchain and cybersecurity, which have already caught much attention from the industry), and hence the requirements are for a broad knowledge base and creativity.

It may be worth noting that two industry stakeholders cautioned that the finance industry and related technology are changing fast. There may currently be a great demand for, say, compliance experts. However, they were not sure about the medium-term horizon for this demand, given increased automation or changes to the regulatory environment. The uncertainty of future demand is similar regarding experts in Fintech. Therefore, the industry stakeholders suggested that the Talent List should be as flexible as possible, with a broad delineation of occupations required. For the finance industry, it was suggested to include only a broadly defined occupation such as "financial services support staff", rather than narrowly defined occupations such as "compliance professionals".

Overall, while there are several initiatives to enhance local talent training for financial services, the importance and global nature of the sector, as well as its strong growth potential, means that high-quality foreign talent is required to support further development of the financial industry in Hong Kong. Financial services already receive a large share of foreign talent in Hong Kong. In 2015, 18% or 9,427 of admitted high skilled visas were in the financial services sector[38]. Given the above sectoral overview, the Consultant suggests the following professions in the financial services sector are considered for the Talent List:

- Experienced management professionals in asset management, including but not limited to trust fund management;
- Experienced professionals in marine insurance
- Actuaries; and
- Experienced professionals in fintech.

4.3.1.3 Information and Communications Technology (ICT) Services

A well-developed Information and Communications Technology (ICT) sector is the backbone of any high added-value economy since it drives innovation and competitiveness across a variety of industry sectors such as: banking and finance, transport and logistics, trading, wholesale and retail, manufacturing, graphics and multimedia etc. The development of the ICT sector is among the top priorities for many economies.

Hong Kong has one of the most advanced ICT sectors in the World. "*According to the annual global ICT Development Index published by ITU in November 2015, Hong Kong ranked second in Asia after Korea, and ninth in the world*" ..."*Hong Kong is also among the highest ranked in the world for digital readiness and internet access capabilities as well as 14th globally in terms of readiness to participate in and benefit from IT developments*"[39] The key strength of the industry in Hong Kong is a robust ICT infrastructure in terms of hardware (e.g. penetration of telephone lines, mobile phones, largest commercial satellite-earth stations) and software (e.g. largest and most sophisticated computer applications in financial sectors in the World).

[38] Admitted through GEP, ASMTP, IANG or QMAS. Based on statistics provided by the Immigration Department.

[39] Hong Kong Trade Development Council (June 2016), "Information Technology Services Industry in Hong Kong". (http://hong-kong-economy-research.hktdc.com/business-news/article/Hong-Kong-Industry-Profiles/Information-Technology-Services-Industry-in-Hong-Kong/hkip/en/1/1X000000/1X006NLI.htm)

The outlook for the industry is positive as Hong Kong strengthens its position as a regional ICT hub for companies to expand in the region, mainly to Mainland China. Worldwide, the ICT industry is expected to grow around 6% per year until 2019, according to industry projections[40].

In 2016, some 87,794 employees were engaged in the ICT sector in Hong Kong, a 5.8% increase from 2014. 2,950 ICT professionals from Mainland China and overseas were admitted to Hong Kong through various immigration schemes in 2015,[41] and around 2,000 local graduates received ICT related degrees from Government-funded ICT related degree programmes (excluding those from self-financed ICT programmes) each year. By 2020, the number of graduates from post-graduate, degree, associate degree, higher diploma, and diploma ICT programmes is expected to reach around 2,900 in publicly funded institutions and about 2,800 in self-financed institutions each year. [42]

Nonetheless, it is believed that this pool of local graduates may not meet the demand in the industry. More than 2,000 new ICT jobs are available each year in Hong Kong[43]. Many graduates of associate degree, diploma, and higher diploma programmes are very likely to pursue further education, reducing the supply of actual manpower available in the market. Moreover, for those who decide to enter the labour market, stakeholders pointed out that many IT graduates did not want to work in the IT discipline after graduation, further reducing the actual supply of local talent. Hence, there is demand for ICT professionals to meet the anticipated increase in the number of ICT jobs and replacement demand generated from the retirement of existing ICT professionals.

Consulted stakeholders noted that a significant proportion of ICT jobs have been outsourced to overseas suppliers, due partly to the lack of experienced ICT professionals with appropriate skills in Hong Kong and partly because of the lower costs in places like India, Taiwan and the Philippines. Despite such potential for the outsourcing of ICT projects, it is believed that demand for local and foreign ICT talent is likely to increase as more business corporations adopt ICT in their business operations. Furthermore, stakeholders advocated that both the industry and the Government should keep ICT projects in Hong Kong. Not only will this provide job opportunities for existing ICT talents, but also serve as a training ground for ICT graduates to become experienced professionals. Thus, while supporting the drawing up of the Talent List, they emphasised that foreign talents to be recruited into Hong Kong should shoulder the responsibility of upskilling local talents, and this should be stated as one of the requirements for foreign talents recruited into Hong Kong (although it is difficult to monitor).

The largest share of ICT professionals work in IT/Software Development. Of all the ICT sub-sectors, IT/Software Development accounted for the largest employment (38% or 33,622 employees), followed by Operations Services (22% or 19,665 employees). However, the largest growth in the number of employees from 2014 to 2016 is seen in IT security.

As noted, ICT talents are employed in many industries. The IT products & service suppliers employ the largest share of ICT talent (34% or some 30,013 employees), followed by Wholesale, Retail, Import/Export, Restaurants and Hotels (19% or 16,495 employees) and Financing, Insurance, Real Estate and Business Services industry (18% or 15,726) in 2016[44].

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[40] www.statistica.com

[41] Includes the sectors of "information technology" and "telecommunications", through the following schemes: General Employment Policy (GEP) (1,513 persons), Admission Scheme for Mainland Talents and Professionals (ASMTP) (421 persons), Immigration Arrangements for Non-local Graduates (IANG) (946 persons), and Quality Migrant Admission Scheme (QMAS) (70 persons). Based on *Statistics on Admission Schemes* prepared by the Immigration Department, April 2016.

[42] VTC (2016), 2016 Manpower Survey Report: Information Technology Sector.

[43] HKTDC, Information Technology Services Industry in Hong Kong, 10 June 2016.

[44] Ibid.

Table 4.4 Employment in IT Employees by Technical Sector

2016 ICT Fields	No. of IT employees	% Share	% Change 2016/14
IT/Software development	33,622	38.3	7.0%
Operation services	19,665	22.4	2.9%
Field support	10,006	11.4	9.4%
IT sales and marketing	7,177	8.2	7.0%
Telecommunications and networking	6,426	7.3	8.5%
System programming	4,101	4.7	0%
IT education and training	3,727	4.2	4.4%
IT management	1,477	1.7	1.0%
Database	824	0.9	-9.9%
IT security	769	0.9	23.6%
Total	**87,794**	**100**	**5.8%**

Source: Manpower Survey Report, Information Technology Sector 2014 and 2016, Vocational Training Council

Table 4.5 Employment in IT Employees by Business Sector

2016 ICT Fields	No. of IT employees	% Share	% Change 2016/14
IT Products & Service Suppliers	30,013	34.2	9.1%
Wholesale, Retail, Import/Export, Restaurants and Hotels	16,495	18.8	-0.5%
Financing, Insurance, Real Estate and Business Services	15,726	17.9	3.7%
Community, Social and Personal Services	10,040	11.4	3.2%
Communication	5,223	5.9	33.2%
Manufacturing	3,008	3.4	2.0%
Government Bureaux/Departments	2,741	3.1	1.4%
Transportation and Storage	1,990	2.3	1.6%
Medical and Healthcare Services	1,077	1.2	15.7%
Digital Creative	618	0.7	-11.3%
Construction	473	0.5	9.0%
Electricity, Gas and Water	390	0.4	3.2%
Total	**87,794**	**100**	**5.8%**

Source: Manpower Survey Report, Information Technology Sector 2016 and 2014, Vocational Training Council

The demand for ICT talents is further increasing. While it appears that the demand for IT professionals can be met by local supply, there is mismatch in experience levels. According to VTC, the annual demand for IT professionals (with a degree or above) was 3,051, which is lower than the projected supply of about 3,300 new graduates meeting the required qualifications.[45] However, employers are looking for experienced IT professionals – and these are considered to be in short supply. Consulted HR firms and industry stakeholders noted a strong and **increasing demand especially for experienced ICT professionals with cutting edge skills.** Several factors are limiting the supply of such local talent:

[45] VTC (2016), 2016 Manpower Survey Report: Information Technology Sector.

- Starting salaries for many ICT jobs, especially frontline workers such as programmers, have stagnated in the past 10 years. The sector is not competitive in recruiting graduates.
- There is a need for continuous education and training of experienced IT talents to keep pace with changing technology. Local supply of such experienced talents with cutting edge skills is low. This is partly due to the fact that, in the past, many IT projects were outsourced to neighbouring cities and countries (e.g. Shenzhen, India and the Philippines), regional headquarters of multinational companies moved outside Hong Kong (i.e. Singapore), and few Hong Kong companies engaged in sophisticated IT jobs such as big data analytics. As a result, there were few opportunities for graduates to gain experience in relevant technologies and global exposure, which are typical prerequisites for higher level positions (e.g. CIO or head of IT department). Many local graduates ended up with technical sales jobs. The 2016 VTC Manpower Survey Report specifically mentioned the demand for new skills related to social media communication skills, Internet and cyber security, big data analytics, virtualization and cloud computing, networking / data communications, e-learning technology, internet of things, artificial intelligence and Fintech. Such skill demand was also echoed in the Ambition "Market Trends Salary Report - 2016 Hong Kong".

Eight consulted industry stakeholders suggested that there was a shortage of experienced systems analysts and computer programmers in different industry sectors, such as logistics and the creative industries. It was not necessary for IT professionals in these sectors to possess industry-specific knowledge or experience. What was required was their ability to apply their IT knowledge and skills in solving issues. For instance, experts in the field of artificial intelligence (AI), augmented reality (AR), 3D design and animation, data compression technology, cyber security, database administration and big data analytics were in short supply. Application examples include IT professionals involved in: the production and marketing of films, video and music; finance; insurance; and information technology. Supply of local professionals experienced in computer hardware was also in shortage. This may partly result from there being an insufficient number of computer engineering students from local undergraduate or postgraduate programmes to meet the demand, and partly because of the lack of necessary supporting infrastructure to develop the hardware industry, in particular those related to smart city and internet of things applications.

Three HR firms consulted noted the shortage of supply of experienced IT talents. They were of the view that the support to IT professionals to update their knowledge and skills and catch up with rapidly changing technology is weak. As a result, IT professionals can easily find their skill set obsolete, further reducing the supply of experienced IT professionals with the right skills.

Five HR firms added that IT professionals in short supply included developers of web-based applications, especially end-to-end applications, database administrators, network administrators, system engineers, professionals in Enterprise Resource Planning (ERP) and AI specialists. The requirements for these positions were training and experience in software such as Oracle, SAP, JAVA, C++ and .NET framework. The shortage was felt in several industry sectors, such as banking and logistics. For example, the pay package for JAVA developers with several years of experience was around HK$30,000 per month. Professionals in AI typically required a PhD in computer science, mathematics or physics plus several years of experience, receiving pay packages in the range of HK$30,000 to HK$50,000 per month. The salary for the head of an IT department could reach HK$1.5 million per annum. Companies looking for such talents had to recruit from places like India and the Philippines. Due to the lack of IT professionals and problems arising from cultural differences between local and foreign workers, a number of companies had opted to outsource their IT jobs to places outside Hong Kong (e.g. India and the Philippines).

At the more innovative end of the scale, an industry stakeholder identified a shortage of experts in blockchain and AI. Few IT professionals in Hong Kong had expertise in these fields. Experts had to be recruited from the USA and Israel. It was stressed that academic qualifications and the length of working experience are not a major concern in recruiting these types of experts, given fast changing

technology. What is more important is sensitivity to data applications and data processing. For tasks such as natural language processing, which has seen growing application in AI, familiarity with linguistics is an advantage. For experts in Blockchain and AI, the salary range for those with two years' relevant experience is between HK$50,000 and HK$100,000 per month.

Two industry stakeholders reiterated that there was a shortage of IT personnel at all levels, in different job positions, such as sales and marketing, in-house support and product development. E-commerce is an area often mentioned by industry stakeholders with a shortage of technical staff at all levels. Fresh IT graduates joining the profession could earn a salary of HK$16,000 to HK$22,000 a month. Some employers were able to recruit IT talents from Asia Pacific countries – especially places with generally lower living standards.

To sum up, local post-secondary institutions are training IT graduates on one hand. On other hand, views of stakeholders consulted point to the shortage of **experienced** IT professionals with cutting edge skills. According to the stakeholders consulted, outsourcing of IT jobs reduces opportunities for inexperienced local IT staff to gain experience through working on large IT jobs. As a result, the economic and market drivers that are shaping parts of the IT sector in Hong Kong can contribute to a shortage of particular kinds of IT professionals – which may in itself inhibit further growth of the sector, especially in terms of moving up the value chain of IT service provision. Thus, while IT occupations are recommended to be included in the Talent List, it has to be stressed that effort needs to be made to train up local talents.

A number of new ICT occupations have been suggested by industry stakeholders, in particular in light of the emerging technologies in AI, virtual reality (VR), AR, and big data analytics. However, the Consultant is mindful in suggesting new occupations, because stakeholders have warned of the evolving nature of these new occupations. In many cases, the demand being described relates to evolving skill needs rather than new occupations – and is forward-looking rather than based on the current occupational profile of jobs (i.e. these are the skill areas in which demand is expected to grow rather than relating to a significant number of current jobs). Hence, the occupations in this report are suggested after making reference to the VTC classifications[46].

In particular, the 2016-17 Budget mentioned that the application of emerging technologies such as big data, robotics and artificial intelligence has brought a number of revolutionary business models and services, and the Government should facilitate the industry to put emerging technologies into practical use in Hong Kong to capture the opportunities to enhance Hong Kong's overall competitiveness.

According to Morgan McKinley, a global recruitment firm, demand for "Data Scientists" is rising in Hong Kong as more and more companies across different sectors require skilled professionals to derive insights from huge data sets to make critical business decisions. However, Hong Kong is still lagging behind other countries, such as the US or UK, in terms of the maturity of the data science job market. According to Morgan McKinley, the local employment market in Hong Kong lacks the supply of data scientists with the necessary academic qualifications and practical work experience as required by Hong Kong companies.

On the other hand, local tertiary institutions in Hong Kong are organising some ICT degree programmes specialising in big data analytics. There is, however, a current shortage of data scientists with advanced level skills and the work experience in applying these skills. Given the ever-expanding demand, it would not be sufficient to solely rely on locally-nurtured I&T talents.

Another occupation requiring closely attention is cyber security specialists. According to Hays, a global recruitment firm, cyber security professionals topped the list of in-demand IT professionals in the first quarter of 2017 in Hong Kong. An increasing number of companies are creating new headcounts on

[46] Source: VTC 2016 Manpower Survey Report of IT Sector (http:/www.vtc.edu.hk/uploads/files/publications/innovation%20and%20technology%20training%20board/2016%20MPS/2016%20Manpower%20Survey%20Report%20(Web).pdf

cyber security professionals to bolster their defences against cyber-attacks on their online platforms and their underlying legacy or big data systems.

Unlike other foreign countries, such as the US and the UK, except for a few top-up degrees, there is no specialised ICT degree programme organised by local tertiary institutions on cyber security or information and network security. As a lengthy process is required for tertiary institutions to design some specialised ICT degree programme to nurture talents in cyber security, it is necessary to admit foreign talents on the proposed ISO professional "Cyber Security Specialists".

Bringing in talented data scientists with practical experience in applying data analytics skills in different industry sectors, and cyber security specialists with practical experience in managing and implementing security solutions will facilitate knowledge transfer of the skills in these areas to local ICT professionals and graduates.

Consulted industry stakeholders anticipate the e-commerce and cloud computing sub-sectors to be the main drivers of growth in the ICT sector in the future, as business corporations increasingly adopt e-commerce in their business operations and leverage the cost advantage of both public and private cloud computing. Both sub-sectors noted a shortage of ICT talents across different professions and occupations, from sales to in-house support and product development.

In recent years, the e-commerce industry has shifted from facilitating B2B transactions to B2C e-commerce (i.e. online consumer shopping). Since 2008, online shopping has become a major trend and strong growth is led by China. In China, the industry is expected to grow by 20% annually in 2014 – 2019[47]. Consulted stakeholders felt that e-commerce in Hong Kong is not as developed as in Mainland China. However, large manufacturers are already setting up offices in Hong Kong with an eye on the Mainland market. They use Hong Kong as the base to take advantage of the good finance and banking services and legal services available. To support this anticipated growth, the industry needs to recruit developers of e-commerce platforms and big data analysts. Stakeholders noted that the industry is likely recruit such talents from the USA and the UK. Some employers were able to recruit such IT talents also from Asia Pacific countries.

Several industry stakeholders cautioned that it was not advisable to draw up a very fine delineation of occupational groups in the context of ICT technical roles. As technology is characterised by such rapid change, what is popular today might not be a year later. Taking blockchain as an example, it is arguably at the peak of the cycle. A change in, say, the state-of-art of cryptography may have a disruptive impact on blockchain applications, thus reducing or substantially changing the demand for blockchain professionals. In addition, there is ample supply of experienced IT professionals from places such as Mainland China, Taiwan, India and the Philippines, who can quickly fill up vacancies. Furthermore, IT technology is interrelated. Professionals working on, say, cloud computing applications may also need to understand AI and other application software, network or data administration, internet security, etc. A broad occupational group is thus proposed for the Talent List in respect of the IT industry, following the classification adopted by the VTC in its manpower surveys.

In summary, the majority of industry stakeholders and HR firms agree that there is a need to recruit experienced ICT professionals with cutting edge skills from abroad. As noted, there are already 2,950 ICT professionals immigrating to Hong Kong per year (based on 2015 figures); 70 of those are admitted through QMAS (33 % of all QMAS admissions in 2015 were ICT professionals). To take into account the rapidly-changing technology, stakeholders noted that while the occupations on the Talent List should not be too narrowly defined. Some specific occupational shortages can, however, be identified. It was suggested that the ICT occupations on the Talent List, cover, but are not limited to, the following developers of IT platforms, including in particular e-commerce platforms:

- Experienced data scientists;

[47] HKTDC Research, E-Commerce: Recent Developments and Opportunities for Hong Kong Businesses

- Experienced cyber security specialists.

It should be noted that there are many specialization in the IT discipline. Different IT undergraduate programmes place varying emphasis on different specializations, and these programmes are continually updated to take on board changing technology and employers' requirements.

For example, tasks related to AI, machine learning and natural language processing are taken by software engineers specializing in the relevant fields. Such software engineers require knowledge and expertise in the use of general purpose programming languages, such as Java, C/C++, C#, Objective C, Python, JavaScript, and Go. Professionals working in cloud computing have to be proficient in database management, network administration and IT security. ERP developers are professionals with expertise in programming languages like SQL and C# and use of software packages like Oracle eBusiness Suite and SAP.

Furthermore, the skills requirements of employers also vary considerably between companies, depending on the expertise and skill sets they already possess. Graduates were also expected to pursue continuing education. In any case, for any IT position, such as network director, the staff concerned should have knowledge of databases, cloud computing and network security, as well as perhaps applications development.

4.3.1.4 Innovation and technology

The Innovation and technology (I&T) sector mainly covers research and development (R&D) activities in the business sector, as well as higher education and public technology support organisations. It also includes activities relating to the commercialisation of R&D outputs in the product and process innovation in the business sector.

The I&T sector is not an industry in the conventional sense, but, rather, it is related to science, technology and innovation activities that may exist in any industry and organisation. Since the range of research and application areas of I&T is very broad, and technological innovation encompasses practically all technology, science and engineering disciplines, it is difficult and not practical to identify only a few areas or pinpoint particular qualifications for the purpose of attracting talents.

In Hong Kong, the Innovation and Technology Bureau (ITB) aims to develop Hong Kong into a knowledge-based economy and an innovation hub for technology and its application in the region.

To catch up with the innovation and technology race, the Government will step up its efforts to spearhead the development of innovation and technology in eight major areas.

- First is to increase resources for R&D with the aim of doubling the Gross Domestic Expenditure on R&D as a percentage of GDP by 2022.
- Second is to pool together technology talent, through initiatives such as the HK$500 million "Technology Talent Scheme".
- Third is to provide investment funding through measures such as the HK$2 billion Innovation and Technology Venture Fund to co-invest, on a matching basis, with venture capital funds in local technology start-ups.
- Fourth is to provide technological research infrastructure, through measures such as developing jointly with the Shenzhen Municipal People's Government the Lok Ma Chau Loop into the "Hong Kong-Shenzhen Innovation and Technology Park".
- Fifth is to review existing legislation and regulations, so as to remove outdated provisions that impede the development of innovation and technology.
- Sixth is to open up government data for use as raw materials in technological research, innovation and the development of smart city.

- Seventh is for Government to lead changes to procurement arrangements by exploring the inclusion of innovation and technology as a tender requirement instead of awarding contract only by reference to the lowest bid, so as to encourage local technological innovation.
- Eighth is through popular science education.

Hong Kong's Current Needs in a Wide Range of Occupations and Professions

The work priorities of ITB cover a number of initiatives with a view to driving economic diversification by I&T. These initiatives include promoting technological R&D, providing technological infrastructure, nurturing I&T talents, promoting "re-industrialisation", supporting start-ups, assisting small and medium enterprises to upgrade and transform, building a Wi-Fi connected city, developing the smart city, promoting big data application, using I&T to improve the daily living of citizens[48] and address social needs[49]. In these areas, talents in ICT (covered in 4.3.1.3), science, engineering, and biotechnology etc. are required.

In 2015, of the 7,344 business establishments that had conducted technological innovation activities, around 35% of them indicated that lack of qualified science and technology personnel was one of the factors that hindered their technological innovation[50].

International research[51] suggests that while I&T today is changing at a faster pace than ever before, most of these technologies involve information technology, electronics and electrical engineering, and can be applied in a number of disciplines, such as business, financial transaction, healthcare, research, and the interconnected world.

One of the key measures of ITB in the 2017 Policy Address is the development of Lok Ma Chau Loop. A key base for co-operation in science research will be established in the Hong Kong-Shenzhen Innovation and Technology Park located in the Loop. It is anticipated that demand for talents in new technologies will increase in coming years, as more foreign companies set up R&D centres in Hong Kong.

Limited Local Talent Pool

Statistics recorded a total of 28,165 R&D personnel in full-time equivalent (FTE) in 2015, which has increased from 27,378 FTE in 2014 and 26,045 FTE in 2013. Despite this slight increase[52], the average number of researchers in R&D (per million people) in Hong Kong in 2015 (3,248) is still below international benchmark (e.g. average of European Union: 3,485; Japan: 5,231; Korea: 7,087)[53].

Consulted stakeholders noted a shortage of professionals engaged in R&D in many sectors in Hong Kong. While a few programmes in Hong Kong offer training in R&D, few graduates from these programmes pursue a relevant career. For example, over 30% of UGC-funded graduates complete STEM (science, technology, engineering and mathematics) related programmes each year[54]. Although these graduates are well placed to take up R&D jobs, many prefer to join the better-paying financial industry, as suggested by HR firms consulted. The situation is similar among university graduates of other relevant streams. For example, when local graduates with a degree in life sciences join the pharmaceutical industry, most of them are in sales or marketing, and only a few are in R&D. Two

[48] LC Paper No. CB(1)624/16-17(01) on 6 Mar 2017 and LC Paper No. CB(4)450/16-17(02) on 7 Feb 2017.

[49] Press Release, "Innovation and Technology Bureau established", November 2015 http://www.info.gov.hk/gia/general/201511/20/P201511200739.htm

[50] HK Innovation Activities Statistics 2015.

[51] Source: MIT Technology Review, 2015 & 2016. http://www.itbusinessedge.com/slideshows/top-10-strategic-technology-trends-for-2017-07.html

[52] HK Innovation Activities Statistics.

[53] Researchers in R&D (per million people) latest data up to 2015. https://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6

[54] Source: UGC

industry stakeholders even held the view that, if there is demand for talents in innovative technology, business corporations would recruit such talents, locally or overseas. This is a flexible and market oriented approach.

Apart from academic qualifications and working experience, which are already included as vetting criteria in the QMAS, other relevant factors should be considered, e.g. IP created, IPO experience, etc. While these are not occupational qualifications, such requirements characterise the group of top notch of I&T practitioners that should be prioritised. The Talent List should not be too restrictive by limiting I&T talents only to such persons whose achievements have already been proven.

It was suggested that I&T talent should be covered in the Talent List. Such talent includes, but is not limited to, the following persons:

- Experts in pharmaceutical and life science / biotechnology
- Experts in data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and
- Experts in materials science/ nanotechnology.

Given the nature of the I&T sector, prestigious I&T practitioners may not necessarily have the required academic background nor the working experience that could be predetermined under any particular talent lists. Considerations may be given to applicants who were involved in I&T projects with significant or other worthy achievements. As such, apart from academic qualifications and working experience, other criteria[55] may be considered to characterise the group of top notch I&T practitioners that Hong Kong should attract.

Testing and certification

The testing and certification (T&C) industry has been providing testing, inspection and certification services to various sectors. By helping to assure the safety and quality of a wide range of products, the industry plays a vital role in our daily life. Through ensuring that products comply with international and regional standards, it also contributes to our manufacturing industry, external trade and high-end manufacturing industries advocated by re-industrialisation. It is thus an integral part of the supply chain. Professionalism, integrity, being responsive to market needs and having a robust accreditation system are all cornerstones of the industry.

Practitioners working in the industry come from a wide range of disciplines including science, applied science and engineering. A number of undergraduate and postgraduate programmes focusing on T&C have been launched in recent years by local universities. They include a Bachelor's degree programme in analytical and testing sciences offered by the Hong Kong Baptist University (HKBU) that started in 2012, a Bachelor's degree dedicated to T&C offered by Hong Kong Open University that started in 2013, a Master's degree in accreditation chemistry offered by Chinese University of Hong Kong that started in 2013, a Master's degree in food analytical and food safety management offered by HKBU that started in 2013, and a Master's degree in analytical chemistry offered by Hong Kong University of Science and Technology that started in 2015. VTC also started its Earn & Learn Pilot Scheme for Testing and Certification Industry (Pilot Scheme) in 2015. The challenge for the T&C industry is how to

[55] Suggested criteria may include:

(i) examples of invention in relevant fields as a director/founder/key staff member of an I&T institution, corporation or R&D organisation;

(ii) proof of recognition of work outside applicants' immediate occupation that has contributed to the advancement of the field;

(iii) have made significant technical, commercial, or entrepreneurial contributions in the relevant sector as either a founder, entrepreneur, or key staff member of a company in the relevant field;

(iv) have been widely recognised as a world leading talent (e.g. recipients of renowned awards in the I&T field);

(v) provide examples of exceptional ability in the field by making academic contributions through researches published in authoritative journals or endorsed by renowned experts.

compete with other sectors in attracting and retaining local talents**.** In this regard, the Hong Kong Council for Testing and Certification (HKCTC) has been taking measures to increase students' awareness and understanding of the potential of the T&C industry by participating in career fairs/talks in local universities and coordinating internship opportunities.

Stakeholders consulted have mentioned that professionals experienced in using high-end testing equipment/technology and conducting relevant testing analysis were in short supply, and that they would like to see more foreign talents brought in to increase experience in new technology and advanced equipment and to conduct relevant research and development (R&D).

However, due to the ever-changing demands in the T&C industry, there is a requirement for specific expertise related to specific fields at different times. This is particularly the case given that new T&C services/technologies are often required to support needs arising from the development of other business sectors. Stakeholders also stressed that flexibility should be allowed to cater for the ever-changing demand of the industry. In this regard, QMAS may not be the most appropriate channel for recruiting experienced T&C professionals to operate high-end equipment and conduct relevant testing analysis.

Currently, the General Employment Policy (GEP) already allows businesses (including the T&C sector) to bring in professionals with specialist skills, knowledge or experience not readily available in Hong Kong, upon their specific requests at a point in time. As such, the T&C sector could continue making use of GEP to fill the gap at different times for professionals to operate high-end equipment and conduct analysis relevant to the business needs at that point, as well as to conduct relevant R&D. In any case, other segments to be included in the Talent List (such as I&T) would already encompass R&D talents.

4.3.1.5 Logistics and Transport Services (including Maritime and Aviation)

Hong Kong is an international transport hub with a well-developed air and maritime transport and logistics services. The sector is a strategic and policy priority for the Government.

Trading and Logistics is one of the four pillar industries of Hong Kong, employing almost 748,300 persons and accounting for 22.3% of the total value-added of the economy in 2015.[56]

Hong Kong is a leading international maritime centre (IMC) in the region

Hong Kong has a strong presence of ship owners, cargo owners and traders, and a vibrant maritime services cluster.[57] The Government is committed to further enhance Hong Kong's position as an IMC.[58] It aims to do so by focusing on high value-added maritime services such as ship finance, marine insurance, maritime law and arbitration. The Transport and Housing Bureau (THB) expressed that both local and overseas talents will be needed to support such development.

The 2015 Policy Address by the Chief Executive noted, '*With the continuous expansion of our country's maritime and shipbuilding industries, our maritime services sector has enormous potential for growth. Hong Kong is well positioned to serve as a springboard for Mainland maritime companies looking to "go global", as well as a platform for international maritime companies to tap the Mainland*

[56] Census & Statistics Department.

[57] HKTDC Research, Maritime Service Industry in Hong Kong, June 2016.

[58] In the National 13th Five-Year Plan, the Central Authorities made clear its support for Hong Kong to reinforce and enhance its status as an international shipping centre. In the 2013, 2014, and 2015 Policy Addresses, dedicated section was included to highlight the importance attached to the development of the maritime industry, particularly the high value-added maritime services (i.e. ship finance, marine insurance, maritime law and arbitration).

market. Hong Kong has what it takes to become an important international maritime services hub for China and the Asia-Pacific region.[59]

Industry research suggested that Hong Kong's competitiveness lies in ship management, ship broking / chartering, liner / cargo agency and some intermediary services. This compares to one of its key regional competitor, Shanghai, which is generally viewed to be stronger in terminal operation, ship building / repair, and equipment supplies[60].

Despite the limited growth potential for the traditional shipping industry, it was pointed out that Hong Kong has a world class port, is the fourth largest ship register, and is the largest third-party ship management centre. As a result, it is possible for Hong Kong to become an international maritime centre. For instance, Hong Kong could contribute to tackling global issues (e.g. environmental protection).

At present, there is no publicly- funded university programmes on naval architecture provided in Hong Kong which has led to recruitment problem of naval architects in the local employment market. Only a few local young professionals choose to work in the industry. Hence, it is considered useful to cover this occupation in the Talent List.

Though there is a local ship management company which has employed local university graduates to undergo a training programme with a view to becoming superintendents of ships, the training programme has been operated for a very short period of time and there is still a long way for them to become professional superintendents.

In terms of talents, several shortages are observed by HR companies and industry stakeholders:

- **Marine engineers and superintendents of ships:** Stakeholder interviews find that most of the current superintendents of ships are foreign professionals (e.g. from India), because it has been difficult to recruit locally to fill positions such as ship superintendents or technical officers.

  One group of stakeholders noted that young graduates in maritime-related disciplines did not wish to work on board ocean-going vessels because they did not want to stay away from home for a long time. There has been recruitment problem of Marine Engineers in the local employment market in recent years, in particular not many youngsters have enrolled in the publicly-funded mechanical engineering degree courses provided in local universities with the intention to join the sea-going profession when there is a plentiful supply of jobs for mechanical engineering graduates in the local infrastructure projects. Hence, the industry had to recruit foreign sea-going marine engineers to work on board ocean-going vessels. Nevertheless, stakeholders from local post-secondary institution pointed out the ample supply of local graduates.

  No consensus among stakeholders consulted could be reached regarding the level of English competency among locally-trained graduates in their employability in the industry. Some believed that many locally trained graduates do not meet the English competency required for the day-to-day operations of ships, because local students were mainly trained in Cantonese. However, some other stakeholders pointed out that language should not pose a problem as most graduates of post-secondary education institutions should have good English languages skills. In addition, it was noted that different nationalities often appear to have preferences for certain occupations in the maritime industry. English language competency for Hong Kong students should not be inferior to these other nationalities.

[59] Chief Executive, Hong Kong's development and situation, retrieved on 11/8/2016 from http://www.info.gov.hk/gia/general/201501/14/P201501140376.htm

[60] BMT Asia Pacific, Consultancy Study on Enhancing Hong Kong's Position as an International Maritime Centre: Final Report, retrieved on 11/8/2016 from http://www.hkmpb.gov.hk/docs/8870%20IMC%20Final%20Report%20-%20ENG%20(16.04.2014).pdf, 51

Although local graduates in maritime studies are qualified, many join other maritime related professions Technical officers usually have a degree in engineering and are typically trained in-house. Salaries for technical officers with 6 years of experience could reach HK$30,000 per month. There is reportedly also an insufficient local supply of the more highly-paid deckhands and technical staff for superyachts. The pay package of chief steward of a superyacht could be in the region of HK$70,000 per month and for superintendent, around HK$160,000 per month.

There is also limited supply of local trainers that have academic qualifications (e.g. PhD degrees) and working experience as officers on board of ocean-going vessels. Stakeholders believed that this limited the development of maritime related programmes at post-secondary education institutions.

The Consultant believes that matching of supply and demand is up to employers to decide. Given there is a local supply, encouraging recruitment of ship superintendents from overseas will not be conducive to developing a pool of local talents. Thus, if ship superintendents are to be included in the Talent List, steps should be taken to encourage local graduates to join the seafaring profession and develop local talents.

- **Naval architect:** Naval architect is an important engineering profession of the maritime industry, dealing with ship design process, shipbuilding, ship surveying, ship maintenance and safety of the ship operation. Naval architects are mostly employed by shipyards, marine consultancy companies and classification societies. Their services are necessary for the construction, certification, classification and registration of vessels in accordance with the requirements of international conventions. Some naval architects are also employed by the Marine Department as Surveyors of Ships (Ship). Furthermore, there was room for Hong Kong to provide consultancy services in ship design, risk assessment and insurance services, although ship building activities do not typically take place in Hong Kong. At present, there is no publicly-funded university programme in naval architecture in Hong Kong, and the THB proposed to include the occupation in the Talent List to fill the vacancies arising from natural turnover. According to industry stakeholders, there was still a demand for foreign professionals, although the growth potential for shipbuilding industry was limited. This was partly because few local young professionals chose to work in the industry.
- **Local seafarers:** While local seafaring sector is besetting with shortage problem, Marine Department (MD) is of the view that importation of overseas seafarers would arouse strong opposition from the local seamen and harbour transportation workers unions. Besides, imported seafarers lack local water knowledge, and their competency level is also uncertain. In this regard, they may not suit the needs of local shipping industry. Maritime Services Training Institute (MSTI) is now undergoing a review exercise on the existing 23-week Certificate for Junior General Purpose Rating (CJGPR) programme. To ensure the graduates are able to serve the local maritime industry as coxswains or engine operators, two new modules will be provided in the revamped programme. MSTI expects the revamped course would attract more enrolments, which may help alleviate local maritime manpower shortage pressure. In the light of the above, THB and MD consider not appropriate to include local seafarers in the Talent List.

Hong Kong is a global and regional aviation hub

The global airline industry is growing rapidly. Industry revenue doubled over the past decade, from US$369 billion in 2004 to US$746 billion in 2014, according to the International Air Transport Association (IATA). Much of the growth has been driven by low-cost carriers (LCCs), which now control some 25% of the worldwide market.[61]

[61] Edward Clayton & Andreas Hilz, 2015 Aviation Trends, Strategy&, retrieved on 15/8/2016 from http://www.strategyand.pwc.com/perspectives/2015-aviation-trends

Civil aviation plays an important role in economic development. The Asia Pacific region has become the world's largest aviation market, expecting significant air passenger growth in the next decade. This passenger growth, together with the opening of new airports and expansion of existing ones, the emergence of new airline business models, and the evolution of airline alliances have created fundamental shifts in the global and regional aviation landscapes. Over the next two decades, Asia is expected to account for almost 50% of worldwide aviation growth. This growth requires support from many skilled aviation professionals to create a safe, efficient and thriving aviation industry.[62]

In the Asia Pacific region, the total number of planes serving the sector is forecast to almost triple from 4,710 in 2011 to 13,670 in 2031. Demand for civil aviation personnel will consequently increase: Asia's airlines will need to recruit an estimated total of 185,600 new pilots and 243,500 technicians.[63] On average, 20 aircraft maintenance personnel are required per passenger and air cargo aircraft. This includes persons employed by commercial air transport operators, maintenance, repair and overhaul organisations and training organisations. Around a quarter of these are licensed. The global demand of aircraft maintenance personnel is estimated to be 580,900 in 2010, which will almost double to 1,165,000 by 2030.[64]

Hong Kong International Airport (HKIA) is the world's third busiest international passenger airport and the world's busiest airport in terms of international cargo throughput since 2006. In 2015, the industry had 27,067 employees.[65] Given its scale and its unique position as a hub for air transport between Mainland China and the rest of the world, there is much potential for Hong Kong to benefit from the global growth trend in air transportation.

- Interviews with representatives of HR companies and industry stakeholders suggest that the increased demand for maintenance engineers will be driven by new value-added services for private aircrafts in additional to passenger aircrafts. Almost all private jet owners use aircraft maintenance, repair and overhaul companies to perform these services.
- IBISWorld[66] recently reported that airlines will have to expand their fleets in the coming years. Such expansion will lead to an increase in demand of industry services such as aircraft maintenance, repair and overhaul. In addition, as aircrafts get older, they require an increasing amount of maintenance.
- Both representatives of HR and stakeholders from the post-secondary education institutes pointed out that the sector is not attractive to young engineers in Hong Kong partly because of an unattractive career ladder. For example, a mechanical engineer working on aircraft repair and maintenance can be paid as his/her starting salary only around HK$10,000 a month, whereas a mechanical engineer position in air conditioning is paid around HK$20,000. Salaries are low, because similar jobs can be performed by engineers in Mainland China or the Philippines for lower cost. The low starting salary has somewhat deterred young engineers from joining and remaining in the aircraft repair and maintenance profession to accumulate sufficient experience in the profession.
- In short, local supply at technical/mechanics level is limited: very few entry level trainees are attracted to join the aircraft maintenance industry due to the very low starting salaries, which further reduces the longer-term availability of the pool of talent to be trained for the more

[62] Civil Aviation Authority of Singapore (2013), Change in motion, Annual Report 2012/13, p.4-24.

[63] Civil Aviation Authority of Singapore (2013), Bridging blue sky: steering Singapore aviation forward, p.12.

[64] International Civil Aviation Organization (2012), The future of safety, 67(1): 12-13.

[65] HKTDC Research, Air Transport Industry Hong Kong, January 2016, retrieved 29/09/2016 from http://hong-kong-economy-research.hktdc.com/business-news/article/Hong-Kong-Industry-Profiles/Air-Transport-Industry-in-Hong-Kong/hkip/en/1/1X000000/1X0018JT.htm

[66] http://www.aviationmaintenance.edu/blog/aircraft-maintenance-industry/secrets-about-aircraft-maintenance-industry/ (Mar 2014)(United States)

experienced levels. The focus should be to take steps to attract local graduates to join the aircraft maintenance profession. It is noted that certain aircraft maintenance operators have made considerable efforts over the past few years in improving their human resources strategies, including training and remuneration packages, thereby significantly improving the manpower situation.

Based on views of stakeholders consulted during the study, the following occupations are recommended to be included in the Talent List:

- Experienced naval architects; and
- Marine engineers and superintendents of ships.

Two HR firms reported that the logistics industry was being consolidated. Companies were downsizing. The trend was driven by migration to e-commerce. For instance, headcounts in supply chain and sourcing positions have declined, and junior job opportunities are being relocated to Mainland China. There should be sufficient supply of local talents – although it was also pointed out that certain skillsets within this industry, e.g. experienced professional in logistics could be in shortage. Therefore, despite the perceived shortage of professionals in logistics, the low growth potential painted by HR firms consulted does not support including other professionals in the logistics industry, apart from those recommended above, in the Talent List.

4.3.1.6 Patent examination

The past decade has seen significant growth in patent filings worldwide, from 1.57 million cases in 2004 to 3.13 million cases in 2016.[67] Asia, and in particular China, has been driving this growth. China received the largest number of patent applications, with its 1.34 million patent filings in 2016 accounting for over 40% of the worldwide total patent filings in the same year. This is followed by the United States and Japan, with Hong Kong being ranked 16th.

In many countries, examination of a patent application generally involves two stages:

- Formality examination, mainly by examining whether the information and documents filed in support of a patent application have complied with the prescribed filing requirements; and
- Substantive examination, i.e. examining and assessing whether the invention for which a patent is applied fulfils the patentability requirements.

In Hong Kong, the Patents Registry (registry) is wholly responsible for examining locally-filed patent applications, which is now mainly based on formality examination. On the other hand, substantive examination of patent applications is not required under the existing local patent regime, i.e. no local institution has ever engaged in substantive examination. In addition, there is no qualification/accreditation system for the patent profession in Hong Kong. In light of the above, there has been a lack of opportunity for home-grown talents in conducting substantive examination. However, this situation is being changed as a result of the recent reform of the local patent system.

Under the Patents (Amendment) Ordinance 2016 ("the Ordinance") (to be commenced), the registry will accept filings of "original grant" patent (OGP) applications requiring substantive examination in addition to the existing formality examination

The Ordinance[68] was enacted in June 2016. Key features of the Ordinance include the introduction of an OGP system for enabling direct filing of standard patent applications in Hong Kong, and the

[67] World Intellectual Property Indicators 2017, World Intellectual Property Organization.

[68] Patents (Amendment) Ordinance 2016, enacted in June 2016 http://www.legco.gov.hk/yr15-16/english/ord/ord017-2016-e.pdf

refinement of the existing short-term patent system, including the introduction of post-grant substantive examination of short-term patents[69].

The OGP system will run in parallel with the existing re-registration system for grant of standard patents in Hong Kong. Under the re-registration system, the Registrar of Patents (Registrar) grants standard patents based on prior grant of corresponding patents in one of the three designated patent offices outside Hong Kong, namely the UK Intellectual Property Office, the European Patent Office, and the State Intellectual Property Office in the Mainland (SIPO) (collectively the "designated patent offices"). The Registrar mainly examines if the information and documents in support of the patent applications comply with the statutory requirements on filings (i.e. formality examination), but does not conduct substantive examination of the patentability of inventions underlying the applications. However, under the OGP system, the Registrar will accept filings of OGP applications, which will be subject to substantive examination.

Another key feature of the Ordinance is to refine the existing short-term patent system by, among other things, enabling the making of requests (by either the proprietor of a short-term patent, or a third party with legitimate grounds or interest) to the Registrar for conducting post-grant substantive examination of a short-term patent as a pre-requisite to enforcement. This measure is designed to enhance the integrity of the short-term patent system.

Subject to the progress of various preparatory work, the OGP system is expected to be rolled out in 2019 at the earliest. The Intellectual Property Department of the Hong Kong SAR Government (IPD, the Government department that operates the registry) signed a Co-operation Arrangement with SIPO in 2013 under which SIPO has agreed to provide the registry with technical assistance and support as well as manpower training in substantive examination. In the long-term, IPD aims to build up indigenous capacity for conducting substantive examination, particularly in those niche technical fields in which Hong Kong has acquired considerable expertise or in which Hong Kong is well placed to enhance its research and development capabilities. This would require talents such as undergraduates and postgraduates in science and technology streams, and also lawyers proficient in patent laws. IPD has expanded the manpower of the registry by recruiting local talents with credentials in science and technical fields, as well as knowledge and experience in patent law and practice, as the new **patent examiners** of the registry who are assisting the registry to attend to various preparatory work for the OGP system, and will, upon undergoing training, be tasked with duties relating to substantive examination under the new patent system[70].

While current needs and the local talent pool are limited, future demand will be based on the operation of and market response to the new patent system; and further development of the system following implementation of the Ordinance

Representatives of HR firms and industry stakeholders interviewed indicated that the current demand for foreign talents is low, because the existing re-registration system (i.e. before implementation of the OGP system) in Hong Kong is only concerned with endorsement of patents obtained outside Hong Kong. Due to the low local market demand, supply of legal professionals specializing in patents in Hong Kong was also low.

However, following the enactment of the Ordinance, the general view[71] is that patenting activity and specialists required to handle these activities are expected to increase in Hong Kong.

[69] "Patents (Amendment) Bill 2015", Conventus Law, December 2016 http://www.conventuslaw.com/report/hong-kong-patents-amendment-bill-2015/

[70] Source: information provided by Commerce and Economic Development Bureau. Patent examiners should have their individual credentials in one of the broad spectrum of science and technical fields.

[71] The Consultant is unaware of official surveys or projections.

The Panel on Commerce and Industry of the Legislative Council has urged the Government "to formulate a long-term human capital development plan to nurture the required local talents in the patent industry, and to build up a qualification/accreditation system to ensure the professionalism of **patent practitioners**".[72]

The talent shortage in Hong Kong mainly lies in the knowledge and skills to undertake substantive examination of patent applications, i.e. examining and assessing whether the invention for which a patent is applied fulfils the patentability requirements. While Hong Kong has a good number of science undergraduates and postgraduates who are potentially qualified as entry-level patent examiners, there is a lack of experienced patent examiners in the local market to train and mentor them in conducting quality and independent substantive examination.

As such, it is deemed essential and necessary for the registry to have the flexibility of recruiting talents outside Hong Kong with substantial experience in patent examination to support its operation in running the new OGP system and also in training the local substantive examination teams. This will help build sufficient knowledge and expertise of the registry for establishing a local pool of patent examiners in the medium- to long-term.

Conducting searches and substantive examination of inventions requires highly specialised legal and technical knowledge and skills. Overseas talents of patent examiners potentially required by the registry are expected to hold the first or postgraduate degree in a science subject and also possess substantial/concrete knowledge and experience in conducting substantive examination of patent applications. The Chief Examiner should preferably have more than 10 years of experience.

Whether the registry would be further expanded by hiring overseas talents as the additional patent examiners (i.e. the extent of the registry's employment opportunities for overseas talents) is subject to suitable review after rolling out the OGP system, having regard to, amongst other things, the market reaction to the system, the relevant caseload, and also the long-term vision of the registry to build up indigenous capacity in technological areas/fields where Hong Kong has acquired its strength and edge, such as information and communications technology or biotech[73].

Turning to the private sector, amongst the confined pool of legal practitioners in Hong Kong with speciality in IP law and practice, the local pool of practitioners with knowledge and experience in patent law and practice is relatively limited, including those having acquired professional qualification in patent practice from other jurisdictions (e.g. the UK, Australia, the USA and Mainland China).

During discussion with an industry stakeholder, it was pointed out that the registration of standard patents in Hong Kong was mainly the endorsement of patents obtained in Mainland China and in the other two designated patent offices, such as the one in the UK. If patent registration in Hong Kong involved technical processes having the design, engineering and legal aspects, there would be an increase in demand for foreign professionals such as scientists, engineers and lawyers proficient in patent laws in other countries.

According to a representative of HR firms, there were not many legal professionals specialised in IP, partly because there was little market demand. A number of multinational companies had their own legal teams outside Hong Kong working on IP. The local teams in Hong Kong were mainly concerned with implementation and supervision.

[72] Bills Committee on Patents (Amendment) Bill 2015 Background Brief LC Paper No. CB(1)219/15-16(02), November 2015. According to information provided by Commerce and Economic Development Bureau, patent practitioners should have ample knowledge and experience in advising on and prosecuting patent applications involving substantial examination as well as in advising on any other issues relating to patent grants.

[73] Managing Intellectual Property, May 2016 http://www.managingip.com/Article/3558603/Interview-Ada-Leung-DirectorHong-Kong-IP-Department.html

Both representatives of HR firms and industry stakeholders interviewed in the course of the study are of the view that there is currently not a need for foreign talents, because the current re-registration system in Hong Kong is only concerned with endorsement of patents obtained outside Hong Kong. Nevertheless, they foresee an increase in demand for foreign professionals such as scientists, engineers and lawyers proficient in patent laws in other countries if applications for patent grants in Hong Kong involves technical processes related to the design, engineering and legal aspects. This is indeed the direction in which Hong Kong is heading.

For the purpose of implementing the new patent system in Hong Kong (to be launched in 2019 the earliest), patent examiners would be solely employed by the registry of the Intellectual Property Department (IPD), being the only authority for grant of patents in Hong Kong. Following an open recruitment, IPD has been able to identify and recruit suitable candidates in the local market to fill the vacant posts of patent examiners in the registry for taking up the new caseload under the new patent system at the starting point. Any further demand for patent examiners would be driven by the market's response to the new patent system. Caseload under the new patent system will be one of the key factors determining the additional number of vacancies for patent examiners in the registry.

In the circumstance, there appears to be no imminent need for IPD to recruit a large number of patent examiners at the initial stage. The fact that IPD has been able to identify and recruit suitable candidates in the local market to fill four vacant patent examiner posts in the registry in a recent recruitment exercise has obviated the immediate demand for foreign talents. In the long run, subject to further review, there may be demand for such talents, especially if the new patent system matures into generating a heavier caseload, and the science/technological areas covered by such caseload turn out to be beyond the expertise of the local talents. In that event, it is anticipated that considerable lead time will be required for Hong Kong to nurture and develop its own local talents (as illustrated by the experience of Singapore, which took around 18 years to set up its own pool of patent examiners after setting up its own OGP system). The long-term goal of the registry is to develop indigenous capacity for conducting substantive examination of patent applications and also for manpower training. In short, it is considered that there is no imminent demand for foreign talents in supporting local patent examination for the time being, and that the demand for such talents can be subject to review in due course after implementation of the new patent system.

4.3.1.7 Legal and Dispute Resolution Services

In the 2015 Policy Address the Government was committed to "*continue with the development of Hong Kong as an international legal and dispute resolution services centre in the Asia Pacific region, in seeking to enhance our position in the international legal, dispute resolution and business arenas*".

As noted by the Department of Justice (DoJ), a large pool of highly-skilled legal and arbitration talent with international exposure is conducive to achieving this policy vision. In addition, the presence of top dispute resolution services providers (i.e., arbitrators and mediators) might have a positive effect on bringing new businesses/clients/bodies to Hong Kong. For the above reasons, the DoJ proposed to consider the inclusion of dispute resolution services providers on the Talent List.

Although there are good local talents available in Hong Kong, there is still a continuing need to appoint dispute resolution services providers from outside Hong Kong for cases arising in the specialised areas of international financial and investor-state disputes and with multilingual ability.

There are no restrictions on foreign nationals (irrespective of whether they are legally qualified) participating in arbitral proceedings in Hong Kong. However, some users of arbitration were of the view that these foreign talents might not be able to obtain employment visas quickly and easily[74]. They

[74] Section 63 of the Arbitration Ordinance (Cap. 609) provides that the restrictions imposed by section 44 (Penalty for unlawfully practising as a barrister or notary public), section 45 (Unqualified person not to act as solicitor) and section 47 (Unqualified person not to prepare

felt that it would help if there was a mechanism to facilitate entry to Hong Kong in areas where local talents were lacking. In this light, ImmD advises that it has been receiving entry applications to take up employment as arbitrators on a short-term basis from time to time. Assessment of urgent applications is expedited as far as practicable to meet the genuine needs of the applicants.

Several industry stakeholders were of the view that there would be increasing demand for arbitration services in Hong Kong. Hong Kong has the potential to become a dispute resolution hub in Asia, with Singapore as the main competitor. They pointed out that in the UK, foreign solicitors could enter and work for up to a month without visa if invited by a UK-based organisation or client to provide arbitration services on a particular area of law. It was suggested that Hong Kong should consider adopting similar arrangement to create a more arbitration-friendly environment. Furthermore, simplified arrangements could be introduced to facilitate foreign arbitrators to set up offices in Hong Kong. Nonetheless, such an arrangement is beyond the scope of the present study.

In the context of the Belt and Road Initiative as well as the Guangdong-Hong Kong-Macao Bay Area Development, Hong Kong has the potential to become a dispute resolution hub targeting users of arbitration from the Belt and Road countries. In addition, given the geographical proximity and cultural as well as linguistic affinity within the Bay Area, Hong Kong will be able to take advantage of this anticipated growth in the need for a larger pool of legal and dispute resolution services providers. To drive the demand for legal and dispute resolution services in Hong Kong, measures have to be taken to promote the designation of Hong Kong as the seat of arbitration and Hong Kong law as the applicable law of contracts for cross-border transactions.

In this regard, it is necessary to encourage transactional lawyers from the Belt and Road countries or the Guangdong-Hong Kong-Macao Bay Area jurisdictions, especially those acting for businesses who will set up their corporate vehicles in Hong Kong for their inbound or outbound investments to be familiar with Hong Kong. The transactional lawyers from outside Hong Kong would be those who possess specialised knowledge of and experience in cross-border transactions in which their countries or jurisdictions play the roles of investing or host states. This approach will provide opportunities for them to be familiar with the strengths of Hong Kong as a preferred neutral seat of arbitration. Importantly, given their connection with as well as their knowledge of and experience in the Belt and Road countries and the Guangdong-Hong Kong-Macao Bay Area jurisdictions, they will provide a good bridge for such cross-border transactions generated by the businesses or governments from those countries or jurisdictions to be based in Hong Kong. In this way, they are in the best position to advise their clients in adopting a choice of law clause and a dispute resolution clause favourable to Hong Kong, resulting in enhancing Hong Kong's position in the international legal community and benefitting the local legal and dispute service providers.

With the implementation of the above measures, Hong Kong may be better placed to capture the above opportunities by expanding its pool of highly skilled dispute resolution services providers with experience and expertise in specialised areas of practice. The transactional lawyers from outside Hong Kong would have to comply with the relevant professional requirements and rules of the Law Society and Bar Association in respect of set-up, practice and ethical conduct where applicable. For those who intend to join Hong Kong law firms or registered foreign law firms in Hong Kong, they have to satisfy the relevant statutory criteria.[75] In-house lawyers who do not intend to join either a Hong Kong law firm or a registered foreign law firm in Hong Kong will have to satisfy analogous requirements to be imposed in the proposed facilitation under QMAS.

certain instruments, etc.) of the Legal Practitioners Ordinance (Cap 159) do not apply to persons involving in arbitral proceedings conducted in Hong Kong.

[75] Section 3 of the Foreign Lawyers Registration Rules (Cap. 159, sub-leg. S) states: "A person … is qualified to be registered as a foreign lawyer if (a) he is a person of good standing in the foreign jurisdiction in which he is qualified to practice law; (b) he has satisfied the [Law] Society that he is a fit and proper person to be so registered."

It is envisaged that a period of not less than 5 years is required to nurture the local talents in the above specialised areas through the relevant training.

A specific shortage was thus identified for the following occupations:

- dispute resolution professionals specialising in resolving international financial and investor-state disputes; and
- transactional lawyers with specialised knowledge of and experience in cross-border transactions from investing or host states along the Belt and Road routes and jurisdictions of the Guangdong-Hong Kong-Macao Bay Area Development.

4.3.1.8 Arts and Culture and Creative Industries

The Government proposed arts and culture and creative industries professionals to be featured on the Talent List

HAB has stressed the Government has an established cultural policy to develop Hong Kong into an international cultural metropolis:

- The policy is based on examples of good practice: New York and London demonstrate the importance of the cultural sector in enhancing the branding and development of a world class financial hub, whereas experience of South Korea and Singapore demonstrate that arts and culture can be an economic enabler and driver in creating high-skilled employment and growth.
- Hong Kong's aspiration to become an international cultural metropolis will be severely constrained if it does not have talents in visual and performing arts as well as arts administrators.
- Local training in tertiary education for museum practitioners and art professional is at its initial stage or is absent.
- Apart from stepping up efforts for home-grown talent, foreign talent will be important to complement the local pool. For instance, visual art professionals, such as curators, could enhance the quality of work and bring the overseas experience.

CEDB noted a strong and persistent shortage of talents in Hong Kong to support the growing number of establishments engaging in motion picture, video and television production, post-production and distribution activities:

- In 2009 – 2015, the publishing activities, motion picture, video and television programme production, sound recording and music publishing activities and programming and broadcasting activities grew by 5.1% annually (value-added) or by 1.5% (persons engaged)[76]
- Based on CEDB's analysis, there are already a number of outstanding international film talents (e.g. movie stars, directors and producers) living and working in Hong Kong. Such international talent are a building block of the Hong Kong film industry, both in the past and future.
- CEDB noted music and television talent should also be considered, for instance: pop singers, music composers and lyric writers who actively engage in the film and television sector. New career opportunities will open in the sector when the two new local free television service licences are granted. Business opportunities for the music industry in the Mainland are also anticipated.

Industry stakeholders, HR companies and recruitment professionals noted some local talent cannot find employment in Hong Kong

The industry has different and diverse views over the need to recruit foreign talents. Some HR companies and recruitment professionals noted that animation was mentioned as an area where Hong Kong has a competitive edge, but South Korea is catching up fast because of strong Government

[76] Source: calculated from C&SD (http://www.censtatd.gov.hk/hkstat/sub/sp350.jsp?productCode=B1080013)

support, while industry stakeholders pointed out that local film production is declining. Currently about 30 to 50 films are produced per year, the majority of which (around 70%) were shot in the Mainland. Industry stakeholders, HR companies, and recruitment professionals noted some local talent in the film industry cannot find employment in Hong Kong and is moving to the Mainland. With the lack of opportunities for local talent, the industry believes attracting foreign talent is not necessary.

CreateHK has reservations about the above findings related to the film industry, which only focused on the issue on employment versus job availability. From the perspective of the Hong Kong film industry, renowned creative talent are not competitors for jobs. They come to Hong Kong because of her attraction as a world class metropolitan, not as labourers seeking for employment. They are prime movers who create working opportunities for others, because they initiate ideas, which would turn into movie projects, no matter where the project is shot. Creative talent is, in this context, the building blocks of the film industry and artists living in Hong Kong are reported as good examples of foreign talent.

Some stakeholders pointed out that the market for comics and animation in Hong Kong was very small. This was partly because of the lack of a prosperous film industry, and a lack of support from the toy industry. This had deterred investors from investing in the industry. As a result, there was limited demand for talent, both local and foreign. A number of production processes had also been outsourced to neighbouring cities like Shenzhen. This had further reduced the demand for professionals in comics and animation. As a result, some local talent had chosen to seek employment outside Hong Kong. After they had gained experience and established reputation in the industry, it was suggested that they would return to Hong Kong, bringing in new ideas from abroad. This questioned the need to recruit foreign talent for the animation industry.

Furthermore, Hong Kong used to be vibrant in television production, film production and Cantonese songs. There were many famous TV and film directors and producers, composers, singers and scriptwriters. Due to the lack of growth potential in recent years, there were few young people joining the industry and a number of experienced professionals have moved to work elsewhere. Again, this raised questions about the need to recruit foreign talent for the creative industries.

Arts managers and administrators, which required at least 10 years of relevant experience were also reportedly in short supply. However, the low salary package, at around HK$10,000 - HK$20,000 per month had discouraged young workers from joining the profession. In addition, for arts managers and administrators, local talents were usually preferred, as they had knowledge of local arts markets and preferences of audience. For artists such as dancers, musicians and arts in other performing arts such as drama, it was also difficult to recruit due to the poor employment conditions, such as low salary, unstable income and lack of career prospects for these artists. Musicians, for example, preferred to become music teachers rather than practitioners in the arts and cultural industry. Besides, The West Kowloon Cultural District Authority was also competing over performing artists, arts curators and arts managers and administrators with the private sector.

Although the Hong Kong creative industries have great potential, there is a risk that there would not be sufficient job opportunities to absorb the supply of local talents who had to look for employment elsewhere (e.g. Mainland China). Many local talents were not even able to find full-time jobs. Song composers, for example, are typically working part-time or as freelancers with unstable income.

In addition, it was stressed that Hong Kong had to train up local talents. There were two types of talents, organic and mechanical. For organic talents (e.g. composers of songs), they had to be groomed at an early age. For mechanical talents, their skills could be trained through repeated practice. To attract local young people into the profession, supportive Government policy and a business-friendly environment coupled with sufficient protection of IP are required. Apart from artists, other occupations are also important to the healthy development of the industry; examples include film writers, but their pay was not attractive enough to attract talents, both local and foreign.

On the other hand, many faculty members of local post-secondary institutions for programmes on the creative industries had to be recruited from overseas. There seemed to be a scant supply of local talents in disciplines such as animation, games, arts management, curating, film and video production and still photography. It was further pointed out that many talents in the creative industries did not go through the traditional education system, and hence do not necessarily have a degree. Such academic qualification requirements had hindered the recruitment of suitable talent for these types of creative roles.

In addition, for the industry as a whole, difficulties in recruitment were experienced in respect of costume-making professionals, theatre directors and arts managers. It was pointed out by another industry stakeholder that, although the Hong Kong Academy for Performing Arts had training programmes for costume designers, the Academy did not train costume makers. Furthermore, as experienced costume makers retired, the salary package for costume makers was not necessarily attractive enough to encourage new blood joining the profession.

Two industry stakeholders added, more specifically, that there was shortage of talent in the following occupations:

1. *Conservator/Restorer (Museum)*. Conservator/restorer is involved in conservation and restoration of art pieces. To effectively conserve/restore the artistic creations, the conservator/restorer has to be an expert specializing in handling the type of materials used in the art piece. There are experienced conservators/restorers in the Government. They are, however, unlikely to leave the public sector, to meet demand in the private sector. Furthermore, there is a lack of training in Hong Kong to develop local talent.
2. *Curator*. There is a demand for curators in both Visual Arts and Performing Arts, and overseas specialists in these areas generally have to be recruited. Expertise in curating has to be developed not just through academic study, but also work exposure and on-the-job training. However, there is scant work opportunity to develop local talent.
3. *Producer/senior arts administrator (senior leadership)*. There is a shortage of arts administrators, including local supply of mid-level talents who are ready to take over from retiring experienced arts administrators. There is lack of experienced arts administrators to drive and promote arts activities. Currently, promotion of arts activities relies on artists. It is also noted that a number of senior administrators in Hong Kong are recruited from overseas.

According to stakeholders, local productions, including television production, are not competitive in terms of quality (for instance when compared to Korea). Reportedly, this is somewhat due to the lack of competition and investment. Investment is low partly because of intellectual property infringement related to on-line piracy[77].

The need for talents in the arts and culture industry is driven by job-based, project-based, or status-based but not by market demand. It often depends on the nature of the group/ troupe and their needs for different types of talents in the projects in progress. Sometimes, it also depends on “connection”, such as some performing groups or artists have connection with overseas performing groups, and overseas talents are therefore required on a temporary need basis.

As regard recruitment of foreign talents, an industry stakeholder cautioned that local artists might question why the government did not devote resources to train up local talents. Unless the government makes a conscientious effort to promote arts and culture, including foreign talents in the arts and cultural industry in the Talent List will not likely to be accepted by local artists.

[77] Stakeholders suggested that Hong Kong develops an intellectual property (IP) financing to support the industry.

In the end, some stakeholders noted that businesses involved in the arts sector are not necessarily big companies and the GEP system of applying for employment visas might not be best placed to cater for the manpower needs of art companies.

In short, there are different views as to whether arts and culture talents should be included in the Talent List. Indeed, the views collected had not established the strong demand for foreign talents in the arts and culture industry. Industry stakeholders believe the supply is sufficient to meet current general demand, but the Government reflects that top talents can help stimulate the development of this industry through creating new job opportunities and introducing new ideas.

A forward-looking view on the creative industries

While concerns raised by stakeholders are quite valid, it should not be forgotten that they refer to situations on the ground. The views put forward by government bureaux and departments, on the other hand, focus on the development potential of arts and culture and creative industries in general.

It is noted that creative industries have immense development potential. They are not merely a cluster of emerging professions that are popular among young people, but are also a powerhouse that will drive the economy, add value and make Hong Kong a more attractive international city. From 2005 to 2015, the value added in nominal terms contributed by creative industries increased at an average annual rate of 5.4%. The number of employees and establishments in these industries also increased by around 15% and 39% respectively. In 2015, the value added in nominal terms contributed by creative industries exceeded HK$57 billion, accounting for 2.5% of our GDP. These industries also employed over 135 000 persons.[78]

It is also noted that in proposing the Belt and Road initiative, the Central Government uses the Five Co-ordinations as its overall objective; they are the co-ordination of policies, connectivity of facilities, unimpeded trade activities, ease of capital flow, and people-to-people links. The aims are to facilitate the joint development of countries along the Belt and Road route, and to promote co-operation in areas such as culture, economy, finance and infrastructure development.[79]

It is believed that Hong Kong can make use of the Guangdong-Hong Kong-Macao Bay Area to proactively promote the further development of creative industries in Hong Kong. [80] More specifically, a number of industry stakeholders consulted pointed out that are several industry sectors and occupations which merit more support from the Government through the importation of foreign talents.

Firstly, stakeholders from the music industry pointed out that demand for high quality music is increasing, with its share accounting for more than half of music market share. This in turn has created a strong demand for top-notch talents in the field of recording engineering and master engineering. On the other hand, there is scant supply of locally trained talents in these two occupations. It is expected that foreign talents could help train up local talents and help develop the high-quality music industry sector.

In addition, in recent years, there has been a renewed interest in Vinyl LP, which in turn has created a strong demand for top-notch talents in cutting Vinyl LP. The supply of local talents is also limited. Thus, it is essential for Hong Kong to bring in foreign talents in cutting and pressing for Vinyl LP to support the development of Vinyl LP production in Hong Kong.

[78] Chief Executive's Policy Address 2017, para. 84 – 85.

[79] https://macaunews.mo/features/macau-to-set-sail-on-belt-and-road-route/, retrieved on 11 February 2018.

[80] Chief Executive's Policy Address 2017, para. 84 – 85.

There is no formal qualification requirement for talents in recording engineering, mastering engineering and cutting/pressing engineer for Vinyl LP. While these talents usually have a university degree, this is not an absolute requirement. Apart from in-depth knowledge and experience in music, these talents are recognised for the quality of their products, through the winning of international prizes. Most of them have at least five years of relevant experience. They are expected to earn in the range of HK$1,000 per hour.

Secondly, a number of industry stakeholders consulted referred to the rapidly increasing popularity of digital entertainment, including but not limited to game. With the availability of games played on mobile phones, the growth potential for the game industry is expected to be great. There are three main areas of expertise required by the game industry, namely art designer, game developer/producer and game programmer. Among the three, there is an acute shortage of game developers and producers.

There is no formal qualification requirement for game developer and producer. What is more important is relevant working experience and demonstrated ability to develop or produce games of good quality. Industry recognition such as winning of prizes and recommendations by industry is also important. Top-notch talents in game development and production usually have at least 3 years of relevant experience. The expected salary of top-notch game developers is at least HK$28,000 per month and that for game producers, at least HK$42,000 per month.

Thirdly, it was pointed out by industry stakeholders that the film industry should not be overlooked. Although a number of local talents are going to the Mainland to work on film production, there is still a shortage of talents to support the film industry in Hong Kong. Thanks to the rapid development in film and related technology, film productions are now delivered through a variety of media and channels. The number of viewers is increasing rapidly. While the industry prefers the nurturing of local talents, the importation of foreign talents is also supported in order to help train local talents.
There are a host of positions where foreign talents are required, ranging from film producer, film director, screenplay writer, leading actor/actress, supporting actor/actress, cinematographer, film editor, art director, costume designer, action choreographer, film score composer, sound designer, original song composer, lyrics writer to visual effects designer.
Industry stakeholders stressed that proposed talents to be imported are top-notch practitioners. There are no formal qualification requirements for artists. It is their achievements and industry recognition that count.

Accordingly the following are proposed to be included in the Talent List:

- Music:
  - Recording Engineers
  - Mastering Engineers
  - Cutting/Pressing Engineers for Vinyl LP
- Digital Entertainment:
  - Game Development Experts (Game Designers, Game Programmers, Game Graphic Designers)
  - Game Producers
- Film:
  - Various roles in pre-production, production and post-production and winners of designated renowned international film festivals

4.3.2 Recommended Talent List

Based on the analysis in 4.3.1, 11 Industry Segments and Occupations (ISO) were proposed for inclusion in the draft Talent List. The draft Talent List was then validated by a further round of

consultation. A total of 12 bodies, including 3 advisory and statutory bodies (ASBs). Chambers of commerce and industry/professional associations were consulted by the consultant and/or the bureaux/departments concerned. After further consultation, the relevant ASBs and industry stakeholders generally welcomed or had no objection to relevant ISO in the draft Talent List. It is recommended that the following 11 ISO are to be included in the finalised Talent List:

(a) Environmental technology services - experienced waste treatment specialists/engineers;

(b) Financial services - experienced management professionals in asset management including but not limited to trust fund management;

(c) Financial services and maritime services - experienced professionals in marine insurance;

(d) Financial services – actuaries;

(e) Financial services - experienced professionals in fintech;

(f) Information and communications technology services - experienced data scientists and experienced cyber security specialists;

(g) Innovation and technology (I&T) experts in, but not limited to, the following fields: (i) pharmaceutical and life science/biotechnology; (ii) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (iii) materials science/nanotechnology;

(h) Maritime services - naval architects;

(i) Maritime services - marine engineers and superintendents of ships;

(j) Legal and dispute resolution services - (i) dispute resolution professionals specialising in resolving international financial and investor-state disputes; and (ii) transactional lawyers , in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states; and

(k) Creative industries professionals, including: (i) music: recording engineers, mastering engineers, cutting/pressing engineers for Vinyl LP; (ii) digital entertainment: game development experts (game designers, game programmers, game graphic designers), game producers; and (iii) films: various roles in pre-production, production and post-production and winners of designated renowned international film festivals.

A high-level overview of the assessment criteria for each of the selected ISOs is provided in Table 4.6 (over the page), followed by summary description. Detailed assessment results of each ISO are further provided in fiches at Annex 1.

Table 4.6 Industry sectors, professions and occupations recommended for inclusion in the Talent List and their respective scores on key assessment criteria

Legend	
✓	Yes, there is some evidence that the industry/profession meets this criterion
✓✓	Yes, there is strong evidence that the industry/profession meets this criterion
×	No, there is some evidence that the industry/profession does not meet this criterion
××	No, there is strong evidence that the industry/profession does not meet this criterion
o	Data gap, there is no evidence to assess this criterion

Sector	Proposed Professions/ Occupational groups	Including but not limited to the identified specific profession	High Skill	Shortage		Sensibility		Added on draft Talent List?
			ISCO Skill Level 4 / Salary level/ Education and Training	Local labour demand is growing	Local labour supply is limited	Development potential	Need for foreign talent	
Environmental Technology Services	1) Experienced waste treatment specialists / engineers	Waste treatment specialists or engineers	✓✓	✓✓	✓	✓	✓	✓
Financial Services	1) Experienced management professionals in asset management including but not limited to trust fund management	Investment analysts; Investment consultants; Fund managers;	✓✓	✓	✓	✓	✓	✓
	2) Experienced professionals in marine insurance [Note]	Marine insurance professionals	✓✓	✓	✓	✓	✓	✓
	3) Actuaries	Actuaries	✓	✓	✓	✓	✓	✓
	4) Experienced professionals in Fintech	Software developer; System analysts; Database designer and administrator; Systems administrator; Computer network administrator	✓	✓	✓	✓	✓	✓

Sector	Proposed Professions/ Occupational groups	Including but not limited to the identified specific profession	High Skill	Shortage		Sensibility		Added on draft Talent List?
			ISCO Skill Level 4 / Salary level/ Education and Training	Local labour demand is growing	Local labour supply is limited	Development potential	Need for foreign talent	
Information and Communications Technology (ICT) Services	1)Experienced data scientists	Data scientists	✓	✓	✓	✓	✓	✓
	2) Experienced cyber security specialists	Cyber security specialists	✓	✓	✓	✓	✓	✓
Innovation and Technology (I&T) Services	1) Experts in pharmaceutical and life science/biotechnology	Pharmaceutical, life science and bio-technology experts	✓	✓	✓	✓	✓	✓
	2) Experts in data engineering (e.g. data mining / data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial / chemical engineering, etc.	Data engineering, artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial / chemical engineering experts	✓	✓	✓	✓	✓	✓
	3) Experts in materials science/nanotechnology	Materials science and nanotechnology experts	✓	✓	✓	✓	✓	✓
Maritime Services	1) Naval architects	Naval architects	✓	✓	✓	✓	✓	✓
	2) Marine engineers and Superintendents of ships	Marine engineers and Superintendents of ships	✓	✓	✓	✓	✓	✓
Legal and Dispute Resolution services	1) Dispute resolution professionals specialising in resolving international financial and investor-state disputes international investment agreements 2) Transactional lawyers, in particular, those from developing Belt and Road countries, with specialised knowledge of and	Dispute resolution professionals and Transactional lawyers	✓✓	✓	✓	✓	✓	✓

Sector	Proposed Professions/ Occupational groups	Including but not limited to the identified specific profession	High Skill	Shortage		Sensibility		Added on draft Talent List?
			ISCO Skill Level 4 / Salary level/ Education and Training	Local labour demand is growing	Local labour supply is limited	Development potential	Need for foreign talent	
	experience in cross-border transactions from investing or host states							
Creative Industries	Talents in: (i) **music**: recording engineers, mastering engineers, cutting/pressing engineers for Vinyl LP; (ii) **digital entertainment**: game development experts (game designers, game programmers, game graphic designers), game producers; and (iii) **films**: various roles in pre-production, production and post-production and winners of designated renowned international film festivals	Creative industries professionals	✓	✓	✓	✓	✓	✓

Note: Experienced professionals in marine insurance span across financial services and transport services

4.3.2.1 Environmental technology services - experienced waste treatment specialists/engineers

Based on policy direction, the Government has a medium-term commitment to waste management by 2022. Evidence suggests that the industry is still in its infancy, but likely to experience growth in the future. With insufficient highly experienced home grown talent and the need for industry to adopt new advanced technologies, foreign talent seems to be the key in increasing innovation and to support future industry development.

Description of tasks

Plan, implement, and coordinate comprehensive waste management systems that are designed to maximize waste prevention, reuse, and recycling opportunities.

Typical qualifications

Based on practices in other countries, to qualify as a professional engineer requires at least a (Washington Accord accredited) bachelor degree in a related engineering discipline and membership with a professional engineering institution such as the Hong Kong Institution of Engineers.

Employers are looking for experienced environmental engineers. Evidence from the USA indicates that experienced environmental engineers have a bachelor's degree (or above) in their specific engineering field. Many are certified professional engineers (PE), a qualification that requires typically at least four years of work experience and the passing of written exams. For waste management engineers, relevant programs include waste management, environmental science, environmental management, chemistry, environmental engineering and civil engineering. It is expected that waste treatment specialists/engineers are considered to be highly-talented professionals. They are expected to have relevant Master or PhD degrees in the fields of advanced thermal waste treatment process or advanced chemical/physical/biological waste treatment process and 10 years of relevant on-the-job experience; or they are expected to have relevant bachelor degree in the fields of advanced thermal waste treatment process or advanced chemical/physical/biological waste treatment process and 15 years of relevant on-the-job experience.

Salary level

As a reference, in the UK, the annual salary of an experienced environmental engineer is GBP29,400 or around HK$23,000 per month. In the USA, in 2012, the median annual wage of environmental engineers was US$80,890 (or HK$52,600 per month). While cross-economy comparison is useful to show the divergence of salaries for environmental engineers, differences in the cost of living, tax rate, etc. across different economies and supply/demand factors should be noted.

4.3.2.2 Financial services - experienced management professionals in asset management including but not limited to trust fund management

The rationale for inclusion of these professionals is based on strong growth in the sector and the apparent shortage of qualified local talent to fill certain management and middle to back office positions.

Description of tasks

- **Investment analysts & investment consultants:** Research and prepare a wide variety of detailed investment opportunities, including alternative investment. Concerned with the development and retention of personal and corporate trust business and its administration with the objective of profit and quality services to customers.
- **Fund managers:** Supervise day-to-day administration of fund portfolios. Select the securities and shares of the fund portfolios, implement the investment policy and distribution policy as stated

in the trust deed. Calculate the unit price of fund portfolios, and promote various fund portfolios to customers.

Typical qualifications

Based on overseas skill shortage lists, a bachelor's degree in commerce, business administration, economics, law and on-the-job training and industry courses and programs are usually required. A master's degree in business administration (MBA) (concentration in finance) or in finance may be required. The Chartered Financial Analyst (CFA) designation, available through a program conducted by the Institute of Chartered Financial Analysts in the United States, may be required by some employers.

Consulted industry stakeholders noted undergraduate training in finance, law and accounting is required. In addition, Mandarin and English language skills are preferred [2015 FSDC report]. For trustee management, knowledge in finance and marketing as well as relevant experience is required.

At least 3 years of relevant experience in fund management industry is required, according to recruitment advertisements for the position of senior investment analyst in Hong Kong.

Salary level

Industry stakeholders noted the monthly salary package for a manager could be in the region of HK$50,000 plus bonus, and that for heads of departments, around HK$120,000 plus bonus, which can vary considerably between individuals and finance firms.

4.3.2.3 Financial services and maritime services - experienced professionals in marine insurance

Based on reported shortage of local talent and a specific need for skills related to overseas regulation the occupations are proposed to be included on the Talent List.

Description of tasks

- Carry out actuarial studies related to the establishment’s operations. Supervise the preparation of valuations and reports as required. Assist management in the formulation of insurance policies.
- Research and prepare a wide variety of detailed insurance opportunities. Advise businesses or individuals on matters related to insurance.

Typical qualifications

Experience in: running the day-to-day underwriting team, covering new business, mid-term adjustment and renewal requirements of both direct clients and broker accounts; monitoring binder progress; finding ways to grow accounts through competitive pricing and excellent service, including liaison with binder insurers to ensure insurance solutions is required.

Typical qualifications are: experience in the insurance business and preferably experience in working in maritime or logistics services, plus first degree in finance and insurance.

Working on board is not a requirement for marine insurance underwriters, but it is an advantage for those who have experience and are willing to work on board in ocean-going vessels or superyachts.

Work experience related to regulatory regimes in other economies is also preferable.

Salary level

For experienced professionals with 5 – 8 years of experience, the salary package can range from HK$35,000 to HK$60,000 per month. According to C&SD, the 2016 median monthly salary of actuarial professionals is HK$33,000.

For a chartered marine insurance professional in Canada, the annual salary ranges from C$38,000 to C$71,000, and the median is in the range of C$52,000. For a general manager in charge of marine insurance in USA, having 10 - 20 years of relevant experience, the annual salary ranges from US$70,000 to US$120,000.

4.3.2.4 Financial services – actuaries

Based on reported shortage of local talent and a specific need for skills related to overseas regulation the occupations are proposed to be included on the Talent List.

Description of tasks

Carry out actuarial studies related to the establishment's operations. Supervise the preparation of valuations and reports as required. Assist management in the formulation of insurance policies.

Typical qualifications

Based on overseas skill shortage lists, actuaries usually require post-secondary education in actuarial science, mathematics, statistics, economics, commerce or business administration. At least 5 years of post-qualification experience in related field is required.

Salary level

For experienced professionals with 5 – 8 years of experience, the salary package can range from HK$35,000 to HK$60,000 per month.

4.3.2.5 Financial services - experienced professionals in fintech

These professionals have been added to the Talent List based on reported shortages from several HR firms and industry representatives, as well as the overall policy direction. As Hong Kong is pursuing development into a Fintech hub, foreign talent specifically related to IT and technology parts of Fintech industry is needed, as it is hard to recruit locally and the local supply is unlikely to prove adequate to meet the strong expected growth in talent demand.

Description of tasks

- Software/Application developers, systems analysts, and database designer and administrator in the area of Fintech. These talents should be able to devise new and/or improved application of technology in financial services, which can improve operational efficiency, save costs, provide new and/or better modes of service delivery and increase the competitiveness of the financial services sector overall.

Typical qualifications

Degree in a relevant discipline, such as computer science, computer engineering, electronics engineering and information science is required. The nature of work in the Fintech is diverse. Due to rapidly-changing technology, it is important to consider both the candidate's length of experience as well as experience with the leading companies in relevant field such as artificial intelligence, advanced software skills (computer programming), big data analytics, Blockchain applications and cybersecurity. The candidate should also show the ability to leverage new technology, including knowledge of applying technology to provide solutions in financial services, and creativity.

Salary level

Salary levels depend on the length and nature of working experience. Data scientists with 10 years of working experience, with at least 5 years data science or data analytics, could be offered a salary package of HK$60,000 – HK$75,000 per month from non-finance companies and HK$75,000 – HK$90,000 per month from finance companies .

4.3.2.6 Information and communications technology services - experienced data scientists and experienced cyber security specialists

Data scientists have been added to the Talent List based on high demand and supply shortage identified by consulted industry stakeholders (DS).

Inclusion of cyber security specialists in the Talent List has been proposed as many business corporations will be recruiting cyber security specialists to help safeguard their online ICT platforms, with the increased use of online ICT platforms and the increasing incidence of cyber-crimes (CSS).

Description of tasks

- **Data scientists:** Data scientist is a relatively new and evolving profession. Data scientists work with large datasets (Big Data) that are generally too complex for analysis using conventional statistical methods and analytical tools. This data can be structured (e.g. data from GPS instruments), or unstructured (e.g. photos, social media). Data scientists use machine learning and statistical methods, data mining, optimization techniques and artificial intelligence to meet client business needs; develop and implement statistical tools to build predictive models helping support clients and work plans
- **Cyber security specialists:** Design and maintain the information security standard and policy, and, support the front-line defence by analysing potential security risks and developing mitigation measures against cyberattacks, carry out assessment and auditing the security implementation, while ensuring the security implementation is always followed by the IT departments.

Typical qualifications

- **Data scientists:** Bachelor degree in mathematics, statistics, computer science, operational research or engineering is required. Master or PhD degree is an advantage. Due to the rapid changing technology, the length of experience is not as important as experience in applying data analytics skills in relevant industry sectors, such as insurance, financial services, retail, marketing, healthcare, logistics, and in smart city development.
- **Cyber security specialists:** Based on overseas skill shortage lists, a bachelor's or master's degree in computer science or engineering is usually required. Certification on networking (such as CCIE) and information security (such as CISSP and CISA) is also required. Several years of experience in network design or computer programming, including supervisory experience and implementation, and Internet and cyber security, are required. Based on VTC ICT Manpower Survey 2016, experience in undertaking design, technical support and review on IT/network security, firewalls and intrusion detection; drafting the information security standards, policy and procedures; and ensuring the implementation/work plans are always followed by the IT teams and departments. Typical qualifications are first degree in IT, with 2 – 10 years of relevant experience in relation to Internet and cyber security.

Salary level

- **Data scientists:** In 2016, data scientists with over 10 years of IT working experience and a minimum 5-year data analytics experience could be offered HK$60,000 to HK$75,000 a month

from non-financial services companies. The salary could reach HK$75,000 to HK$95,000 if employed by financial services companies.

- **Cyber security specialists:** According to VTC Manpower Survey Report (2016), salaries of the top 16% of IT security specialists could reach the range of HK$600,001 – HK$1,080,000 per annum. According to C&SD, the 2016 median monthly salary of systems operation professionals was HK$30,000 per month.

4.3.2.7 Innovation and technology (I&T) experts in, but not limited to, the following fields: (i) pharmaceutical and life science/biotechnology; (ii) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (iii) materials science/nanotechnology

R&D personnel in innovation and technology are high skilled talents, required for current R&D activities in Hong Kong and to support the development potential of Hong Kong into an innovation hub for the region. The local talent pool may not sufficiently fill current and future needs.

Description of tasks

A broad range of tasks related to research and development in related innovation field.

Typical qualifications

- **Pharmaceutical and life science/biotechnology**

In most countries, pharmacists must obtain a university degree at a pharmacy school or related institution, and/or satisfy other national/local credentialing requirements. In many contexts, students must first complete pre-professional (undergraduate) coursework, followed by about four years of professional academic studies to obtain a doctoral degree in pharmacy.

For biotechnologists, the typical qualification is a degree in a relevant scientific subject such as biotechnology, biochemistry, biology, chemistry, microbiology, environmental biology or chemical engineering. A postgraduate qualification such as a masters or PhD is usually required.

- **Data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.**

For data scientists, the typical qualification is a degree and preferably a post-graduate degree in relevant fields such as computer science.

For artificial intelligence experts, they usually have relevant training software engineering addition to a degree in artificial engineering.

For robotic engineering experts, a post-graduate degree in Robotics, Computer Engineering, Electrical Engineering, Mechanical Engineering or equivalent, and several years of experience in developing mobile robot, serial-arm robot, and their robotic applications is required.

For blockchain professionals, a background in computer science or engineering, plus further training in blockchain is required. In addition, experience in a back-end developer role is crucial in addition to strong back-end skills.

For biometrics engineers, the qualifications is a degree in computer science or biometrics and 3 years of related experience, a master degree in relevant fields plus 1 year of related experience, or a PhD degree in relevant field.

- **Materials science/nanotechnology**

For materials scientists, the typical qualification is a degree in relevant discipline such as applied chemistry, applied physics, materials engineering or materials science or technology. For many research jobs, a post-graduate qualification is usually required.

For nanotechnologists, the typical qualification is a master degree in nanotechnology or related fields and experience of working in a laboratory. For some employers, a PhD degree is required.

Notwithstanding the typical qualifications above, due to the rapid changing development of the I&T sector, education attainment and the length of experience may not be as important as having attained outstanding achievements in top-notch I&T institutions, corporations and R&D organisations, which could prove that the applicant is a well-recognised talent.

Examples of such proof include:

- examples of invention in relevant fields as a director/founder/key staff member of an I&T institution, corporation or research and development organisation; or
- proof of recognition of work outside the applicants' immediate occupation that has contributed to the advancement of the field; or
- significant technical, commercial, or entrepreneurial contributions in the relevant sector as either a founder or entrepreneur or key staff member of a company in the relevant field; or
- widely recognised as a world leading talent (e.g. recipients of renowned awards in the field); or
- examples of exceptional ability in the field by making academic contributions through researches published in authoritative journals or endorsed by renowned experts.
- Recommendation by reputable R&D Centres, Quangos and Tertiary Institutes in relevant field

Salary level

For pharmaceutical professionals, the average annual salary is US$189,900 and that for the top 25% is US$231,200.

The annual salary in the UK for highly experienced biotechnologists is GBP60,000.

For materials scientists, in 2016 the median annual salary was US$99,430. For the top 10%, the salary was US$157,750.

For data scientists, in 2016, a candidate who had over 10 years of working experience with a minimum 5-year data science or analytics experience could be offered HK$60,000 to HK$75,000 a month from non-financial services companies whereas his salary could reach HK$75,000 to HK$95,000 if he is employed by financial services companies.

For artificial intelligence experts, the annual salary in the US ranges from US$145,000 to US$231,000, with the average at around US$186,000.

For robotics engineers, in the UK, the median annual salary is GBP36,000 and the maximum could reach GBP75,000.

For blockchain experts, their salaries vary considerably. In the UK, large corporations such as banks pay around GBP100,000 per annual for an expert with five years or more.

For biometrics engineers, in the US the annual salary ranges from US$75,000 to US$85,000 and the average is US$78,000.

For materials scientists, in the US, in 2016, the median annual wage was US$99,430 and for the top 10%, the annual wage was US$157,750.

According to stakeholders consulted, the pay package is around HK$40,000 – HK$60,000 per month for a technical manager in nanotechnology. In the UK, the annual salary of a higher experienced nanotechnologist is GBP60,000.

4.3.2.8 Maritime services - naval architects

It has been recommended to include naval architects on the Talent List to support high-value operations in a strategically-important sector.

Description of tasks

Study and prepare specification for the building, conversion or repair of ships or offshore structures. Study, design, and advise ships and offshore structures. Plan and supervise their overall design, development, construction, operation, maintenance and repair. Provide professional advice for the certification and registration of vessels in accordance with the requirements of international conventions.

Typical qualifications

For naval architects, experience in designing, building, and maintaining of different types of ships. Naval architects are primarily responsible for the ship design, including the form, structure, and stability of ships, and they are engineers that design and develop systems to build or maintain ships and other structures for the seas.

Requirement to become a naval architect is a Bachelor's degree from an university in naval architecture, and five years of full-time experience of work in shipping companies, classification societies or shipyards etc. in the planning, administering or expediting of ship design, and/or construction, or coordinating a very large engineering project relating to vessel/superyacht design, shipbuilding or ship modification, two years of which must have been in an administrative, managerial, executive or supervisory capacity.

Salary level

International pay scale suggests that the salary for naval architects is in the range of US$53,000 - US$146,000 per annum (equivalent to HK$35,000 – HK$95,000 per month).

4.3.2.9 Maritime services - marine engineers and superintendents of ships

It has been recommended to include marine engineers and superintendents of ships on the Talent List in response to the lack of availability of local talents and the importance of the industry.

Description of tasks

Examples of the duties of marine engineers and superintendents of ships include the following:

- Responsible for the overall management and technical operations of assigned fleet of ships in a safe and profitable manner. This includes overseeing the daily operations of maintenance and repair, budgeting, survey schedules, training, on board supervision and monitoring, general assessment of vessels, inspections and docking;
- To provide technical assistance and advice to ships both at home port and overseas;
- To monitor technical status of vessel with relation to statutory certification and survey;

- To perform technical compliance audits and investigation on defects/failures on a regular scheduled basis to ensure conformance with regulatory requirements;
- To work closely with the management team and perform systematic review of the Quality, Health, Safety, and Environment (QHSE) system to ensure its smooth and successful implementation;
- To ensure the assigned vessels are technically operational and maintain vessels' zero loss time accident record and to report all vessel incidents, Near Misses to prevent and eliminate potential incidents;
- To liaise with management, customers or stakeholders on technical and operational matters including performance, expenditure and condition of the vessel;
- To attend to vessel dry docking, repairs and survey when required and prepare repair specifications for dry docking and maintenance; and
- To provide training to seafarers to ensure they are conversant with the company safety management system.

Examples of the duties of marine engineers working in the classification societies or as private surveyors include the following:

- To conduct statutory certification and surveys throughout the ship's life (building new ship, annual survey, interim survey, special survey) to ensure that the ship, its components and machinery are built and maintained according to the standards required for their class and complying with international standards;
- To witness tests and operation of emergency and safety machinery and equipment;
- To examine ships' cargoes or on-board conditions such as fuel quality; investigating accidents at sea (e.g., oil spillages or failure of machinery or structures which are not considered to be critical); and preparing accident reports for insurance purposes;
- To investigate marine accidents in relation to fire or engine failure; and
- To attend court as an expert witness.

Typical qualifications

Typical qualifications include minimum of 2 years' sailing experience as Chief Engineer, i.e. holders of Class 1 Certificate of Competency of Marine Engineer Officer, with 2 years of experience as Superintendent or previous experience in a Senior Engineering position in the Marine Industry; or

Post-graduate Degree (MEng or MSc) or equivalent qualification in Marine Engineering or Mechanical Engineering or other related discipline with 5 years of experience as Superintendent or previous experience in a Senior Engineering position in the Marine Industry is required.

Salary level

The annual salary of superintendents of ships in Asia region is around of US$92,700

4.3.2.10 Legal and dispute resolution services - (i) dispute resolution professionals specialising in resolving international financial and investor-state disputes; and (ii) transactional lawyers, in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states

It has been proposed to include dispute resolution service providers on the Talent List to support the development of Hong Kong into a leading centre for international dispute resolution.

Description of tasks

- Dispute resolution professionals
  - Arbitrators: neutral parties who render final and binding decisions at the conclusion of arbitral proceedings; and
  - Mediators: impartial individuals, who, without adjudicating a dispute, assist the parties to the dispute to reach a negotiated settlement.
- Transactional lawyers

  The transactional lawyers from outside Hong Kong who possess specialised knowledge of and experience in cross-border transactions in which their countries or jurisdictions play the roles of investing or host states are those who are in the best position to advise their clients in adopting a choice of law clause and a dispute resolution clause favourable to Hong Kong, resulting in enhancing Hong Kong's position in the international legal community and benefitting the local legal and dispute service providers.

Typical qualifications

Subject to the agreement of the parties, parties may appoint a person as an arbitrator or mediator regardless of the nationalities and professional qualifications of that person. In Hong Kong, other than the lawyers and retired judges, many other professionals, such as accountants, engineers and surveyors, also serve as arbitrators or mediators.

Transactional lawyers from outside Hong Kong are those who possess legal qualifications from their home jurisdictions and specialise in advising their clients on cross-border transactions.

Salary level

Varied

4.3.2.11 Creative industries professionals, including: (i) music: recording engineers, mastering engineers, cutting/pressing engineers for Vinyl LP; (ii) digital entertainment: game development experts (game designers, game programmers, game graphic designers), game producers; and (iii) films: various roles in pre-production, production and post-production and winners of designated renowned international film festivals

To support the development of Hong Kong into a trend-setting creative capital in the region, and thereby create more job opportunities, it seems that foreign experienced talents in creative industries are the key to achieve such goal.

Description of tasks

- **Music**
  - *Recording engineers*

    Responsible for recording, editing and mixing audio.
  - *Mastering engineers*

    Conduct the important stage of fine-tuning the recorded music.
  - *Cutting/Pressing engineers for Vinyl LP*

    Produce top quality records and Long Plate records.

- **Digital entertainment**
  - *Game development experts (Game designers, Game programmers, Game graphic designers)*

    Software

    Involve in various aspects of a game's creation from concept and story writing to the game design and programming. Other areas of work include audio, design, production, game technology research and visual arts.
  - *Game producers*

    Set the direction of the game, define the strategy of the game, assemble and manage a team of engineers, designers and artists; outline, schedule and track tasks; make sure the project is heading the right direction and assure the quality of the game.
- **Films**
  - *Film producers*

    Plan and coordinate various aspects of film production such as selecting scripts, coordinating scriptwriting, directing and editing and arranging financing.
  - *Film directors*

    Oversee a film's entire artistic production and are responsible for interpreting and expressing in a film the intentions of the screenwriter and producer as set out in the screenplay.
  - *Screenplay writers*

    Write a screenplay for film production.
  - *Leading actors/actresses*

    Take up the leading role of performance in a film production.
  - *Supporting actors/actresses*

    Take up the secondary role in a film production.
  - *Cinematographers*

    Make decisions on lighting and framing of scenes in consultation with the director.
  - *Film editors*

    Work with the raw footage, selects shots and combines them into sequences to create a finished motion picture.
  - *Art directors*

    Oversee artists and crafts people, such as set designer and set decorator, and is responsible for planning and executing the design of the sets, properties, set dressing and scenery.
  - *Costume designers*

    Responsible for, planning, designing, and production of the wardrobes for all the actors on screen.
  - *Action choreographers*

    Design action scenes and work with the director to shoot dramatic action sequences.

- *Film score composers*

  Write the musical score for a film production.

- *Sound designers*

  Supervise the work of the entire sound post production process as well as having a specialised role in creating the sound concept for production, and work with the director and editor to balance the sound to their liking.

- *Original song composers*

  Write, compose, create or conceive the music of a song for a film.

- *Lyrics writers*

  Write the lyrics of a song for a film.

- *Visual effects designers*

  Assess the parts of a film production that need visual effects (VFX), ensure the VFX shots are filmed correctly on set, and negotiate with the production crew the budget and discuss with them the feasibility of the VFX works.

Typical qualifications

- **Music**

  - *Recording engineers*

    Possess special skills to produce top quality records, having completed a specialised programme in a vocational school or a degree in audio engineering, sound engineering technology, etc., and a winner of Grammy Awards (Best Recording Engineer Awards), Beijing 北京十大錄音師大獎 and Guangzhou 廣州華語金曲獎最佳錄音師獎 or other renowned and industry-recognised Mainland/overseas music awards.

  - *Mastering engineers*

    Hold a degree in acoustic engineering, audio engineering or music production engineering, having in-depth deep understanding on the science behind and the artistic touch of sound; and a winner of Grammy Awards (Best Mastering Engineer Awards) or other renowned and industry-recognised Mainland/overseas music awards.

  - *Cutting/pressing engineers for Vinyl LP*

    Possess special skills to produce top quality records and Long Plate records. As there is no award for the Pressing Engineer for vinyl LP, assessment should be made basing on a candidate's CV, profile and past track record of producing famous records, his/her scientific or professional experience in the communications field, including the design or marketing of audio mixing equipment or audio broadcast equipment. Have at least 10 years of active participation in broadcasting engineering or its associated fields and have demonstrated sufficient technical proficiency.

- **Digital entertainment**

  - Game development experts (Game designers, Game programmers, Game graphic designers)

    Possess 3 years of experience in game development and having played the role of a game designer, game programmer or game graphic designer in the development of a successful game that had won any category of awards in one or more well-recognised awards in the

Mainland or overseas, e.g. awards given by 中國音像與數字出版協會遊戲出版工作委員會, British Academy Games Award, The Games Award (U.S.A.), Game Developers Choice Awards (U.S.A.) and Game Star Award (Taiwan).

- *Game producers*

  Possess 5 years of experience in game development and having played the role of a game producer of a successful game that had won any category of awards in one or more well-recognised awards in the Mainland or overseas, e.g. awards given by the 中國音像與數字出版協會遊戲出版工作委員會, British Academy Games Award, The Games Award (U.S.A.), Game Developers Choice Awards (U.S.A.) and Game Star Award (Taiwan).

- **Films**

Various roles in pre-production, production and post-production and winners of designated renowned international film festivals, for example the Tier I and Tier II events under the "Sponsorship for Local Films Nominated to Participate in Film Festivals Overseas" of the Film Development Fund

Salary level

- **Music**

Recording engineers: HK$60,000 – 70,000 per month

Mastering engineers: HK$60,000 – 70,000 per month

Cutting/pressing engineers for Vinyl LP: HK$60,000 – 70,000 per month

- **Digital Entertainment**

Game development experts: At least HK$28,000 per month, subject to working experience

Game producers: At least HK$42,000 per month, subject to working experience

- **Film**

Practitioners in film industry are remunerated on a project basis and their remuneration varies significantly depending on various factors such as the time spent on the film project, type of the film, film crew composition, etc. The estimated range below of remuneration per project for each position as set out below is based on the estimated remuneration for production of a Chinese film of budget from HK$6 million to HK$150 million.

Position	Range of Remuneration per Project (HK$)
Film producer	200,000 – 8 million
Film director	300,000 – 10 million
Screenplay writer	200,000 – 5 million
Leading actor/actress	150,000 – 20 million
Supporting actor/actress	25,000 – 1.2 million
Cinematographer	180,000 – 2 million
Film editor	90,000 – 800,000
Art director	120,000 – 800,000
Costume designer	90,000 – 800,000
Action choreographer	20,000 – 200,000
Film score composer	80,000 – 400,000
Sound designer	50,000 – 800,000
Original song composer	20,000 – 200,000
Lyrics writer	15,000 – 150,000
Visual effects designer	100,000 – 1.2 million

4.4 Proposed updating mechanisms

This section sets out the key considerations and proposes options for updating the Hong Kong Talent List. It is based on the experiences of the initial Talent List development and the lessons from the international examples. The first part of the section sets out the factors to be considered in designing an updating process to help build consensus and so that updating is workable and meets its objective and the needs of stakeholders. The second part of the section translates these considerations into a set of options based on the evidence (including a recommended option).

4.4.1 Key considerations

The key areas that underpin the development of an agreed updating process are:

- **Data availability:** Understanding how wider policy developments, especially with regard to the collection of quantitative data, may inform the Talent List updating process; resourcing and proportionality of approach.
- **International evidence:** Reflection on how other countries have approached the updating of their occupational shortage lists.
- **Establishing parameters for updating the Talent List:** Agreeing the purpose and general principles for updating the Talent List; the timescale for updating the Talent List; sources of evidence that can be incorporated.

These areas are inter-linked. For example, the proportionality of the Talent List updating process may depend on how occupational and employment data is gathered in future. The appropriate timescale is linked to the purpose of the exercise and required steps.

4.4.2 Data availability

In all countries studied, there are common principles for designing and updating occupational shortage lists, but each approach depends on the data available at national level. **The future availability of data to support quantitative indicators will therefore inform any future action to update the Talent List in Hong Kong**.

The lack of current data has been a feature in the initial Talent List development. It has already been recommended that the Government should consider developing a stronger quantitative evidence base in the long-term:

- This includes potentially enhancing the VTC Manpower Surveys to provide comparable cross-occupation data on employment level, demographics and turnover[81].
- In order for this evidence to be useful for the purpose of updating the Talent List, there is a need for sufficient occupational granularity (at least 4-digit occupational level), given that the Talent List is framed at the detailed occupational level.

Adding occupational granularity to workforce/employer surveys adds an exponential cost to the required sample size. The benefits in terms of being able to assess relative demand for different occupations (on a truly comparable basis) has to be looked at alongside the additional resource requirements, and take account of the fact that quantitative data is only one part of the overall assessment.

[81] The Training Boards of VTC conduct Manpower Surveys for 24 industries/sectors to project their manpower requirements and business outlook. Since 2017-18, VTC conducts full Manpower Surveys once every four years in addition to periodic information updates through desk research and focus group interview so as to precisely reflect the latest development of industries. It is noted that under the current mechanism, no cross-reference is made among the Manpower Surveys of different sectors.

The initial Talent List has been able to draw 'bottom up' on a range of sector surveys to support the assessment. This is more resource intensive than being able to analyse a single cross-sectoral dataset, and has the weakness of being less able to contextualise the results (i.e. to compare between sectors). However, this does not mean that additional resources for quantitative cross-sector data gathering are necessarily justified:

- Where other countries have invested in this type of evidence, it has been to serve multiple purposes – and may not directly be driven by Talent List considerations at all (although Talent List development can benefit from the data).
- Skills and employment forecasting are typically driven by higher-level policy requirements for long-term planning – in terms of support for employers, or to influence the training and education sector.
- Information on student enrolments (and often, more usefully, on student destinations) is either driven as an administrative requirement for public funding purposes, to inform university/college planning, or as an accountability tool.

The future availability of additional quantitative data to support the updating of the Talent List therefore cannot be assumed, and is a question that reaches beyond the scope of the Talent List itself in terms of the case for providing additional resources for generating this data. This suggests that **any process for updating the Talent List has to be based on the current availability of data, but should be mindful that in the medium- to long-term new data may become available.**

4.4.3 International evidence

Proposals for updating the Hong Kong Talent List draw on the international experiences reviewed as part of the project. Key dimensions of the closest comparator examples (Australia; Canada; New Zealand; Singapore; South Korea), which all have – or recently had – talent lists that have generally been in place for at least ten years are set out in Table 4.7.

Table 4.7 Descriptive overview of methodologies to draw-up and update lists of shortage professions

	Australia	Canada	New Zealand	Singapore	South Korea	United Kingdom
Name	Skilled Occupations List (SOL)	Priority Occupational List (POL)	Essential Skills In Demand Lists (ESIDs)[82]	Strategic Skills-in-Demand List (SSL)[83]	List of occupations eligible under E-7 visa scheme	Shortage Occupation List (SOL)
Number of Professions on the List	190 (2015/16 version)	50 (2014 version)	22 occupation groups[84] (2015 version)	8 occupational groups covering 99 occupations (2012 version)	82 occupations[85] (2013 version)	130 job titles within 35 professions (2015 version)
Aim	To identify occupations that would benefit from independent skilled immigration to meet medium to long-term skill needs of the Australian economy.	To better align the labour market needs with the immigration system and to reduce the overall number of new applicants.	To align immigration policy to labour market demand.	To signal strategic and/or in-demand occupations to locals and foreigners.	To meet changing demand from employers for foreign professional workers.	To encourage immigration from skilled professionals worldwide in occupations where UK faces shortages.
Methodology	Mainly based on quantitative evidence, e.g. labour force data, graduate surveys, employment projection, etc. Views from industry stakeholders, employer representatives/professional organisation will also be collected.	Mainly based on the quantitative analysis of forecast labour market skills shortages. The final "sensibility" criteria is applied to withdraw occupations from the POL if those occupations required specific Canadian experience, e.g. public sector management, judge, etc.	According to the nominations of occupations from industry stakeholders, the Department of Labour would further assess the occupations based on the skill level, scale and shortage. Final decisions would be made by the Minister of Immigration after receiving additional information from industry groups.	Based on the occupation shortage statistics through quarterly labour market surveys, and inputs on shortage skills and skills strategic for economic growth from various industry bodies.	Based on requests from employers on the types of foreign professionals required in Korea, the ministries would submit the recommendations to the inter-ministerial advisory committee for further advice. The Ministry of Justice has the statutory authority in deciding which of the occupations is included in the E-7 visa scheme.	Based on the quantitative analysis of national survey data, the Migration Advisory Committee (MAC) would then gather views from industry stakeholders through various means. The MAC would shortlist occupations that fulfil the three criteria, i.e. skilled (NQF Level 6), shortage of labour and sensibility (sensible for labour shortage to be filled by immigrant labour).

[82] The ESIDs consist of three separate lists, namely Long-term Skill Shortage List (LTSSL), Immediate Skill Shortage List (ISSL) and Canterbury Skill Shortage List.

[83] The SSL was abolished in 2013.

[84] LTSSL: 10 occupational groups covering 77 occupations; ISSL: 7 occupational groups covering 59 occupations; Canterbury List: 5 occupational groups covering 34 occupations.

[85] The occupations selected are classified into two categories: (i) Job activities determined by contract with public and private institutions and (ii) Cutting-edge technology jobs.

	Australia	Canada	New Zealand	Singapore	South Korea	United Kingdom
Criteria and process used to determine whether occupations should be added to the list	There must be high-quality information available to evidence the need, and that evidence must show two out of the three following: – Long lead time (to develop supply), – High skill use, – High risk for economy (e.g. licensing and registration requirements; risks to businesses being able to operate legally; government policy priority)	- List of occupations projected to be in risk of shortage by Canadian Occupational Projection System (COPS) - Results from forecasting activities of the provinces and territories using different methodologies - Analysis of the Citizenship and Immigration Canada (CIC) backlog of applications whether supply of occupations in the applications inventory could meet the projected labour market demand.	Employers invited to propose changes to the list. Proposed occupations must meet three requirements: – Occupation must be skilled: Level 1-3 on ANZSCO skill level classification – Occupation must have sufficient scale: 2000 workers in occupation or at least 50 visa approvals in previous 12 months – Occupation must have shortage	With frequent consultations with the industries, the Ministry of Manpower would shortlist occupations based on high value added, specific skill set requirements and existing local workforce gap.	Ministries conduct their own follow-up including site visits to employers to see if the requests are justified. The ministries will set different quota and salary requirements for the occupations proposed to be included in the E-7 visa scheme. Information on the detailed mechanism, including the types of qualitative and quantitative information reviewed by individual ministries, the different quota set for each occupation and the different salary requirements is confidential	Indicators that occupation is skilled: - Typical earnings or ranges of earnings in the job title, - Proportion of the workforce qualified at particular levels - Occupation has a compulsory level or duration of on-the-job training or experience required to become a skilled practitioner. - Indicators that occupation has shortage: - Employer-based indicators (e.g. reports of shortage), - Price-based indicators (e.g. earnings growth), - Volume-based indicators (e.g. employment or unemployment), - Other indicators of imbalance based on administrative data.
Updating Frequency	Annually	Annually	Annually	2-3 years	Not clearly defined	Upon request by the government. MAC recommends bi-annually

Updating mechanisms of occupational shortage lists overseas always include quantitative analysis based on national labour force data and existing analysis of labour market shortages. Often quantitative analysis presents a first step of drawing up occupational shortage lists (e.g. in Canada and the UK). Generally though these countries have access to much more detailed occupational labour market information than is currently available in Hong Kong.

In many cases studied, qualitative analysis and data gathering is conducted to narrow down the first list based on quantitative analysis of national data. However, a different method which might fit the Hong Kong context and its lack of existing and detailed labour market data is observed in New Zealand. In New Zealand, the Ministry initiates a so called Occupation Nomination Procedure where industry stakeholders (i.e. employers' groups, trade unions and industry training bodies) are invited to submit proposals for an occupation to be included, removed or moved between the lists. After the proposals are received, the Department of Labour prepares a Preliminary Indicator Evidence Report which draws together evidence of skill level, scale and shortage for each occupation under review.

All reviewed methods of drawing-up occupational shortage lists assess occupations against two main criteria: skill and shortage. But the indicators used to assess these two criteria differ based on available evidence. Occupations are not automatically added or removed from the list even if there is evidence of both skill and shortage. The final decision to include or remove an occupation from the list is commonly taken after an assessment of sensibility and the criteria of such assessment vary from time to time with no common definition among different economies. This provides the government with discretion in relation to removing or adding particular occupations on the grounds of the occupations' development potential, the territory's strategic considerations (e.g. whether the occupations to be included are beneficial to the sustainable development of the economy), protecting national workers or other territorial interests. Most of these grounds and criteria are explicitly set out for the public's inspection and discussion.

4.4.4 Parameters for updating the Talent List

4.4.4.1 Types of sources

The talent list devised as part of this project draws on a range of sources and combines different methodologies (e.g. data analysis; stakeholder consultations) to produce an initial list. As noted above, our review of overseas experience highlighted approaches generally characterised by a mix of quantitative top-down methods, qualitative bottom-up methods and qualitative top-down methods. As in Hong Kong, **Talent List design and updating elsewhere generally *combines* different methods**. Differences are mainly about the indicators used and how the evidence is weighed. This combination of different types of data/intelligence should therefore arguably provide the foundation for the updating process.

4.4.4.2 The timetable for updating the Talent List

An important question to consider is whether the update should take place periodically (i.e. at a discrete point in time), or if there should be a continuous element (i.e. new occupations can be added to the list mid-cycle). The latter approach offers greater flexibility, but it creates a series of challenges:

- It requires potentially substantial resources to run the Talent List as a continuous process and deal with an unpredictable demand to add occupations to the list.
- It arguably makes it more difficult to manage the quality of decision-making and to communicate with clarity the status of different occupations.
- It may not reflect the timescale over which the labour market needs substantially change.

It is assumed therefore that Talent List updating would be periodic. There is potentially a trade-off between how regularly the Talent List is updated and the ability to effectively establish it, so that stakeholders are aware of and familiar with it. Countries that have followed an annual cycle for updating (e.g. Canada and Australia) are characterised by simplified central decision-making. They combine quantitative and qualitative methods, but are able to base decisions on more easily-available 'live' data.

Given the time taken to develop the initial list, it is suggested that an annual review is both unnecessary and impractical for Hong Kong. Some industries change rapidly, but a key learning point from the initial Talent List development is that stakeholders often note that the case for inclusion of emerging needs is not always backed up by actual demand (especially with technology-driven demand). It should also be flagged up that the current to mid-term prospect of the occupations concerned has been taken into account during the drawing up of the Hong Kong's Talent List.

Ultimately, **the timetable for updating the Talent List has to be informed by data availability**. Based on the international evidence, it is suggested that two years is the minimum timescale to consider, and that three years may be towards the upper limit for updating the Talent List – especially as the list is only newly-established. It may be possible to consider a process by which the Talent List has a scheduled update, but there is still scope for adding new occupations in exceptional situations.

4.4.4.3 Adding and removing occupations

The key purpose of updating the Talent List is to ensure that it remains relevant against a backdrop of changing labour market needs. The Singapore example highlighted the importance of having both a process to add new occupations to the list and to remove them as well. It is presumed that this would be the intent in Hong Kong also, otherwise a risk is created that the list becomes less responsive to *the latest* need over time.

This raises a question about the basis on which occupations would be removed. It is logical to base this on data on the number of applications under the Talent List; however, wider considerations may also be included, so it is unlikely to be a mechanical question (e.g. changes to local supply; any policy changes likely to influence demand). It suggests that **during the periodic Talent List updating, *all* current occupations are reviewed to check their continuing eligibility/relevance**.

This may be a 'light touch' process in practice – for example, based on the number of applications under the Talent List and review of whether any evidence has emerged suggesting that the occupation should be removed. The default presumption would therefore be that existing occupations would retain their place on the Talent List unless there is evidence to the contrary.

4.4.4.4 Potential steps to updating the Talent List

It may be important to ensure consistency with the initial process to develop the Talent List so as not to unnecessarily reinvent the process, while learning lessons from the initial exercise. One lesson could be the value in having, as far as possible, objective measures to support occupational selection for inclusion on the Talent List.

There is a set of descriptive and broadly comparable indicators that have been used to shape the initial Talent List and which provide broadly comparable measures of eligibility for inclusion:

- Employment and salary data;
- Qualification level and professional experience required;
- Labour supply/education and training pipeline.

Descriptive occupational information generated as part of the initial Talent List development, such as job roles and professional requirements, can be developed over time and used for updating the Talent

List, as required (e.g. adding new occupations; checking to ensure that the information remains current).

It is likely that alongside more descriptive and 'objective' information, **any process to update the Talent List will still require consultation with industry and gathering qualitative intelligence on shortages and the nature of current/future demand**. A general issue that Talent Lists internationally have to manage is that sector/industry stakeholders can have their own perspectives on economic need. An important aspect of the development of the initial Talent List in Hong Kong has been to scrutinise suggested occupations in order to understand the nature of any identified shortages and whether they are best addressed through foreign labour. This bottom up intelligence – and the independent scrutiny of it – is likely to be an important aspect of updating the Talent List, irrespective of the quality and availability of quantitative data. Factors such as the strategic importance of particular industries will remain integral to the overall assessment.

4.4.5 Proposed options for updating the Talent List

Below we propose three options for updating the Talent List, taking account of the key considerations described above. For all options, it is assumed that:

- The updating process encompasses both the potential inclusion of new occupations and the removal of occupations where the level of demand/need has changed.
- To some degree, all options are based on a mix of top down and bottom up inputs, as with the international examples – although the balance between these inputs varies by options.
- Updating is undertaken on the basis of currently-available information, although there should be a scope under all options to reflect on and incorporate new data that might be produced in future. As the future availability of data is a function of wider debates about the development of labour market statistics in Hong Kong, which might be informed by, but are unlikely to be driven by the needs of the Talent List and (even when the collection of such data commences) would take time to accumulate sufficiently meaningful and reliable sets of data, we do not presuppose any such data being available at the point of next updating.

The review process would draw on the key judgement criteria used for the initial list to support comparability (salary data; qualification level and professional experience required; labour supply). Below we describe three potential options before summarising their key characteristics in Table 4.8 and making a recommendation on a preferred approach:

- Option 1: Light touch periodic updating
- Option 2: In-depth periodic updating
- Option 3: Continuous updating

4.4.5.1 Option 1: Light touch periodic updating

Option 1 is based on the assumption that, once up and running, the Talent List can be updated without having to revisit the evidence base from first principles (i.e. the scale and extent of primary research and consultation undertaken to devise the initial Talent List does not need to be directly repeated to recreate the same evidence base on occupational demand). It reflects that while labour market demand changes over time, these changes are long-term in nature and that the purpose of the Talent List is to tackle structural/strategic labour market challenges rather than short-term or more transient skills shortages.

The updating process is based on two stages. Stage one involves a central review by Government of both the performance/use of the current occupational list (to ensure continuing relevance) and to capture intelligence on new occupations that many need to be added to the list. The option assumes

either a short consultation with Ministries to identify new occupations or a mechanism being established for Ministries to nominate future additions 'as and when' for the next updating point.

The second stage is verification with industry. Industry stakeholder engagement is by exception – where there is existing evidence (from whatever source) of a new need or there is a proposal to remove an occupation. The judgement criteria for inclusion in all cases would follow that of the initial Talent List – evidence that it is a high skill occupation, salary data (taking account of occupational limitations), and relevant evidence on labour supply/demand mismatch or strategic importance – sourced from graduate data or industry surveys. The process is quicker and less labour-intensive than undertaking a full review. The appropriateness of this approach depends on the organisation responsible for the Talent List being sufficiently confident that it will have a comprehensive overview of changing needs in order to determine an updated list for verification with industry.

4.4.5.2 Option 2: In-depth periodic updating

Option 2 deploys the same judgement criteria as Option 1, but starts with a wider engagement with industry to identify occupations for potential inclusion in an updated Talent List. This would involve running a consultation (based on a pro-forma) during which stakeholders or Government could nominate occupations to be added to the list. Indicatively, this consultation would last at least 6-8 weeks. Nominated occupations would then be checked to ensure that they comply with the judgement criteria – with follow-up consultation/clarification with stakeholders as necessary. This approach is more systematic and enables wider stakeholder engagement, although it is significantly more resource intensive that Option 1.

4.4.5.3 Option 3: Continuous updating

Option 3 allows stakeholders to recommend new occupations to add to the Talent List when they believe there is sufficient need. As such, it is the most responsive model and it is attuned to a system in which there is a lack of detailed occupational data held centrally. However, it is the most difficult to manage from a resource perspective and requires additional parameters to be set in terms of allowable requests. A periodic process to check continuing relevance of existing occupations on the list would still be required (drawing on parts of the approach under Option 1).

The basic process would be that any industry stakeholder or Ministry stakeholder would be able to contact a central point responsible for the Talent List and request inclusion. The stakeholder would be required to provide certain evidence (based on a similar pro-forma to Option 1) in line with the key judgement criteria, focusing on the qualitative or industry-specific evidence used to inform the initial Talent List.

Under this model, the onus is on the nominating stakeholder to make the case for inclusion. In order to prevent the same occupation being repeatedly requested for inclusion, it is recommended that any decision to accept/reject the occupation should be valid for two years.

Table 4.8 summarizes the key characteristics of the proposed updating options.

Table 4.8 Key characteristics of the proposed updating options

	Option 1: Light-touch periodic	Option 2: In-depth periodic	Option 3: Continuous updates
Operation mode	The authority to conduct quick central review of the performance/usage of individual ISO on the existing Talent List, to verify with the industries and to capture	Similar to Option 1 but starts with a wider engagement with industries to identify ISO for potential inclusion/ removal, to run consultation with stakeholders lasting for at least 6-8 weeks.	The stakeholders to submit recommendation with evidence under the prescribed criteria for the consideration of the authority.

	Option 1: Light-touch periodic	Option 2: In-depth periodic	Option 3: Continuous updates
	market intelligence on new occupations.		
Frequency	2 years	2 to 3 years	Not applicable
Timescale for the updating process	Estimated 4-6 month period	Estimated 6-8 month period	Estimated 2-3 month lead time per request
Balance of top down and bottom up inputs	Process driven centrally/by top-down evidence with bottom-up inputs used selectively for verification purposes, thereby requiring a shorter time period to undertake.	Process driven by bottom-up evidence, which informs a comprehensive top down analysis. More than one round of stakeholder engagement, and so a longer period of time, would be required.	Driven by bottom-up intelligence verified (as available) against top down data. A standing central processing point is required. While it offers greater flexibility, it is arguably more difficult to manage the quality of decision-making and to communicate with clarity the status of different occupations.

4.4.6 Recommended approach

Given that it is unlikely that new quantitative data will become available within the likely timescale for updating the Talent List, the recommended updating mechanism will largely follow a qualitative approach. We provide the option of continuous updating (Option 3), which main advantage is its theoretical responsiveness. However, international evidence indicates that occupational shortage lists operating with similar approaches tend to focus on addressing structural labour market weaknesses. As a tool, they are less adept and suited to dealing with short-term and newly-emerging labour market needs, irrespective of the updating method followed. As such, it is suggested that a degree of rigour is retained by following a more in-depth periodic updating model (i.e. Option 2). This approach also best supports comparability with the initial Talent List.

In terms of how this model could work in practice, we suggest that the updating exercise, to be repeated at the interval of every two to three years, would start with an internal assessment within the Government on the general trend of macro economy (through the study over statistics/figures of recent GDP) and occupational or employment trends by industry breakdown. This would be followed by engagement with industry to identify occupations for potential inclusion in the updated Talent List. The engagement process would involve running a consultation (based on a pro-forma or checklist against the assessment criteria) during which both stakeholders and government bureaux and departments (Census and Statistics Department, Office of the Government Economist and subject bureaux and departments for specific industry sectors) could nominate occupations to be added/removed to the list. Indicatively, this consultation could last for at least 6-8 weeks. Nominated occupations would then be checked and discussed by the authority to ensure that they comply with the criteria – with follow-up consultation/clarification with stakeholders as necessary.

5 Conclusions and recommendations

The preparation of the Talent List has completed. The Talent List would highlight to world talents which specific ISO are needed most for Hong Kong's further economic development, and would help attract them to come to Hong Kong. This should help Hong Kong gain competitive advantage in attracting international talents vis-à-vis other economies, creating cluster effects, and stimulating the development of local talents. The Talent List would also provide useful reference for the Government, training institutions and professional bodies in various aspects of manpower planning.

As QMAS seeks to attract highly skilled or talented persons to settle in Hong Kong in order to enhance Hong Kong's economic competitiveness, the Government considers it appropriate to apply the Talent List upon its finalisation to the QMAS to provide immigration facilitation for eligible applicants. The Advisory Committee on Admission of Quality Migrants and Professionals has been consulted on the arrangements including the details of the immigration facilitation to be implemented. While immigration facilitation would be provided, individual applicants have to be subject to necessary documentary proof of the qualification and experience requirements for the "talent" professionals in the respective ISO in the Talent List.

ANNEXES

Annex 1

Fiches for the Eleven Industry Segments and Occupations (ISO) Recommended for Inclusion into the Talent List

(1)

Industry Segment : Environmental technology services

Occupation / Profession : Experienced waste treatment specialists / engineers

Professionals with experience in waste management

Rationale for consideration on the Talent List: To support the Government's ten year strategy on waste management.

Industry	Environmental technology services industries
HSIC Version 2.0	M7116 – Environmental engineering and related consultancy services
Occupation Index	213 – Life science professionals
List of Professions	213 – Environmental protection professionals
Description of tasks	**Waste treatment specialists or engineers:** Plan, implement, and coordinate comprehensive waste management systems that are designed to maximize waste prevention, reuse, and recycling opportunities[86].
Typical qualifications	Based on practices in other countries, to qualify as a professional engineer requires at least a (Washington Accord accredited) bachelor degree in a related engineering discipline and membership with a professional engineering institution such as the Hong Kong Institution of Engineers. Employers are looking for experienced environmental engineers. Evidence from the USA indicates that experienced environmental engineers have a bachelor's degree (or above) in their specific engineering field. Many are certified professional engineers (PE), a qualification that requires typically at least four years of work experience and the passing of written exams.[87] For waste management engineers, relevant programs include waste management, environmental science, environmental management, chemistry, environmental engineering and civil engineering[88]. It is expected that waste treatment specialists / engineers are considered to be highly-talented professionals. They are expected to have relevant Master or PhD degrees in the fields of advanced thermal waste treatment process or advanced chemical / physical / biological waste treatment process and 10 years of relevant on-the-job experience; or they are expected to have relevant bachelor degree in the fields of advanced thermal waste treatment process or advanced chemical / physical / biological waste treatment process and 15 years of relevant on-the-job experience.
Salary level	As a reference, in the UK, the annual salary of an experienced environmental engineer is GBP 29,400 or around HK$ 23,000 per month. In the USA, in 2012, the median annual wage of environmental engineers was US$ 80,890 (or HK $52,600 per month).[89] While cross-economy comparison is useful to show the divergence of salaries for environmental engineers, differences in the cost of living, tax rate, etc. across different economies and supply/demand factors should be noted.

Assessment criteria		Evidence	Score[90]
High skill	**ISCO Skill Level**	Skill Level 4	✓✓
	Salary level	Salary level is above HK$ 15,000 per month (territorial median) and below HK$ 45,000 per month (90th percentile) in mid-2016.	
	Education and training	3 or 4 years bachelor and 1 or 2 year master's degree required meeting the indicative benchmark of 5 years.	
Shortage	**Local labour demand is growing**	Strong demand for professionals in the field of environmental industries [Source: HR]. The industry grew by 9.8% in 2014 [Industry research]. [91]	✓✓
	Local labour supply is limited	There were 43,750 persons engaged (at all levels) in 2015 [C&SD]. The industry is still in the developmental stage and the current supply of experienced workers is limited locally [HR]. According to Government's statistics, employment of the environmental industry increased by 3.8% in 2014-2015. The Government will support local environmental services	✓

[86] ECO, Canada (http://www.eco.ca/career-profiles/waste-management-specialist/).

[87] US Bureau of Labour Statistics (https://www.bls.gov/ooh/architecture-and-engineering/environmental-engineers.htm#tab-4).

[88] ECO, Canada (http://www.eco.ca/career-profiles/waste-management-specialist/).

[89] Marion, Jason W and Sinde, Yalonda (2015), "The need for environmental public health professionals and the role of EHAC-Accredited Programs in increasing the pool", in Journal of Environmental Health, 78(2): 36 – 41.

[90] ✓ Some evidence that the industry/profession meets this criterion; ✓✓ Strong evidence that the industry/profession meets this criterion; × Some evidence that the industry/profession does not meet this criterion; ×× Strong evidence that the industry/profession does not meet this criterion; o Data gap, there is no evidence to assess this criterion.

[91] http://hong-kong-economy-research.hktdc.com/business-news/article/Hong-Kong-Industry-Profiles/Environmental-Protection-Industry-in-Hong-Kong/hkip/en/1/1X000000/1X09TYPH.htm

Professionals with experience in waste management

		providers in developing the China market. There is great demand for cost-effective solutions for combating serious environmental problems in China, which, in turn, generates a huge market for environmental protection services providers. In other words, demand for skilled manpower by local environmental services providers is expected to increase. Local firms recruit local talent; foreign firms recruit internationally through company transfers, nonetheless international transfer is insufficient to meet local demand. There is not sufficient training locally for professionals in environmental engineering. Professionals working in this area, both local and foreign, were trained overseas. [Industry stakeholders]	
Sensibility	**Development potential**	The Government has a medium-term commitment to waste management by 2022.	✓
	Need for foreign talent	A number of environmental services companies in Hong Kong had to recruit experienced talents from abroad [HR]. Local training opportunities are not sufficient to meet the anticipated demand for experienced engineers and, as a result, many employers are recruiting experienced environmental engineers trained overseas [Industry stakeholders].	✓

Final assessment

Based on policy direction, the Government has a medium-term commitment to waste management by 2022. Evidence suggests that the industry is still in its infancy, but likely to experience growth in the future. With insufficient highly experienced home grown talent and the need for industry to adopt new advanced technologies, foreign talent seems to be the key in increasing innovation and to support future industry development.

(2)

Industry Segment	**:**	**Financial services**
Occupation / Profession	**:**	**Experienced management professionals in asset management including but not limited to trust fund management**

Experienced management professionals in asset management including but not limited to trust fund management

Rationale for consideration on the Talent List: Asset management is expected to be a key area of future growth in Hong Kong. It is necessary to ensure that the talent pool has the capacity and skill set to meet the growth of the asset management sector in Hong Kong.

Industry	Financial services – Asset management
HSIC Version 2.0	661901, 663000 (with Securities and Futures Commission's (SFC) licences) K6440 – Trusts, funds and similar financial entities
Occupation Index	242 – Finance professionals
List of Professions	242 – Investment analyst, fund manager, investment consultant
Description of tasks	■ **Investment analysts & Investment consultants:** Research and prepare a wide variety of detailed investment opportunities, including alternative investment. Concerned with the development and retention of personal and corporate trust business and its administration with the objective of profit and quality services to customers. ■ **Fund managers:** Supervise day-to-day administration of fund portfolios. Select the securities and shares of the fund portfolios, implement the investment policy and distribution policy as stated in the trust deed. Calculate the unit price of fund portfolios, and promote various fund portfolios to customers.
Typical qualifications	Based on overseas skill shortage lists, a bachelor's degree in commerce, business administration, economics, law and on-the-job training and industry courses and programs are usually required. A master's degree in business administration (MBA) (concentration in finance) or in finance may be required. The Chartered Financial Analyst (CFA) designation, available through a program conducted by the Institute of Chartered Financial Analysts in the United States, may be required by some employers. Consulted industry stakeholders noted undergraduate training in finance, law and accounting is required. In addition, Mandarin and English language skills are preferred [2015 FSDC report]. For trustee management, knowledge in finance and marketing as well as relevant experience is required. At least 3 years of relevant experience in fund management industry, according to recruitment advertisements for the position of senior investment analyst in Hong Kong.
Salary level	Industry stakeholders noted the monthly salary package for a manager could be in the region of HK$50,000 plus bonus, and that for heads of departments, around HK$120,000 plus bonus, which can vary considerably between individuals and finance firms[92].

Assessment criteria		Evidence	Score[93]
High skill	ISCO Skill Level	Skill Level 4	✓✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	4 years bachelor and at least 3 years of work experience meeting the indicative benchmark of 5 years.	
Shortage	Local labour demand is growing	Strong growth of the sector due to growth in Asia, financial market liberalization in the Mainland and government policy to strengthen the sector. Asset management was expected to have a moderate increase in demand for talent in the next 2-4 years [2015 FSDC report]	✓
	Local labour supply is limited	Current lack of qualified local talent to fill in positions especially for middle and senior management positions. [2015 FSDC report]	✓
Sensibility	Development potential	The Government and stakeholders see profound development potential for the asset management industry. The Government has been implementing various initiatives to develop Hong Kong into a full-service asset management hub. In 2014, the asset management industry generated an average of HK$2.2 million of value-added (VA) per person engaged, an increase from HK$2 million in 2013. Total VA increased from HK$17.5 billion in 2008 to HK$18 billion in 2014 (i.e. average annual growth rate of 0.5%)[94]. Hong Kong's asset and wealth management business amounted to HK$24,270 billion at end-2017.[95] The number of asset management licensed corporations (i.e. Type 9 regulated activity) increased by 85% from 844 (end-2011) to 1,563 (end-June 2018)[96].	✓

Experienced management professionals in asset management including but not limited to trust fund management		
Need for foreign talent	There is some shortage of qualified local talent to fill certain positions.	✓

Final assessment

The rationale for inclusion is based on strong growth in the sector and the apparent shortage of qualified local talent to fill certain management and middle to back office positions.

[92] It was not indicated in the consultations whether housing benefits were included in the package, but the figures quoted are likely to be total salary package.

[93] ✓ Some evidence that the industry/profession meets this criterion; ✓✓ Strong evidence that the industry/profession meets this criterion; × Some evidence that the industry/profession does not meet this criterion; ×× Strong evidence that the industry/profession does not meet this criterion; o Data gap, there is no evidence to assess this criterion.

[94] Census and Statistics Department; *Hong Kong Monthly Digest of Statistics, Feature Article – The Asset Management Industry in Hong Kong*; November 2016, http://www.statistics.gov.hk/pub/B71611FA2016XXXXB0100.pdf

[95] Source: SFC's Asset and Wealth Management Activities Survey 2017 (http://www.sfc.hk/web/EN/published-resources/surveys/periodic-surveys/).

[96] Source: SFC (http://www.sfc.hk/web/EN/files/SOM/MarketStatistics/c02.pdf).

(3)

Industry Segment	**:**	**Financial services and maritime services**
Occupation / Profession	**:**	**Experienced professionals in marine insurance**

Experienced professionals in marine insurance

Rationale for consideration on the Talent List: To support lack of technical expertise, especially in the insurance sector.
Shortage of experienced marine underwriters to meet the increasing demand for marine insurance business arising from anticipated growth in the number of ocean-going vessels using Hong Kong as their home base and the increasing number of super-yachts visiting Hong Kong.

Industry	Financial service and insurance sector
HSIC Version 2.0	K66 – Activities auxiliary to financial service and insurance activities K651 – Insurance underwriting
Occupation Index	212 – Mathematicians, actuaries and statisticians and related professionals 242 – Finance professionals
List of Professions	212 – Actuaries 242 – Insurance consultants
Description of tasks	■ Carry out actuarial studies related to the establishment's operations. Supervise the preparation of valuations and reports as required. Assist management in the formulation of insurance policies. ■ Research and prepare a wide variety of detailed insurance opportunities. Advise businesses or individuals on matters related to insurance.
Typical qualifications	Experience in: running the day-to-day underwriting team, covering new business, mid-term adjustment and renewal requirements of both direct clients and broker accounts; monitoring binder progress; finding ways to grow accounts through competitive pricing and excellent service, including liaison with binder insurers to ensure insurance solutions. Typical qualifications are: experience in the insurance business and preferably experience in working in maritime or logistics services, plus first degree in finance and insurance. Working on board is not a requirement for marine insurance underwriters, but it is an advantage for those who have experience and are willing to work on board in ocean-going vessels or superyachts. Work experience related to regulatory regimes in other economies. One of the principles for drawing up the Talent List is not to deprive our local talents of their training and employment opportunities. To strike a balance, an experience threshold of at least 3 years' experience should be imposed. This occupation is not covered by skill shortage lists overseas.
Salary level	For experienced professionals with 5 – 8 years of experience, the salary package can range from HK$35,000 to HK$60,000 per month. According to C&SD, the 2016 median monthly salary of actuarial professionals is HK$33,000. For a chartered marine insurance professional in Canada, the annual salary ranges from C$38,000 to C$71,000, and the median is in the range of C$52,000. For a general manager in charge of marine insurance in USA, having 10 - 20 years of relevant experience, the annual salary ranges from US$70,000 to US$120,000.

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile) (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	Degree in marine insurance and relevant experience in marine insurance.	
Shortage	Local labour demand is growing	Feedback from stakeholders indicates that there is potentially great demand, as more ocean-going vessels use Hong Kong as their home base and more super-yachts visit Hong Kong.	✓
	Local labour supply is limited	Feedback from stakeholders indicate that there is scant supply of professionals with working experience in marine insurance, particularly those who are willing to work on board and gain experience in ocean-going vessels or superyachts, and with work experience related to regulatory regimes in other economies (although collectively these are relatively niche/specialised requirements). Very few university students choose the course of marine insurance, which is very demanding. This has limited the supply of marine insurance professionals.	✓

Experienced professionals in marine insurance

Sensibility	Development potential	Hong Kong is a leading international maritime centre (IMC) in the region. It is the policy objective of the Government to further enhance Hong Kong's position as an IMC. In the National 13th Five-Year Plan, the Central Authorities has made clear its support for Hong Kong to reinforce and enhance its status as an international shipping centre. In the 2013, 2014, and 2015 Policy Addresses, a dedicated section was included to highlight the importance attached to the development of the maritime industry, particularly the high value-added maritime services, ship finance, marine insurance, maritime law and arbitration (hereinafter referred to as "the high value-added maritime services"). In a consultancy study completed in 2014 commissioned by the Transport and Housing Bureau on "Enhancing Hong Kong's Position as an IMC" (HKIMC Consultancy Study), the consultant recommended that Hong Kong should seek to expand the presence of commercial principals such as ship managers, owners and operators in Hong Kong, and also to enhance capabilities in providing high value-added maritime services.	✓
	Need for foreign talent	There was a shortage of marine insurance professionals who were aware of overseas regulations, as well as insurance accounting professionals who had experience working in the insurance business. Such professionals could be recruited from places like the UK, EU and Australia [Industry stakeholders]	✓

Final assessment

Based on reported shortage of local talent and a specific need for skills related to overseas regulation the occupations are proposed to be included on the Talent List.

(4)

Industry Segment : Financial Services

Occupation / Profession : Actuaries

Actuaries

Rationale for consideration on the Talent List: To support lack of technical expertise especially in the insurance sector.

Industry	Financial service and insurance sector
HSIC Version 2.0	K66 – Activities auxiliary to financial service and insurance activities
Occupation Index	212 – Mathematicians, actuaries and statisticians and related professionals
List of Professions	212 – Actuary
Description of tasks	Carries out actuarial studies related to the establishment's operations. Supervises the preparation of valuations and reports as required. Assists management in the formulation of insurance policies.
Typical qualifications	Based on overseas skill shortage lists, actuaries usually require post-secondary education in actuarial science, mathematics, statistics, economics, commerce or business administration. At least 3 years of post-qualification experience in related field.
Salary level	For experienced professionals with 5 – 8 years of experience, the salary package can range from HK$35,000 to HK$60,000 per month.

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	4 years bachelor's degree and at least 5 years of post-qualification experience meeting the indicative benchmark of 5 years.	
Shortage	Local labour demand is growing	Insurance firms are facing a problem hiring staff with technical knowledge and the knowledge or regulatory regimes that can serve increasing clients, mainly from Mainland [2015 FSDC report] Insurers also responded in a survey that the demand for experienced management professionals in actuarial science is going to increase in the coming years in light of the development in the local regulatory regime and international standards of the insurance sector, in particular the implementation of the Risk-based Capital Regime, the International Financial Reporting Standards 17 – Insurance Contracts, etc.	✓
	Local labour supply is limited	HR firms noted, and the industry opined that there has been a shortage of experienced professional actuaries supporting back office operations of insurance companies.[HR] The supply of local graduates cannot help to meet the projected demand in the short to medium-term	✓
Sensibility	Development potential	The insurance industry generated around HK$1.3 million VA per person engaged in 2015, an increase from HK$1.2 million in 2013. Average annual growth of VA increased by 6.1 % between 2008 and 2015. Vacancy rate was 2.9% in end-Sept 2016, compared to 4.8% in 2013 [97]	✓
	Need for foreign talent	There was a shortage of experienced actuarial professionals who were familiar with overseas regulations as well as insurance accounting. Such professionals could be recruited from places like the UK, EU and Australia [Industry stakeholders]	✓

Final assessment

Based on reported shortage of local talent and a specific need for skills related to overseas regulation the occupations are proposed to be included on the Talent List.

(5)

Industry Segment : Financial services

Occupation / Profession : Experienced professionals in Fintech

Experienced professionals in Fintech

Rationale for consideration on the Talent List: To develop Hong Kong into a financial technology hub.

Industry	Financial service – Fintech
HSIC Version 2.0	K – Financial and insurance activities
Occupation Index	251 – Software and applications developers and analysts 252 – Database and network professionals
List of Professions	2511, 2512 – Systems analyst, software developer 2521, 2522, 2523 – Database designer and administrator, systems administrator, computer network administrator
Description of tasks	■ Software/Application developers, systems analysts, and database designer and administrator in the area of Fintech. These talents should be able to devise new and/or improved application of technology in financial services, which can improve operational efficiency, save costs, provide new and/or better modes of service delivery and increase the competitiveness of the financial services sector overall.
Typical qualifications	Degree in a relevant discipline, such as computer science, computer engineering, electronics engineering and information science. The nature of work in the Fintech is diverse. Due to rapidly-changing technology, it is important to consider both the candidate's length of experience as well as experience with the leading companies in the relevant field such as artificial intelligence, advanced software skills (computer programming), big data analytics, Blockchain applications and cybersecurity. The candidate should also show the ability to leverage new technology, including knowledge of applying technology to provide solutions in financial services, and creativity.
Salary level	Salary levels depend on the length and nature of working experience. Data scientists with 10 years of working experience, with at least 5 years data science or data analytics, could be offered a salary package of HK$60,000 – HK$75,000 per month from non-finance companies and HK$75,000 – HK$90,000 per month from finance companies[98].

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	Higher education and experience with the leading companies in the field meeting the indicative benchmark of 3-5 years.	
Shortage	Local labour demand is growing	A number of HR firms indicated strong demand for professionals with both training in IT and experience in finance [HR]	✓
	Local labour supply is limited	Talents with knowledge and expertise in IT applications, natural language processing, artificial intelligence and big data analytics are lacking [Industry stakeholders]	✓
Sensibility	Development potential	Given the position as a leading international financial centre and a highly developed information and communications technology sector, Hong Kong is an ideal place for developing financial technologies. The Government is implementing a range of measures to develop Hong Kong into a Fintech hub [FSTB]	✓
	Need for foreign talent	Very limited talent pool for Fintech professionals in Hong Kong, especially IT professionals [Industry stakeholders & HR] Financial services sector already employs a large share of foreign talent in Hong Kong; in 2015, 18% of admitted high skilled visas were in financial services sector [ImmD statistics]	✓

Final assessment

Added to the Talent List based on reported shortages from several HR firms and industry representatives, as well as the overall policy direction. As Hong Kong is pursuing development into a Fintech hub, foreign talent specifically related to IT and technology parts of Fintech industry is needed, as it is hard to recruit locally and the local supply is unlikely to prove adequate to meet the strong expected growth in talent demand.

[98] Computerworld Hong Kong (12 August 2016), "Rising demand for data scientists in Hong Kong".

(6)

Industry Segment	**:**	**Information and communications technology (ICT) services**
Occupation / Profession	**:**	**Experienced data scientists; and** **Experienced cyber security specialists**

Experienced data scientists

Rationale for consideration on the Talent List: very high demand both globally and locally, and local supply is in shortage.

Industry	ICT
HSIC Version 2.0	J620 – Information technology services activities
Occupation Index	2120 – Mathematicians, actuaries and statisticians 2511 – Systems analysts
List of Professions	2120 – Mathematicians 2120 – Statisticians 2511 – Business analysts 2511 – Computer scientists
Description of tasks	Data Scientist is a relatively new and evolving profession. Data scientists work with large datasets (Big Data) that are generally too complex for analysis using conventional statistical methods and analytical tools. This data can be structured (e.g. data from GPS instruments), or unstructured (e.g. photos, videos, social media). Data scientists use machine learning and statistical methods, data mining, optimisation techniques and artificial intelligence to meet client business needs; develop and implement statistical tools to build predictive models helping support clients and work plans.
Typical qualifications	Bachelor degree in mathematics, statistics, computer science, operational research, engineering, data science or related disciplines. Master or PhD degree is an advantage. Due to the rapid changing technology, the length of experience is not as important as having actual experience in applying data analytics skills in industry sectors, such as insurance, financial services, retail, marketing, healthcare, logistics, and in smart city development.
Salary level	In 2016, data scientists with over 10 years of IT working experience and a minimum 5-year data analytics experience could be offered HK$60,000 to HK$75,000 a month from non-financial services companies. The salary could reach HK$75,000 to HK$95,000 if employed by financial services companies.

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓✓
	Salary level	Salary level above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	3 or 4 years bachelor or preferably 1 or 2 year master's degree required, relevant experience in data science or analytics	
Shortage	Local labour demand is growing	According to Computerworld, recruitment of data scientists or data analysts has been a rising trend across all sectors in Hong Kong since early 2015. The financial services industry (FSI), retail, property management and telecoms companies have high demand for these talents. Industries with high demand for data scientists are Fintech, IT solutions providers, and those in the commercial space.	✓✓
	Local labour supply is limited	Stakeholders consulted pointed to a shortage of talents in big data analytics.	✓
Sensibility	Development potential	There is a huge demand for talents in big data analytics for smart city development and growth areas such as e-commerce.	✓
	Need for foreign talent	Firms are recruiting experienced IT personnel, including data scientists from abroad.	✓

Final assessment

Added to the Talent List based on high demand and supply shortage identified by consulted industry stakeholders.

Experienced cyber security specialists

Rationale for consideration on the Talent List: Shortage of experienced cyber security specialists to meet increasing demand for expertise in IT, especially cyber security, arising from the increased use of online platforms in different sectors especially e-commerce.

Industry	ICT
HSIC Version 2.0	J620 – Information technology services activities J631 – Web portals, data processing, hosting and related activities
Occupation Index	253 – Technical support professionals
List of Professions	Cyber security specialists
Description of tasks	**Cyber security specialists:** Design and maintain the information security standard and policy, and, support the front-line defence by analysing potential security risks and developing mitigation measures against cyberattacks, carry out assessment and audit the security implementation, while ensuring the security implementation is always followed by the IT departments.
Typical qualifications	Based on overseas skill shortage lists, a bachelor's or master's degree in computer science information technology, information system management, information/computer engineering or related disciplines is usually required. Certification on information security (such as CISSP and CISA) is usually required and some jobs may also require certification on networking (such as CCIE). Several years of experience in security and risk management, network security/architecture or software development security, including supervisory experience and implementation, and Internet and cyber security, are required. Based on VTC ICT Manpower Survey 2016, experience in undertaking design, technical support and review on IT/network security, firewalls and intrusion detection; drafting the information security standards, policy and procedures; and ensuring the implementation/work plans are always followed by the IT teams and departments. Typical qualifications are first degree in IT, with 2 – 10 years of relevant experience in Internet and cyber security. Holders of certification on information security (such as CISSP and CISA) typically require a first degree with 4 years' experience in IT security related areas.
Salary level	According to VTC Manpower Survey Report (2016), salaries of the top 16% of IT security specialists could reach the range of HK$600,001 – HK$1,080,000 per annum. According to C&SD, the 2016 median monthly salary of systems operation professionals was HK$30,000 per month.

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓
	Salary level	Salary level mostly above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	Higher education and at least 2 years of experience meeting the indicative benchmark of 5 years.	
Shortage	Local labour demand is growing	According to estimates compiled by VTC, the annual demand is for around 630 IT security specialists. Feedback from stakeholders points to strong growth in online transactions, calling for the need for tightened IT security measures. Cyber security experts were also noted as being short in supply in the production and marketing of films, video and music.	✓
	Local labour supply is limited	Local supply of degree, higher diploma and professional diploma in IT is only around 2,200 for all IT related jobs, but supply of *experienced* professionals is insufficient.	✓
Sensibility	Development potential	The ICT industry is a major driver of continuous social and economic growth, underpinning innovation, competitiveness and long-term development of all sectors.	✓
	Need for foreign talent	Feedback from stakeholders indicates that employers are recruiting talents from Mainland China and countries like India and the Philippines.	✓

Final assessment

Proposed inclusion of IT security specialists in the Talent List. With the increased use of online ICT platforms and the increasing incidence of cyber-crimes, many business corporations will be recruiting IT security specialists to help safeguard their online ICT platforms.

(7)

Industry Segment	**:**	**Innovation and technology**
Occupation / Profession	**:**	**Innovation and technology Experts in, but not limited to, the following fields:** **(a) pharmaceutical and life science/biotechnology;** **(b) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and** **(c) materials science/ nanotechnology**

Innovation and technology Experts in, but not limited to, the following fields: (a) pharmaceutical and life science/biotechnology; (b) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (c) materials science/nanotechnology	
Rationale for consideration on the Talent List: To develop Hong Kong into a knowledge-based economy and an innovation hub for the region, and ease the shortage of R&D personnel experienced by industry stakeholders The nature of innovation and technology suggests that it is impossible to predict and cover different specialisations for specific periods of time. This also explains why stakeholders are unable to pinpoint any specialisation required. It is the market that determines the kind of specialisation required at any one point in time. Given that I&T is not a conventional industry or occupation, it should be noted that the information included under "HSIC Version 2.0", "Occupation Index" and "List of Professions" is by no means exhaustive. The typical qualifications and salary levels were cited from overseas sources and are only for illustrative purpose.	
Industry	Innovation & Technology– Research and Development
HSIC Version 2.0	M7210 Research and development on natural sciences and engineering M7190 – Engineering, technical and consultancy services not related to construction and real estate activities J620 – Information technology service activities
Occupation Index	211– Physical, earth science and related professionals 213 – Life Science professionals 214 – Engineering professionals (excluding electrical, electronics and telecommunication) 251 – Software and applications developers and analysts
List of Professions	(a) pharmaceutical and life science/biotechnology 2131 – Biologists, botanists, zoologists, pharmacologist, biochemists and related professionals 2149 – Biomedical engineers (b) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc. 2512 – Software developers 2514 – Applications programmers (c) materials science/ nanotechnology 211 – Physicists, chemists 214 – Engineers
Description of tasks	A broad range of tasks related to research and development in related innovation field.
Typical qualifications	**(a) biotechnology** For biotechnologists, the typical qualification is a degree in a relevant scientific subject such as biotechnology, biochemistry, biology, chemistry, microbiology, environmental biology or chemical engineering. A postgraduate qualification such as a masters or PhD is usually required.[99] [100] **(b) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.** For data scientists, the typical qualification is bachelor degree in mathematics, statistics, computer science, operational research, engineering, data science or related disciplines. Master or PhD degree is an advantage. Due to the rapid changing technology, the length of experience is not as important as having actual experience in applying data analytics skills in industry sectors, such as insurance, financial services, retail, marketing, healthcare, logistics, and in smart city development. For artificial intelligence experts, they usually have relevant training software engineering addition to a degree in artificial engineering.[101]

[99] https://targetjobs.co.uk/careers-advice/job-descriptions/454431-biotechnologist-job-description

[100] https://nationalcareersservice.direct.gov.uk/job-profiles/biotechnologist

[101] http://theinstitute.ieee.org/career-and-education/career-guidance/how-to-land-a-job-in-artificial-intelligence

Innovation and technology Experts in, but not limited to, the following fields: (a) pharmaceutical and life science/biotechnology; (b) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (c) materials science/nanotechnology	
	For robotic engineering experts, a post-graduate degree in Robotics, Computer Engineering, Electrical Engineering, Mechanical Engineering or equivalent, and several years of experience in developing mobile robot, serial-arm robot, and their robotic applications.[102] For blockchain professionals, a background in computer science or engineering, plus further training in blockchain. In addition, experience in a back-end developer role is crucial and in addition to strong back-end skills.[103] For biometrics engineers, the qualifications is a degree in computer science or biometrics and 3 years of related experience, a master degree in relevant fields plus 1 year of related experience, or a PhD degree in relevant field.[104] **(c) materials science/ nanotechnology** For materials scientists, the typical qualification is a degree in relevant discipline such as applied chemistry, applied physics, materials engineering or materials science or technology.[105] For many research jobs, a post-graduate qualification is usually required.[106] For nanotechnologists, the typical qualification is a master degree in nanotechnology or related fields and experience of working in a laboratory. For some employers, a PhD degree is required.[107] Apart from education attainment and the length of working experience, considerations may also be given to experience with the top-notch I&T institutions, corporations and R&D organisations. Other relevant criteria includes: - examples of invention in relevant fields as a director/founder of an I&T institution, corporation or research and development organisation; or - proof of recognition of work outside the applicants' immediate occupation that has contributed to the advancement of the field; or - made significant technical, commercial, or entrepreneurial contributions in the relevant sector as either a founder or entrepreneur of a company in the relevant field; or - been widely recognised as a world leading talent (e.g. recipients of renowned awards in the field); or - examples of exceptional ability in the field by making academic contributions through researches published in authoritative journals or endorsed by renowned experts. Recommendation by reputable R&D Centres, Quangos and Tertiary Institutes in relevant field would be an advantage. Specific requirements are subject to market demand at the time.

[102] https://boards.greenhouse.io/jdcom/jobs/4007206002#.WoZgSuRG2Z8.

[103] https://www.computerworlduk.com/careers/how-get-job-as-blockchain-developer-3640764/

[104] https://www.linkedin.com/jobs/view/biometrics-engineer-at-the-mitre-corporation-596100773

[105] https://nationalcareersservice.direct.gov.uk/job-profiles/materials-engineer

[106] https://www.bls.gov/ooh/life-physical-and-social-science/chemists-and-materials-scientists.htm

[107] https://nationalcareersservice.direct.gov.uk/job-profiles/nanotechnologist

Innovation and technology Experts in, but not limited to, the following fields: (d) pharmaceutical and life science/biotechnology; (e) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and (f) materials science/nanotechnology	
Salary level	For pharmaceutical professionals, the average annual salary is US$189,900 and that for the top 25%, US$231,200.[108] The annual salary in the UK for highly experienced biotechnologists is GBP60,000.[109] For materials scientists, in 2016 the median annual salary was US$99,430. For the top 10%, the salary was US$157,750.[110] For data scientists, in 2016with over 10 years of IT working experience and a minimum 5-year data analytics experience could be offered HK$60,000 to HK$75,000 a month from non-financial services companies. The salary could reach HK$75,000 to HK$95,000 if employed by financial services companies. For artificial intelligence experts, the annual salary in the US ranges from US$145,000 to US$231,000, with the average at around US$186,000.[111] For robotics engineers, in the UK, the median annual salary is GBP36,000 and the maximum could reach GBP75,000.[112] For blockchain experts, their salaries vary considerably. In the UK, large corporations such as banks pay around GBP100,000 per annual for an expert with five years or more.[113] For biometrics engineers, in the US the annual salary ranges from US$75,000 to US$85,000 and the average is US$78,000.[114] For materials scientists, in the US, in 2016, the median annual wage was US$99,430 and for the top 10%, the annual wage was US$157,750.[115] According to stakeholders consulted, the pay package is around HK$40,000 – HK$60,000 per month for a technical manager in nanotechnology. In the UK, the annual salary of a higher experienced nanotechnologist is GBP60,000.[116]

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓
	Salary level	Salary level is mostly close to HK$ 45,000 per month (90th percentile). (note: territorial median is $15,000 per month in mid-2016). According to stakeholders consulted, the pay package is around HK$40,000 – HK$60,000 per month for a technical manager in nanotechnology.	
	Education and training	For the three fields, as indicated above, higher education and experience in the field are required.	
Shortage	Local labour demand is growing	R&D personnel in this field are in demand according to industry stakeholders; Government policy of developing Hong Kong into an innovation hub requires more researchers in I&T.	✓
	Local labour supply is limited	There is a shortage in R&D personnel according to HR firms and industry stakeholders; although 30% of university graduates in Hong Kong are from STEM subjects, many do not follow career paths in research.	✓
Sensibility	Development potential	ITB notes I&T talents are important to develop Hong Kong into a knowledge-based economy and an innovation hub for the region. I&T provides support to different industries and exists in different fields.	✓
	Need for foreign talent	Current shortage in R&D personnel and Government policy to develop Hong Kong as an innovation hub means that demand may not be satisfied by the local talent pool and hence the need for foreign talent.	✓

[108] https://www.aaps.org/career-development/aaps-salary-survey-calculator

Innovation and technology Experts in, but not limited to, the following fields:

(d) pharmaceutical and life science/biotechnology;

(e) data engineering (e.g. data mining/data analytics), artificial intelligence, robotics, distributed ledger technologies, biometric technologies, industrial/chemical engineering, etc.; and

(f) materials science/nanotechnology

Final assessment

R&D personnel in innovation and technology are high skilled talents, required for current R&D activities in Hong Kong and to support the development potential of Hong Kong into an innovation hub for the region. The local talent pool may not sufficiently fill current and future needs.

[109] https://nationalcareersservice.direct.gov.uk/job-profiles/biotechnologist#salary

[110] https://www.bls.gov/oes/current/oes192032.htm

[111] https://www.paysa.com/salaries/artificial-intelligence--s

[112] https://www.indeed.co.uk/Robotics-Engineer-jobs

[113] https://www.computerworlduk.com/careers/how-get-job-as-blockchain-developer-3640764/

[114] https://www.paysa.com/salaries/biometrics-engineer--t

[115] https://www.bls.gov/oes/current/oes192032.htm

[116] https://nationalcareersservice.direct.gov.uk/job-profiles/nanotechnologist#salary

(8)

Industry Segment : Maritime services

Occupation / Profession : Naval architects

Naval architects

Rationale for consideration on the Talent List: Shortage of naval architects to meet potential demand for the design and certification of ships in Hong Kong to support Hong Kong in becoming a maritime centre in Asia.

Industry	Transport
HSIC Version 2.0	L719 – Engineering, technical and consultancy services not related to construction and real estate activities.
Occupation Index	242 – Engineering professionals
List of Professions	242 – Naval architects
Description of tasks	Study and prepare specification for the building, conversion or repair of ships or offshore structures. Study, design, and advise ships and offshore structures. Plan and supervise their overall design, development, construction, operation, maintenance and repair. Provide professional advice for the certification and registration of vessels in accordance with the requirements of international conventions.
Typical qualifications	For naval architects, experience in designing, building, and maintaining of different types of ships. Naval architects are primarily responsible for the ship design, including the form, structure, and stability of ships,[117] and they are engineers that design and develop systems to build or maintain ships and other structures for the seas.[118] Requirement to become a naval architect is a Bachelor's degree from an university in naval architecture, and five years[119] of full-time experience of work in shipping companies, classification societies or shipyards etc. in the planning, administering or expediting of ship design, and/or construction, or coordinating a very large engineering project relating to vessel/superyacht design, shipbuilding or ship modification, two years of which must have been in an administrative, managerial, executive or supervisory capacity. [120]
Salary level	International pay scale suggests that the salary for naval architects is in the range of US$53,000 - US$146,000 per annum (equivalent to HK$35,000 – HK$95,000 per month). [121]

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	At least Bachelor's degree and a five years of job experience required meeting the indicative benchmark of 5 years. (see note 127)	
Shortage	Local labour demand is growing	Feedback from stakeholders indicates that there is potentially great demand, for Hong Kong to enhance its role as a maritime centre in Asia.	✓
	Local labour supply is limited	As there is no university in Hong Kong providing curriculum on Naval Architecture or Shipbuilding Technology, this has limited the supply of naval professionals.	✓
Sensibility	Development potential	Hong Kong is a leading IMC in the region. It is the policy objective of the Government to further enhance Hong Kong's position as an IMC. In the National 13th Five-Year Plan, the Central Authorities has made clear its support for Hong Kong to reinforce and enhance its status as an international shipping centre. In the 2013, 2014, and 2015 Policy Addresses, dedicated section was included to highlight the importance attached to the development of the maritime industry, particularly the high value-added maritime services, ship finance, marine insurance, maritime law and arbitration (hereinafter referred to as "the high value-	✓

[117] US Bureau of Labor Statistics, Marine Engineers and Naval Architects, retrieved on 11/8/2016 from http://www.bls.gov/ooh/architecture-and-engineering/marine-engineers-and-naval-architects.htm

[118] WEBB Institute, What is a Naval Architect and Marine Engineer?, retrieved on 11/8/2016 from http://www.webb.edu/about-webb-institute/what-is-a-naval-architect/

[119] It is the minimum year of work experience for a person with qualification of naval architecture to become a chartered naval architect.

[120] Department of Transportation of New York City, Job Posting Notice, retrieved on 11/8/2016 from https://a127-jobs.nyc.gov/psc/nycjobs/EMPLOYEE/HRMS/c/HRS_HRS.HRS_CE.GBL?Page=HRS_CE_JOB_DTL&Action=A&JobOpeningId=222840&SiteId=1&PostingSeq=1&

[121] Ibid.

Naval architects

	added maritime services"). In the HKIMC Consultancy Study completed in 2014, the consultant recommended that Hong Kong should seek to expand the presence of commercial principals such as ship managers, owners and operators in Hong Kong, and also to enhance capabilities in providing high value-added maritime services.	
Need for foreign talent	The HKIMC Consultancy Study mentioned that Hong Kong's relative strength in terms of 'shipbuilding and ship repair' is very weak. This is because most of the shipyards have been relocated to the Mainland. However, Hong Kong is in need of talents in ship design to fill the positions in local dockyards. In fact, many shipping companies have been recruiting foreign talents in naval architecture to help relieve the manpower shortage in the sector.	✓

Final assessment

Recommended to include naval architects on the Talent List to support high-value operations in a strategically-important sector.

(9)

Industry Segment : Maritime services

Occupation / Profession : Marine engineers and Superintendents of ships

Marine engineers and Superintendents of ships

Rationale for consideration on the Talent List: Most of the current superintendents of ships and marine engineers are foreign professionals (e.g. from India), because it has been difficult to recruit locally to fill the posts. Inclusion of marine engineers and superintendents of ships in the Talent List is to support Hong Kong in becoming a maritime centre in Asia.

Industry	Transport
HSIC Version 2.0	L50 – Water transport
Occupation Index	214 – Engineering professionals
List of Professions	214 – Superintendents of ships
Description of tasks	Examples of the duties of marine engineers and superintendents of ships include the following: - responsible for the overall management and technical operations of assigned fleet of ships in a safe and profitable manner. This includes overseeing the daily operations of maintenance and repair, budgeting, survey schedules, training, on board supervision and monitoring, general assessment of vessels, inspections and docking; - to provide technical assistance and advice to ships both at home port and overseas; - to monitor technical status of vessel with relation to statutory certification and survey; - to perform technical compliance audits and investigation on defects/failures on a regular scheduled basis to ensure conformance with regulatory requirements; - to work closely with the management team and perform systematic review of the Quality, Health, Safety, and Environment (QHSE) system to ensure its smooth and successful implementation; - to ensure the assigned vessels are technically operational and maintain vessels' zero loss time accident record and to report all vessel incidents, Near Misses to prevent and eliminate potential incidents; - to liaise with management, customers or stakeholders on technical and operational matters including performance, expenditure and condition of the vessel; - to attend to vessel dry docking, repairs and survey when required and prepare repair specifications for dry docking and maintenance; and - to provide training to seafarers to ensure they are conversant with the company safety management system. Examples of the duties of marine engineers working in the classification societies or as private surveyors include the following: - to conduct statutory certification and surveys throughout the ship's life (building new ship, annual survey, interim survey, special survey) to ensure that the ship, its components and machinery are built and maintained according to the standards required for their class and complying with international standards; - to witness tests and operation of emergency and safety machinery and equipment; - to examine ships' cargoes or on board conditions such as fuel quality; investigating accidents at sea (e.g., oil spillages or failure of machinery or structures which are not considered to be critical); and preparing accident reports for insurance purposes; - to investigate marine accidents in relation to fire or engine failure; and - to attend court as an expert witness. Superintendents of ships or Technical Superintendents are job titles mostly for Marine Engineers who manage a fleet of ships in shipping companies with regular visits on board in ensuring their compliance with the relevant standards and requirements. For superintendents of ships who possess the qualification of Master Mariner (i.e. seafarers who have previous work experience as Deck Officer Class 1 on board ocean-going vessels), they are usually called as Marine Operations Managers / Port Captains.

Marine engineers and Superintendents of ships

Typical qualifications	Typical qualifications include minimum of 2 years sailing experience as Chief Engineer, i.e. holders of Class 1 Certificate of Competency of Marine Engineer Officer[122], with 2 years of experience as Superintendent or previous experience in a Senior Engineering position in the Marine Industry; or Post-graduate Degree (MEng or MSc) or equivalent qualification [123] in Marine Engineering or Mechanical Engineering or other related discipline[124] with 5 years of experience as Superintendent or previous experience in a Senior Engineering position in the Marine Industry.
Salary level	The annual salary of superintendents of ships in Asia region is around of US$92,700.

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓
	Salary level	Salary level is above HK$ 45,000 per month (90th percentile). (note: territorial median is HK$15,000 per month in mid-2016).	
	Education and training	At least Bachelor's degree and a five years of job experience required meeting the indicative benchmark of 5 years.	
Shortage	Local labour demand is growing	Feedback from stakeholders indicates that there is potentially great demand, for Hong Kong to enhance its role as a maritime centre in Asia.	✓
	Local labour supply is limited	Very few university students choose to work at sea after graduating from the course of mechanical engineering. As for the marine engineering studies, there is no university in Hong Kong providing such curriculum. This has limited the supply of marine professionals.	✓
Sensibility	Development potential	Hong Kong is a leading IMC in the region. It is the policy objective of the Government to further enhance Hong Kong's position as an IMC. In the National 13th Five-Year Plan, the Central Authorities has made clear its support for Hong Kong to reinforce and enhance its status as an international shipping centre. In the HKIMC Consultancy Study completed in 2014, the consultant recommended that Hong Kong should seek to expand the presence of commercial principals such as ship managers, owners and operators in Hong Kong, and also to enhance capabilities in providing high value-added maritime services.	✓
	Need for foreign talent	As mentioned above, Hong Kong's relative strength in terms of 'shipbuilding and ship repair' is comparatively weak. Local shipping companies have been recruiting marine engineers and superintendents of ships overseas to fill the position.	✓

Final assessment

Recommended to include marine engineers and superintendents of ships on the Talent List in response to the lack of availability of local talents and the importance of the importance of the industry.

[122] It is one of the three classes (i.e. Class 3 to Class 1 in ascending order) of Certificate of Competency stipulated by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers ("STCW") on ocean-going vessels. Seafarers with non-STCW qualifications will be assessed on individual basis.

[123] Teaching work in mechanical or marine engineering at tertiary institutions or surveyors' duties in classification societies can be considered as equivalent qualification. Qualification at Bachelor's or post-graduate degree level is not a must for Marine Engineers.

[124] Such as Building Services for some subjects like *Applied Mechanics*, *Applied Heat* are regarded as relevant to marine engineering. Assessment on individual subjects taken in the post-graduate degree programmes is required. Marine-related engineering qualification is a mandatory requirement for Marine Engineers.

(10)

Industry Segment : Legal and dispute resolution

Occupation / Profession : Legal and dispute resolution service providers covering:

(a) dispute resolution professionals specialising in resolving international financial and investor-state disputes; and

(b) transactional lawyers, in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states

Legal and dispute resolution service providers covering: **(a) dispute resolution professionals specialising in resolving international financial and investor-state disputes; and** **(b) transactional lawyers, in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states**	
Rationale for consideration on the Talent List: To support the development of Hong Kong as an international legal and dispute resolution services centre in the Asia Pacific region, in seeking to enhance our position in the international legal, dispute resolution and business arenas.	
Industry	Professional, scientific and technical activities
HSIC Version 2.0	M 691 – Legal activities
Occupation Index	261 – Legal professionals
List of Professions	2619 – Legal professionals not elsewhere specified: dispute resolution professionals 2611 – Lawyers: transactional lawyers
Description of tasks	▪ **Dispute resolution professionals** - Arbitrators: neutral parties who render final and binding decisions at the conclusion of arbitral proceedings; and - Mediators: impartial individuals, who, without adjudicating a dispute, assist the parties to the dispute to reach a negotiated settlement. ▪ **Transactional lawyers** The transactional lawyers from outside Hong Kong who possess specialised knowledge of and experience in cross-border transactions in which their countries or jurisdictions play the roles of investing or host states are those who are in the best position to advise their clients on the applicable law of contracts and seat of arbitration. Attracting them to come will enhance Hong Kong's position in the international legal community and benefitting the local legal and dispute service providers.
Typical qualifications	(a) Dispute resolution professionals Specialised arbitrators or mediators with multilingual skills who have been previously appointed to resolve international financial disputes or investment disputes between investors and host states. The arbitrators or mediators must have given awards or have facilitated parties to reach settlement agreements in three (3) or more cases in the above specialised areas in the past three (3) years. (b) Transactional lawyers (i) A person of good standing in his/her foreign jurisdiction in which he/she is qualified to practise law; (ii) He/she is a fit and proper person to be registered as a foreign lawyer in Hong Kong by the Law Society of Hong Kong or employed as in-house counsel of companies in Hong Kong; (iii) He/she has at least eight (8) years post qualification experience as a legal practitioner in any jurisdiction and holds a current practising certificate in his/her home jurisdiction; (iv) He/she has five (5) years or more specialised experience in advising corporate clients to conduct cross-border transactions in which his/her country or jurisdiction plays the role of investing or host state (e.g. debt and/or equity capital market transactions, merger and acquisitions and cross-border finance); and (v) Priority will be given to nationals of those countries along the Belt and Road routes which are considered developing countries by the World Trade Organization ("WTO").
Salary level	[Varied]

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill Level 4	✓✓
	Salary level	[Varied]	

Legal and dispute resolution service providers covering: **(a) dispute resolution professionals specialising in resolving international financial and investor-state disputes; and** **(b) transactional lawyers, in particular, those from developing Belt and Road countries, with specialised knowledge of and experience in cross-border transactions from investing or host states**			
	Education and training	▪ **Dispute resolution professionals** There are no specific requirements under the laws of Hong Kong on those who wish to become arbitrators or mediators. That said, there are professional bodies which provide education and training courses for those who wish to become arbitrators or mediators. ▪ **Transactional lawyers** These are lawyers qualified in their home jurisdictions.	
Shortage	Local labour demand is growing	▪ **Dispute resolution professionals** There is a continuing need to appoint dispute resolution professionals from outside Hong Kong for cases arising in the specialised areas of financial and investor-state disputes and with multilingual skills. ▪ **Transactional lawyers** Transactional lawyers from outside Hong Kong who possess specialised knowledge of and experience in cross-border transactions in which their countries or jurisdictions play the roles of investing or host states are in the best position to advise their clients on the applicable law of contracts and seat of arbitration. Attracting them to come will enhance Hong Kong's position in the international legal community and benefitting the local legal and dispute service providers.	✓
	Local labour supply is limited	▪ **Dispute resolution professionals** It is envisaged that a period of not less than 5 years is required to nurture the local talents in these specialised areas of dispute resolution through the relevant training ▪ **Transactional lawyers** These transactional lawyers are qualified in other jurisdictions and cannot be trained locally.	✓
Sensibility	Development potential	There is a growing trend of Mainland Chinese enterprises seeking to 'go global', encouraged by the Belt and Road Initiative and, more recently, the Guangdong-Hong Kong-Macao Bay Area Development. In this regard, Hong Kong is in a unique position as a neutral venue to provide international legal and dispute resolution services in the areas of financial and investment matters.	✓
	Need for foreign talent	Arbitrators and mediators from outside Hong Kong with multilingual ability are required in specialised areas of international financial and investor-state disputes. Transactional lawyers from outside Hong Kong are required for the reasons stated above so as to increase the chances of Hong Kong being designated as the seat of arbitration and Hong Kong law being chosen as the applicable law of contracts.	✓
Final assessment			
To be included to support the development of Hong Kong into a leading centre for international dispute resolution.			

(11)

Industry Segment : Creative Industries

Occupation / Profession : Creative Industries Professionals, including

(a) Music:

- **Recording Engineer**
- **Mastering Engineer**
- **Cutting/Pressing Engineer for Vinyl LP**

(b) Digital Entertainment:

- **Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer)**
- **Game Producer**

(c) Film:

- **Various roles in Pre-Production, Production and Post-production and Winner of Designated Renowned International Film Festivals**

Talent in

(a) Music
- Recording Engineer
- Mastering Engineer
- Cutting/Pressing Engineer for Vinyl LP

(b) Digital Entertainment
- Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer)
- Game Producer

(c) Film
- Various roles in Pre-Production, Production and Post-production and Winner of Designated Renowned International Film Festivals

Rationale for consideration on the Talent List: To foster the future development of local creative sectors. The presence of foreign experienced talent would attract more local or foreign investments to local creative industries, which facilitate local creative industries to expand their markets in the Belt and Road countries and the Guangdong-Hong Kong-Macao Bay Area and enhance Hong Kong's status as a trend-setting creative capital in the region.

Industry	Creative Industries
HSIC Version 2.0	R 90 – Creative and performing arts activities R 9020 – Creative artists, musicians and writers
Occupation Index	214 – Engineering professionals 2149 – Engineering professionals not elsewhere classified 216 – Architects, planners, surveyors and designers 2166 – Graphic and multimedia designers 251 – Software and applications developers and analysts 2513 – Web and multimedia developers 265 – Creative and performing artists
List of Professions	Recording Engineer Mastering Engineer Cutting/Pressing Engineer for Vinyl LP Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer) Game Producer Expert in Film Production
Description of tasks	▪ **Music** - Recording Engineer Responsible for recording, editing and mixing audio. - Mastering Engineer Conducts the important stage of fine-tuning the recorded music. - Cutting/Pressing Engineer for Vinyl LP Produces top quality records and Long Plate records. ▪ **Digital Entertainment** - Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer) Involved in various aspects of a game's creation from concept and story writing to the game design and programming. Other areas of work include audio, design, production, game technology research and visual arts. - Game Producer Sets the direction of the game, defines the strategy of the game, assembles and manages a team of programmers, designers and artists; outlines, schedules and tracks tasks; makes sure the project is heading the right direction and assures the quality of the game. ▪ **Film** - Film Producer Plans and coordinates various aspects of film production such as selecting scripts, coordinating scriptwriting, directing and editing and arranging financing. - Film Director Oversees a film's entire artistic production and is responsible for interpreting and expressing the intentions of the screenwriter and producer set out in the screenplay.

Talent in

(a) Music
- Recording Engineer
- Mastering Engineer
- Cutting/Pressing Engineer for Vinyl LP

(b) Digital Entertainment
- Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer)
- Game Producer

(c) Film
- Various roles in Pre-Production, Production and Post-production and Winner of Designated Renowned International Film Festivals

- Screenplay Writer
  Writes a screenplay for film production.
- Leading Actor/Actress
  Takes up the leading role of performance in a film production.
- Supporting Actor/Actress
  Takes up the secondary role in a film production.
- Cinematographer
  Makes decisions on lighting and framing of scenes in consultation with the director.
- Film Editor
  Works with the raw footage, selects shots and combines them into sequence to create a finished motion picture.
- Art Director
  Oversees artists and crafts people, such as set designer and set decorator, and is responsible for planning and executing the design of the sets, properties, set dressing and scenery.
- Costume Designer
  Responsible for, planning, designing, and production of the wardrobes for all the actors on screen.
- Action Choreographer
  Designs action scenes and works with the director to shoot dramatic action sequences.
- Film Score Composer
  Writes the musical score for a film production.
- Sound Designer
  Supervises the work of the entire sound post production process as well as having a specialised role in creating the sound concept for production, and works with the director and editor to balance the sound to their liking.
- Original Song Composer
  Writes, composes, creates or conceives the music of a song for a film.
- Lyrics Writer
  Writes the lyrics of a song for a film.
- Visual Effects Designer
  Assesses the parts of a film production that need visual effects (VFX), ensures the VFX shots are filmed correctly on set, and negotiates with the production crew the budget and discusses with them the feasibility of the VFX works.

Typical qualifications

- **Music**
  - Recording Engineer
    Possesses special skills to produce top quality records, having completed a specialised programme in a vocational school or a degree in audio engineering, sound engineering technology, etc. and a winner of Grammy Awards (Best Recording Engineer Awards), Beijing 北京十大錄音師大獎,Guangzhou 廣州華語金曲獎最佳錄音師獎., or other renowned and industry-recognised Mainland/overseas music awards.
  - Mastering Engineer
    Holds a degree in acoustic engineering, audio engineering or music production engineering, having in-depth understanding of the science behind and the artistic touch of sound; and a winner of Grammy Awards (Best Mastering Engineer Awards) or other renowned and industry-recognised Mainland/overseas music awards..
  - Cutting / Pressing Engineer for Vinyl LP
    Possesses special skills to produce top quality records and Long Plate records. As there is no award for Pressing Engineer for Vinyl LP assessment should be made basing on a candidate's CV, profile and track

Talent in
(a) Music - Recording Engineer - Mastering Engineer - Cutting/Pressing Engineer for Vinyl LP **(b) Digital Entertainment** - Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer) - Game Producer **(c) Film** - Various roles in Pre-Production, Production and Post-production and Winner of Designated Renowned International Film Festivals

record of producing famous records, and his/her scientific or professional experience in the communications field, including the design or marketing of audio mixing equipment or audio broadcast equipment. Has at least 10 years of active participation in broadcasting engineering or its associated fields and has demonstrated sufficient technical proficiency.

- **Digital Entertainment**
  - Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer)

Possesses 3 years of experience in game development, and having played the role of a game designer, game programmer or game graphic designer in the development of a successful game that had won any category of awards in one or more well-recognised awards in the Mainland or overseas, e.g. awards given by 中國音像與數字出版協會遊戲出版工作委員會, British Academy Games Award, The Games Award (U.S.A.), Game Developers Choice Awards (U.S.A.) and Game Star Award (Taiwan).

  - Game Producer

    Possesses 5 years of experience in game development, and having played the role of a game producer of a successful game that had won any category of awards in one or more well-recognised awards in the Mainland or overseas, e.g. awards given by the 中國音像與數字出版協會遊戲出版工作委員會, British Academy Games Award, The Games Award (U.S.A.), Game Developers Choice Awards (U.S.A.) and Game Star Award (Taiwan)

- **Film**

  Various roles in pre-production, production and post-production and are winner of designated renowned international film festivals, e.g. the Tier I and Tier II events under the "Sponsorship for Local Films Nominated to Participate in Film Festivals Overseas" of the Film Development Fund[125] .

Salary level

- **Music**

  Recording Engineer: HK$60,000 – 70,000 per month
  Mastering Engineer: HK$60,000 – 70,000 per month
  Cutting / Pressing Engineer for Vinyl LP: HK$60,000 – 70,000 per month

- **Digital Entertainment**

  Game Development Expert: At least HK$28,000 per month, subject to working experience
  Game Producer: At least HK$42,000 per month, subject to working experience

- **Film**

  Practitioners in film industry are remunerated on project basis and their remuneration varies significantly depending on various factors such as the time spent on the film project, type of the film, film crew composition, etc. The estimated range of remuneration per project for each position as set out below is based on the estimated remuneration for production of a Chinese film of budget from HK$6 million to HK$150 million.

[125] Examples of Tier I events: Academy Awards (Oscar) in USA, Festival de Cannes in France, Berlin International Film Festival in Germany, etc. Examples of Tier II events: Melbourne International Film Festival in Australia, Brussels International Fantastic Film Festival in Belgium, Toronto International Film Festival in Canada and China Golden Rooster and Hundred Flowers Film Festival in Mainland China, etc. As there is no "Best Producer" award in international film festivals, film producers of the "Best Film" awards in any of the film festivals on the Tier I and Tier II lists will be regarded as qualified candidates. However, the name(s) of the film producer(s) have to have appeared on the original poster of the film.

Talent in

(a) Music

- Recording Engineer
- Mastering Engineer
- Cutting/Pressing Engineer for Vinyl LP

(b) Digital Entertainment

- Game Development Expert (Game Designer, Game Programmer, Game Graphic Designer)
- Game Producer

(c) Film

- Various roles in Pre-Production, Production and Post-production and Winner of Designated Renowned International Film Festivals

Position	Range of Remuneration Per Project (HK$)
Film Producer	200,000 – 8 million
Film Director	300,000 – 10 million
Screenplay Writer	200,000 – 5 million
Leading Actor/Actress	150,000 – 20 million
Supporting Actor/Actress	25,000 – 1.2 million
Cinematographer	180,000 – 2 million
Film Editor	90,000 – 800,000
Art Director	120,000 – 800,000
Costume Designer	90,000 – 800,000
Action Choreographer	20,000 – 200,000
Film Score Composer	80,000 – 400,000
Sound Designer	50,000 – 800,000
Original Song Composer	20,000 – 200,000
Lyrics Writer	15,000 – 150,000
Visual Effects Designer	100,000 – 1.2 million

Assessment criteria		Evidence	Score
High skill	ISCO Skill Level	Skill level 4	
	Salary level	▪ **Music** Recording Engineer: HK$ 60,000 – 70,000 per month (above 90th percentile of the salary level of the whole working population in Hong Kong) in mid-2016 Mastering Engineer: HK$ 60,000 – 70,000 per month (above 90th percentile of the salary level of the whole working population in Hong Kong) in mid-2016 Cutting/Pressing Engineer for Vinyl LP: HK$ 60,000 – 70,000 per month (above 90th percentile of the salary level of the whole working population in Hong Kong) in mid-2016 ▪ **Digital Entertainment** Game Development Expert: At least HK$28,000 per month (above 75th percentile of the salary level of the whole working population in Hong Kong) in mid-2016, subject to working experience Game Producer: At least HK$42,000 per month (above 90th percentile of the salary level of the whole working population in Hong Kong), subject to working experience ▪ **Film** Practitioners in film industry are remunerated on project basis and their remuneration varies significantly depending on various factors such as the time spent on the film project, type of the film, film crew composition, etc. The estimated range of remuneration per project for each position as set out below is based on the estimated remuneration for production of a Chinese film of budget around HK$150 million.	

Talent in

(a) Music

- Recording Engineer
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(b) Digital Entertainment

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- Game Producer

(c) Film

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		Position / **Range of Remuneration for High-skilled practitioner Per Project (HK$)** Film Producer: 6 - 8 million Film Director: 7.5 - 10 million Screenplay Writer: 3.8 - 5 million Leading Actor/Actress: 15 - 20 million Supporting Actor/Actress: 0.9 - 1.2 million Cinematographer: 1.5 - 2 million Film Editor: 600,000 - 800,000 Art Director: 600,000 - 800,000 Costume Designer: 600,000 - 800,000 Action Choreographer: 150,000 - 200,000 Film Score Composer: 300,000 - 400,000 Sound Designer: 600,000 - 800,000 Original Song Composer: 150,000 - 200,000 Lyrics Writer: 110,000 - 150,000 Visual Effects Designer: 0.9 - 1.2 million
	Education and training	▪ **Music** Degree/diploma in relevant disciplines is an added advantage while over 5 years' relevant working experience is more crucial for recording engineer, mastering engineer and cutting/pressing engineer for Vinyl LP. ▪ **Digital Entertainment** Degree in relevant disciplines such as computer science, software engineering, mathematics, computer information systems or computer games is required for game development expert and game producer. ▪ **Film** Various roles in pre-production, production and post-production and are winner of designated renowned international film festivals, for example the Tier I and Tier II events under the "Sponsorship for Local Films Nominated to Participate in Film Festivals Overseas" of the Film Development Fund ("Professional Animator" not included).
Shortage	Local labour demand is growing	According to a Manpower Demand Survey conducted by CreateHK in mid-2016, it was revealed that film and television sector constituted one of the top three creative sectors in terms of the number of creative vacancies (i.e. 400) in the coming three years. The further development of Hong Kong's creative industries lies on very high quality human capital with all-round international exposure.
	Local labour supply is limited	Internationally or nationally acclaimed talent in creative industries possess international vision, exposure and experience, which could not be acquired through local training.
Sensibility	Development potential	The development of the Belt and Road Initiative and the Guangdong-Hong Kong-Macao Bay Area will bring in high quality talent with knowledge of the southern China market or from Belt and Road countries such as

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		ASEAN which attract cross-territorial fertilisation of cultures and product/service designs that would facilitate the building up of the Asian talent pool and casting Hong Kong as a leading creative hub among other Asian competitors. The signing of ASEAN Free Trade Agreement (FTA) will create new business opportunities and further enhancement to the trade and investment flows.
	Need for foreign talent	Overseas talent remain an important source of impetus to drive the further development of the film/music/digital entertainment businesses.

Final assessment

Admission of foreign experienced talent in creative industries is one of the key elements to support the further development of Hong Kong's creative industries and enhancement of Hong Kong's status as a trend-setting creative capital in the region, thereby creating more job opportunities.

Annex 2 Consulted HR agencies and recruitment practitioners

Individuals from the following firms or organisations have contributed to the consultancy study through focus group sessions or in-depth interviews. It should be however noted that some of their views were made in their personal capacity. For some of them opted to keep themselves anonymous, they are grouped at the end of the list.

Aacurapid Talent Acquisition

ConnectedGroup

ExcelNet Total HR Solutions

Hong Kong Institute of Human Resource Management

Korn Ferry

Nova Management Consultants Limited

Peoplesearch

Other 13 HR agencies and recruitment practitioners

Annex 3 Consulted Industry Stakeholders

Individuals from the following firms or organisations have contributed to the consultancy study through focus group sessions or in-depth interviews. It should be noted that some of their views were made in their personal capacity. For some of them opted to keep themselves anonymous, their respective sectors are therefore shown at the end of the list.

Convoy Financial Group Limited

Deltamac (HK) Co. Ltd. /Clickplay (HK) Ltd.

FinFabrik

Federation of Hong Kong Film Makers

Guosen Securities HK

Herbert Smith Freehills

Hong Kong Arts Development Council

Hong Kong Association for Testing, Inspection and Certification

Hong Kong Chamber of Films

Hong Kong Comics and Animation Federation

Hong Kong Computer Society

Hong Kong Council for Testing and Certification

Hong Kong Creative Industries Association

Hong Kong Cyberport Management Company Limited

Hong Kong Digital Entertainment Association

Hong Kong Film Awards Association

Hong Kong Game Industry Association

Hong Kong Green Building Council

Hong Kong Netrepreneurs Association

Hong Kong Record Merchants Association

Hong Kong Science and Technology Parks Corporation

Hong Kong Securities and Investment Institute

Hong Kong Shipowners Association

Hong Kong Theatre Association

Integrated Solutions

Motion Picture Industry Association

Movie Producers and Distributors Association

The Alternative Investment Management Association (Hong Kong)

The Association of IT Leaders in Education

The Chinese Manufacturers' Association of Hong Kong

The City University of Hong Kong

The Employers' Federation of Hong Kong

The Environmental Management Association of Hong Kong

The Hong Kong Polytechnic University

The Hong Kong University of Science and Technology

The Open University of Hong Kong

West Kowloon Cultural District Authority

Electronics and Telecommunications Training Board, Vocational Training Council

Import / Export/ Wholesale Trades Training Board, Vocational Training Council

Information Technology Training and Development Training Board, Vocational Training Council

Metals Training Board, Vocational Training Council

Retail Trade Training Board, Vocational Training Council

2 professionals and 1 academic of architecture sector

1 association of arts profession

3 professionals of arts and culture sector

1 representative from association of business profession

4 banks

1 organisation of education sector

1 association and 1 professional of engineering sector

1 professional of environmental protection sector

5 associations and 1 professional of film sector

3 organisations and 2 professionals of financial sector

1 association of game related industry

2 associations and 1 professional of information and communications technology sector

2 professionals and 2 academics of innovation and technology sector

1 association of legal and arbitration sector

1 company, 1 professional and 2 academics of marine sector

2 companies and 2 associations of music industry

1 company of retail industry

1 academic of testing and certification sector