October 2022

Consultation Paper

Listing Regime for Specialist Technology Companies

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HOW TO RESPOND TO THIS CONSULTATION PAPER

The Exchange, a wholly-owned subsidiary of HKEX, invites written comments on the matter discussed in this paper, or comments on related matters that might have an impact upon the matter discussed in this paper, on or before **18th December 2022**.

To submit written comments please complete the questionnaire that can be accessed via the link and QR code below.

Link: https://surveys.hkex.com.hk/jfe/form/SV_41SJbQrjgDz54qO

QR code:

Our submission enquiry number is (852) 2840 3844.

Respondents are reminded that we will publish responses on a named basis in the intended consultation conclusions. If you do not wish your name to be disclosed to members of the public, please state so when responding to this paper. Our policy on handling personal data is set out in Appendix VI.

Submissions received during the consultation period by **18th December 2022** will be taken into account before the Exchange decides upon any appropriate further action and a consultation conclusions paper will be published in due course.

DISCLAIMER

EXECUTIVE SUMMARY

Purpose

1. This Consultation Paper solicits market feedback on proposals to amend the Listing Rules to enable the listing of Specialist Technology Companies on the Main Board of the Exchange. Definitions of the terms used in this paper are set out in the "Definitions" section below (see page 83).

Background

2. In 2018 we significantly diversified the opportunities for investors in our markets through reforms that:

   (a) permitted the listing of **Biotech Companies** that are primarily engaged in R&D, have developed at least one Core Product beyond the concept stage and are seeking a listing to raise funds to bring their Core Product(s) to commercialisation;

   (b) permitted the listing of **WVR Issuers** that are considered innovative, so that the individual founders of these companies could retain control if they had been materially responsible for their rapid growth and success; and

   (c) created a new concessionary secondary listing route for **overseas issuers** listed on a Qualifying Exchange, so that Hong Kong investors have access to such companies whilst preserving the most important protections offered by the Hong Kong regulatory regime.

3. The 2018 Listing Reforms have resulted in listings, on the Exchange, of many more companies from the Healthcare[1] and Information Technology[2] industries. Today, the Information Technology industry is, by far, the largest industry on the Exchange's market and the Healthcare and Information Technology industries combined now made up more than one-third of the total market capitalisation of the Hong Kong market.

[1] The Healthcare industry includes Pharmaceuticals, Biotechnology, Chinese Medicines, Medical Devices, and Medical & Aesthetic Services subsectors, as defined by the HSICS.

[2] The Information Technology industry includes Telecommunication Equipment, Computers & Peripherals, System Applications & IT Consulting, E-Commerce & Internet Services, Software, and Semiconductors subsectors, as defined by the HSICS.

Remaining gap to other markets

4. Despite the improvements to the diversification of our markets following the 2018 Listing Reforms, our research shows that Hong Kong still lags behind the US and Mainland China in terms of the number and market capitalisation of companies belonging to the industries below (referred to as "Specialist Technology Industries" in this paper):

   (a) next-generation information technology;

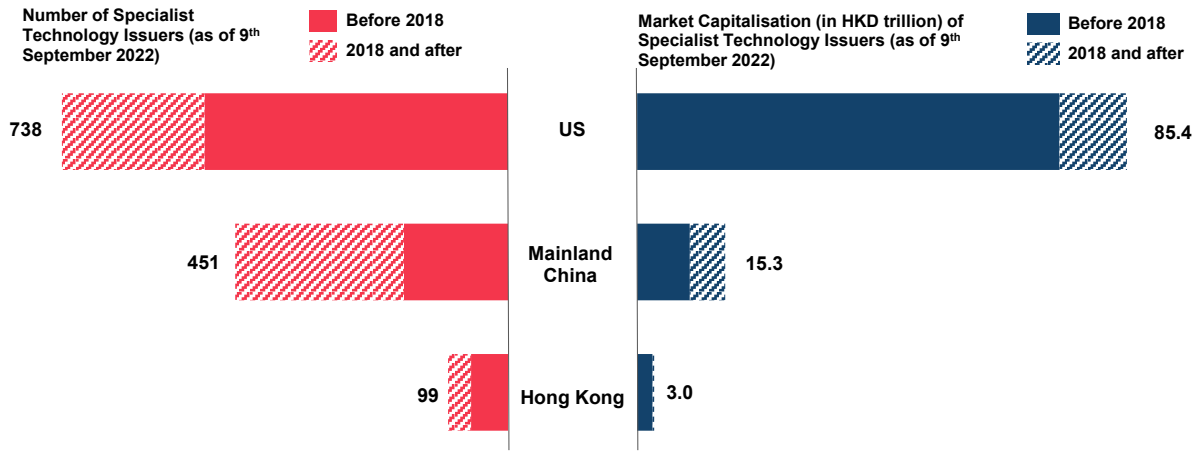
   (b) advanced hardware;

   (c) advanced materials;

   (d) new energy and environmental protection; and

   (e) new food and agriculture technologies.

Figure 1: Number of Specialist Technology Issuers and their combined market capitalisation in the US, Mainland China and Hong Kong markets[3]



Source: HKEX, Bloomberg, and WIND database (as of 9th September 2022)

5. Specialist Technology Companies currently face difficulties listing in Hong Kong because they often cannot meet the profit, revenue or cash flow requirements of our Main Board Eligibility Tests. Many of them are still engaged in R&D to bring their products and/or services to commercialisation and those that have commercialised are not able to meet our tests because of the nature of their businesses. This is despite the fact that some of these Specialist Technology Companies' market capitalisation may be well over the minimum threshold for a Hong Kong listing.

[3] Specialist Technology Issuers may be double counted in this figure if they are dual primary listed on two markets, or if they are primary listed on one market and secondary listed on another.

6. Our discussions with market stakeholders have led us to believe that there would be strong appetite among investors in Hong Kong for the listings of Specialist Technology Companies due to their high growth potential.

Key Issues

7. The nature of Specialist Technology Companies means that they pose particular regulatory issues.

Difficulty in reaching a consensus on valuation

8. Specialist Technology Companies often operate in new markets that are at the early stages of their development. Consequently, it may be difficult to accurately predict the potential market size of the company's products / services, as well as how successful the company will be in addressing the needs of that potential market. In comparison, for traditional industries where the market for their products / services is mature and has a long history, valuations can be assessed with a higher degree of confidence.

9. Specialist Technology Companies that have not commercialised their Specialist Technology Products are subject to heightened risks of speculation and manipulation of their valuation because the market may speculate on the status of their commericalisation progress. They may also modify their business models significantly over time as they try to find one that is commercially successful. This could lead to share price volatility and/or trading illiquidity after their listing.

Absence of a Competent Authority

10. Biotech Companies are subject to Competent Authority regimes that set external milestones on the development progress of their Core Products through the three-phase clinical trial process. Even though this does not mitigate the risk that a Biotech Company may not successfully commercialise its products or generate sufficient revenue to sustain its operations after listing, a Competent Authority regime does provide investors with a frame of reference with which to judge the stage of development of those Core Products, in the absence of commercial indicators such as revenue and profit.[4]

11. The products and/or services of Specialist Technology Companies are not usually required to be evaluated or approved by a Competent Authority. This means investors and intermediaries do not have the benefit of an independent process against which to judge the stage of development of the Specialist Technology Products and its progress towards commercialisation.

[4] HKEX, Consultation Paper on a Listing Regime for Companies from Emerging and Innovative Sectors, paragraph 73, February 2018.

12. The Exchange is also not in a position to vet or assess the truth or accuracy of the claims made by the Specialist Technology Company in its Listing Document regarding the technical capabilities, commercial viability or the stage of development of the Specialist Technology Products.

Viability of a product or service

13. Some Specialist Technology Companies apply technologies that are novel and so special expertise is necessary to assess the capabilities of their products. This may lead to the risk of companies intentionally overstating these capabilities in the knowledge that their claims cannot be easily refuted or proven false. Also, deficiencies in the capabilities of the product may not be uncovered until commercialisation.

Failure to successfully commercialise

14. Similar to Biotech Companies, early stage Specialist Technology Companies that are still engaging in R&D to bring their products to commercialisation are also subject to the risk that the company is not able to successfully commercialise their products. In these circumstances, investors in those companies may lose most, if not all, of the value of their initial investment in the company.

Reliance on external funding to support operations

15. Early stage Specialist Technology Companies that have not yet generated sufficient revenue would fund their working capital requirements through proceeds from equity or debt financing, instead of from their operations. This means they are subject to a higher risk of corporate failure if they are unable to secure sufficient external funding.

16. Also, Specialist Technology Companies may seek additional funding through issuing additional shares or other equity securities after listing, which could result in dilution of existing shareholders' ownership interest.

Proposals

17. We aim to address these and other issues through the proposals set out in this paper.

Categorisation

18. We propose to divide Specialist Technology Companies into two categories, namely:

    (a) those that have achieved meaningful commercialisation of their Specialist Technology Products (as indicated by their revenue achieving a minimum threshold), referred to in this paper as "Commercial Companies"; and

    (b) those that are primarily engaged in R&D to bring their Specialist Technology Products to commercialisation or have not yet achieved the minimum revenue threshold, referred to in this paper as "Pre-Commercial Companies".

19. Additional requirements in Rules and guidance will apply to Pre-Commercial Companies due to the higher risks associated with these companies, including the risk that they will be unable to successfully commercialise their products and/or services and the higher risk of corporate failure due to a lack of funding.

Requirements

20. The table below summarises the key requirements that we propose to put in place for Commercial Companies and Pre-Commercial Companies:

SUBJECT	KEY REQUIREMENTS		SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER
	COMMERCIAL COMPANIES	PRE-COMMERCIAL COMPANIES	
I. QUALIFICATIONS FOR LISTING			
Expected market capitalisation	• At least HK$8 billion at the time of listing	• At least HK$15 billion at the time of listing	B(I)
Revenue	• At least HK$250 million arising from the company's Specialist Technology business segment(s) for the most recent audited financial year	No requirement	B(II)
R&D	• Engaged in R&D for at least three financial years		B(III)
	• R&D investment constitutes at least 15% of total operating expenditure for each of the three financial years prior to listing	• R&D investment constitutes at least 50% of total operating expenditure for each of the three financial years prior to listing	
Operational track record	• At least three financial years of operation under substantially the same management prior to listing[5]		B(IV)

[5] The Exchange may accept a shorter trading record of at least two financial years in exceptional circumstances, in line with Rule 8.05B(3). Please refer to paragraph 147.

SUBJECT	KEY REQUIREMENTS		SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER
	COMMERCIAL COMPANIES	PRE-COMMERCIAL COMPANIES	
Third-party investment	• **Definition of Sophisticated Independent Investors**: (a) must not be a core connected person of the listing applicant (excluding a person being connected only by virtue of being a substantial shareholder); and (b) must be a sophisticated investor who meets any of the indicative size thresholds or qualification requirement as outlined in paragraph 160 • **Minimum investment requirements:** The listing applicant must have received meaningful investment from Sophisticated Independent Investors. As an indicative benchmark, an applicant meeting the following requirements will generally be considered as having received "meaningful investment": o investment from at least two Sophisticated Independent Investors at least 12 months prior to the date of the listing application, each holding such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the listing applicant as at the date of listing application and throughout the pre-application 12-month period (referred to as "Pathfinder SIIs" in this document); and o at least the following aggregate investment from all Sophisticated Independent Investors as at the time of listing of:		B(V)

<table>
<tr><th>SUBJECT</th><th colspan="2">KEY REQUIREMENTS</th><th>SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER</th></tr>
<tr><th></th><th>COMMERCIAL COMPANIES</th><th>PRE-COMMERCIAL COMPANIES</th><th></th></tr>
<tr><td></td><td><table>
<tr><th>Expected market capitalisation at the time of listing (HK$)</th><th>Minimum total investment (as % of issued share capital) at time of listing</th></tr>
<tr><td>≥ 8bn to < 20bn</td><td>20%</td></tr>
<tr><td>≥ 20bn to < 40bn</td><td>15%</td></tr>
<tr><td>≥ 40bn</td><td>10%</td></tr>
</table></td><td><table>
<tr><th>Expected market capitalisation at the time of listing (HK$)</th><th>Minimum total investment (as % of issued share capital) at time of listing</th></tr>
<tr><td>≥ 15bn to < 20bn</td><td>25%</td></tr>
<tr><td>≥ 20bn to < 40bn</td><td>20%</td></tr>
<tr><td>≥ 40bn</td><td>15%</td></tr>
</table></td><td></td></tr>
<tr><td>Additional qualification requirements for Pre-Commercial Companies</td><td>Not applicable</td><td>Demonstrate, and disclose in its Listing Document, a credible path to achieving the Commercialisation Revenue Threshold
Have available working capital (including the expected IPO proceeds) to cover at least 125% of its group’s costs (which must substantially consist of general, administrative and operating costs and R&D costs) for at least the next 12 months</td><td>B(VI)</td></tr>
</table>

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<tr><th>SUBJECT</th><th colspan="2">KEY REQUIREMENTS</th><th>SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER</th></tr>
<tr><th></th><th>COMMERCIAL COMPANIES</th><th>PRE-COMMERCIAL COMPANIES</th><th></th></tr>
<tr><td colspan="4">II. IPO REQUIREMENTS</td></tr>
<tr><td>More robust price discovery process</td><td colspan="2">• Allocate at least 50% of the total number of shares offered in IPO to Independent Institutional Investors
• Revised initial allocation and clawback mechanism as follows:
<table>
<tr><th></th><th rowspan="2">Initial</th><th colspan="2">No. of times (x) of over-subscription in the public placing tranche</th></tr>
<tr><th></th><th>≥ 10x to < 50x</th><th>≥ 50x</th></tr>
<tr><td>Minimum allocation to retail investors as % of total shares offered in IPO</td><td>5%</td><td>10%</td><td>20%</td></tr>
</table></td><td>C(I)</td></tr>
<tr><td>Requirements on free float and offer size</td><td colspan="2">• Free float: minimum free float (being shares not subject to any disposal restrictions) of at least HK$600 million upon listing;
• Offer size: the Exchange would expect the listing of a Specialist Technology Company to be accompanied by an offer (including both the placing tranche and the public subscription tranche) of a meaningful size and reserves the right not to approve the listing if the offer size is not significant enough to facilitate post-listing liquidity, or otherwise gives rise to orderly market concerns.</td><td>C(II)</td></tr>
<tr><td>Disclosure requirements</td><td colspan="2">• Additional disclosure requirement in the Listing Document to facilitate IPO investors' assessment of a Specialist Technology Company, including: (a) pre-IPO investments and cash flows; (b) products and commercialisation status and prospects; (c) R&D; (d) industry specific information; and (e) intellectual property.
• A warning statement in its Listing Document that the applicant is a Specialist Technology Company and so investment in its securities carries additional risks</td><td>C(III)</td></tr>
</table>

SUBJECT	KEY REQUIREMENTS		SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER
	COMMERCIAL COMPANIES	PRE-COMMERCIAL COMPANIES	
Additional disclosure requirements	Not applicable	• Disclose in its Listing Document the key stages and milestones for its Specialist Technology Product(s) to achieve the Commercialisation Revenue Threshold • Warning statement in its Listing Document should also draw investors' attention to the risk that the company may not generate sufficient revenue to sustain its operations after listing and that it may fail due to a lack of available funds	C(III)
III. POST-IPO REQUIREMENTS			
Post-IPO lock-up	• Post-IPO lock-up on the following persons: (a) controlling shareholders of the listing applicant; (b) key persons including founders, any WVR beneficiaries, executive directors and senior management, and key personnel responsible for the technical operations and/or R&D; and (c) Pathfinder SIIs		D(I)

SUBJECT	KEY REQUIREMENTS		SECTION REFERENCE IN CHAPTER 3 OF THIS PAPER
	COMMERCIAL COMPANIES	PRE-COMMERCIAL COMPANIES	
Continuing obligations for Pre-Commercial Companies (until achieving the Commercialisation Revenue Threshold)	Not applicable	• Additional disclosure in the interim and annual reports including the timeframe for, and any progress made towards, the issuer achieving the Commercialisation Revenue Threshold; and updates on any revenue, profit and other business and financial estimates as provided in the Listing Document (and any subsequent updates to those estimates as published by the Pre-Commercial Company) • Shortened remedial period of 12 months (rather than the usual 18 months) for re-compliance with the sufficiency of operations requirement before delisting • Restricted from effecting any transaction that would constitute a material change of business without the prior consent of the Exchange • Identified through the stock marker "PC"	D(II)

GEM Reforms

21. In February 2018, following public consultation, we re-positioned our second board, GEM, as a stand-alone board for SMEs. Since then the number of new listings and funds raised by GEM companies have declined.

22. The Exchange notes that the FSDC recently proposed reform of GEM so that its eligibility requirements take into account the needs of new economy industries[6]. Other stakeholders also supported GEM reform, but preferred a new stand-alone listing venue, distinct from GEM, for technology companies[7].

23. We believe that the proposed introduction of the Specialist Technology Regime, as set out in this paper, will address some of the concerns expressed by these stakeholders. Our proposals will improve the attractiveness of Hong Kong to new economy companies generally by enabling the listing, on the Main Board, of Specialist Technology Companies that cannot meet our current Main Board Eligibility Tests.

24. However, we are aware that our proposed Specialist Technology Regime will not necessarily address the fund raising needs of SMEs. The Exchange will explore other ways to address this as part of a separate exercise.

Request for Comment

25. We would like to invite public comments on the proposals. Responses to this Consultation Paper should be submitted to us by 18th December 2022. When providing your comments please give reasons for your views. We also welcome any alternative suggestions regarding the conditions and requirements we have set out in this paper.

Next Steps

26. The Exchange will take into account responses and comments to this paper before deciding upon any further appropriate action and publishing a conclusions paper.

[6] FSDC, "Hong Kong as an International Financial Centre – Enhancement of Hong Kong's IPO offerings" (FSDC Paper No.52), page 14, 3rd March 2022.

[7] The Chamber of Hong Kong Listed Companies, "Nasdaq of China" Addendum, page 8, 5th May 2022.

CHAPTER 1: BACKGROUND

2018 Listing Reforms

27. In 2018 we took a step forward towards diversifying our markets through the implementation of major listing reforms[8] as set out below.

Biotech Companies

28. We permitted the listing of Biotech Companies that cannot meet our Main Board Eligibility Tests subject to additional requirements.

29. These additional requirements included requiring the Biotech Company to have developed at least one Core Product beyond the concept stage, and requiring the development progress of those Core Product(s) to be verified by a Competent Authority. Regulation by a Competent Authority and the stages involved in their approval processes provide an indication as to the Biotech Companies' development progress. This gives investors a frame of reference to judge the value of these Biotech Companies, in the absence of traditional indicators such as revenue and profit.

30. The listing regime for Biotech Companies also included other key requirements on R&D, third party investment requirements and additional disclosure requirements.

WVR Issuers

31. We allowed issuers with WVR structures to list to attract good quality and high growth companies from innovative sectors. This reform enabled the individual founders of these companies to retain control if they had been materially responsible for their rapid growth and success, despite the substantial dilution to their economic stake caused by multiple rounds of pre-IPO fundraising.

32. We applied additional requirements due to the risks associated with investing in companies with a WVR structure. This included the risk that the interests of the beneficiaries of WVR may not be aligned with those of other shareholders, and that the WVR beneficiaries will be in a position to exert significant influence over the affairs of the issuer and the outcome of shareholders' resolutions, irrespective of how other shareholders vote.

[8] HKEX, Consultation Conclusions on a Listing Regime for Companies from Emerging and Innovative Sectors, April 2018.

33. Key requirements we implemented included requiring a large expected market capitalisation for listing applicants (a minimum market capitalisation threshold of either HK$40 billion or HK$10 billion (if it has at least HK$1 billion revenue in its last audited financial year), a third party investment requirement, ringfencing the minimum voting power of non-WVR shareholders and requiring the beneficiaries of WVR to have a minimum economic interest in the WVR issuer.

34. The Exchange also retained absolute discretion to reject an application for listing with a WVR structure even if an applicant met the requirements set out in the Listing Rules and related guidance to ensure only "bona fide" candidates who fit the target profile are listed.

Secondary listings of overseas issuers

35. We created a concessionary route to secondary listing for overseas issuers that are listed on a Qualifying Exchange so that Hong Kong investors have access to such companies whilst preserving the most important protections offered by the Hong Kong regulatory regime.

36. The concessionary regime for secondary listings of overseas issuers is based on the premise that:

    (a) reliance is placed on a track record of good regulatory compliance of an overseas issuer on the Qualifying Exchange where it is primary listed; and

    (b) the overseas issuer has a large expected market capitalisation at the time of secondary listing.

Subsequent Developments

37. The Exchange has continued to review and refine the listing regimes put in place by the 2018 Listing Reforms.

Guidance on disclosure requirements for Biotech Companies

38. In April 2020, the Exchange published the Biotech Disclosure Guidance regarding the listing document disclosure of Biotech Companies. This provided prospective Biotech Companies with more clarity on the drafting of listing documents in areas such as the competitive landscape and addressable market of their Core Products, Competent Authority communications and their sophisticated investors.

39. In February 2021, the Exchange updated the Biotech Disclosure Guidance regarding the presentation of fair, balanced and accurate disclosure and the Exchange's expectations on certain key areas, including business models, products, R&D and risk factors in listing documents.

Consultation on corporate WVR beneficiaries

40. In January 2020, the Exchange published a consultation paper[9] to solicit market feedback on a proposal to permit corporates to benefit from WVR, subject to appropriate requirements.

41. In October 2020, the Exchange concluded that it should limit corporate WVR beneficiaries to only eligible Greater China Issuers that were: (a) controlled by corporate WVR beneficiaries as at 30th October 2020; and (b) primary listed on a Qualifying Exchange on or before 30th October 2020.[10]

Consultation on listing regime for overseas listed issuers

42. In 2021[11], the Exchange carried out a holistic review of the listing regime for overseas issuers[12], resulting in one common set of core shareholder protection standards that apply to all issuers. We also streamlined the requirements for the secondary listing and dual-primary listing of overseas listed issuers.

Impact of the 2018 Listing Reforms

43. Since they became effective on 30th April 2018, 79 issuers have been listed under the Listing Reform Chapters (as of 9th September 2022). This represents 10.8% of the total number of issuers listed on the Exchange and 20.7% of its total market capitalisation (see Table 1).

Table 1: New listings under the Listing Reform Chapters of the Listing Rules

2018 Listing Reform	New listings since 30th April 2018		Market capitalisation as of 9th September 2022		Year-to-date trading turnover as of 9th September 2022	
	Number	% of total listed issuers	In HKD trillion	% of total market	In HKD trillion	% of total market
Biotech Companies	52	7.1%	0.49	1.4%	0.28	1.7%
WVR Issuers[13]	11	1.5%	2.27	6.4%	1.78	11.0%

[9] HKEX, Consultation Paper on Corporate WVR Beneficiaries, 31st January 2020.

[10] HKEX, Consultation Conclusions on Corporate WVR Beneficiaries, 30th October 2020.

[11] HKEX, Consultation Conclusions on Listing Regime for Overseas Issuers, November 2021. The amended Listing Rules and guidance letter came into effect on 1st January 2022.

[12] An "overseas issuer" is an issuer which is neither a Hong Kong issuer (an issuer which is incorporated, or otherwise established, in Hong Kong) nor a PRC issuer (an issuer which is duly incorporated in the PRC as a joint stock limited company).

[13] WVR Issuers listed under Chapter 19C are included in the row "Seconding listings of overseas issuers" and excluded from the row "WVR Issuers".

2018 Listing Reform	New listings since 30th April 2018		Market capitalisation as of 9th September 2022		Year-to-date trading turnover as of 9th September 2022	
	Number	% of total listed issuers	In HKD trillion	% of total market	In HKD trillion	% of total market
Secondary listings of overseas issuers[14]	17	2.3%	4.60	13.0%	1.81	11.0%
Total[15]	**79**	**10.8%**	**7.32**	**20.7%**	**3.87**	**23.3%**

Source: HKEX (as of 9th September 2022)

Diversification Resulting from the 2018 Listing Reforms

44. The 2018 Listing Reforms have had a broader impact on the diversification of companies on our market beyond listings under the Listing Reform Chapters, as the 2018 Listing Reforms have attracted many other companies in the Healthcare [16] and Information Technology[17] industries to list here.

Information Technology

45. The Information Technology industry only represented around 15% of the total market capitalisation prior to 2018. Today, the Information Technology industry is, by far, the largest industry on the Exchange's market, representing 30% of total market capitalisation as of 31st December 2021 (see Figure 2).

Healthcare

46. Before the 2018 Listing Reforms, the contribution of Healthcare companies to total market capitalisation was insignificant and so not separately measured. As a consequence of the increasing number of listings and the increase in trading in the shares of issuers operating in the industry, in September 2019, Healthcare companies were introduced to the HSICS for the first time.

[14] Overseas issuers listed by way of a secondary listing under Chapter 19C. Some of these issuers have since converted to a dual-primary listing from a secondary listing.

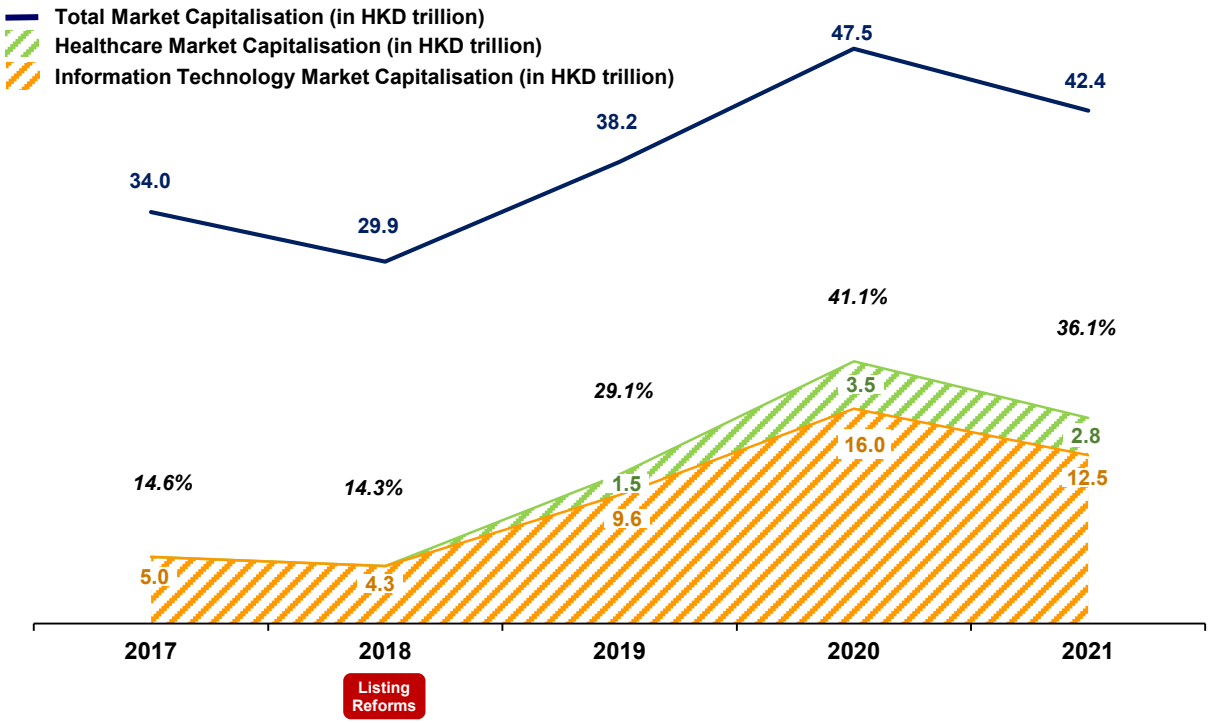
[15] One Biotech Company was listed under both Chapter 18A and Chapter 19C. It is counted once only in the row "Total".

[16] The Healthcare industry includes Pharmaceuticals, Biotechnology, Chinese Medicines, Medical Devices, and Medical & Aesthetic Services subsectors, as defined by the HSICS.

[17] The Information Technology industry includes Telecommunication Equipment, Computers & Peripherals, System Applications & IT Consulting, E-Commerce & Internet Services, Software, and Semiconductors subsectors, as defined by the HSICS.

47. Representation in the Healthcare industry on the Exchange has since grown steadily to 7% of total market capitalisation in 2021. In that year, the Healthcare Information Technology industries combined made up more than one-third of the total market capitalisation of Hong Kong market (see Figure 2).

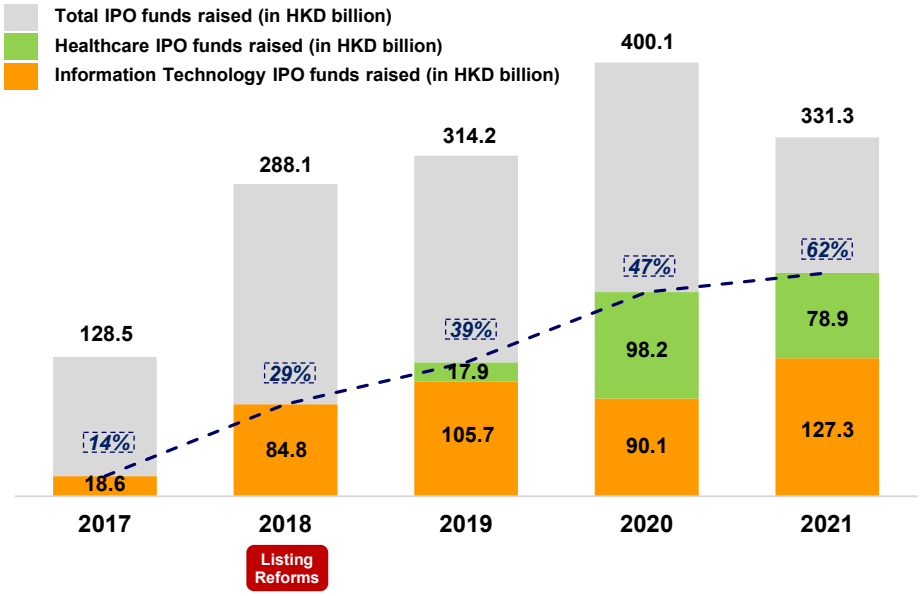
Figure 2: Market capitalisation of Information Technology and Healthcare Industries in HKD trillion and as a percentage of the total market capitalisation of Hong Kong market at the end of each year from 2017 to 2021



Source: HKEX (as of January 2022)

48. In terms of funds raised in 2021, in the Healthcare and Information Technology industries, HK$200 billion was raised from 47 new listings (see Figure 3). This corresponds to 62% of Hong Kong's total IPO funds raised during 2021.

Figure 3: IPO funds raised from the Healthcare and Information Technology industries in HKD million and as a percentage of total IPO funds raised on Hong Kong market between 2017 and 2021



Source: HKEX (as of January 2022)

49. The growing number of listed Healthcare companies has also led to an increase in the number and diversity of healthcare related investment products, a broader healthcare investor base and an expansion of sell-side analyst coverage specialised in Healthcare and Biotech Companies investments in Hong Kong[18]. The increase in listings, with the help of governments and universities[19], has also contributed greatly to the growth of Healthcare and biotech finance expertise in Hong Kong.

Remaining Gap to Other Markets

50. Despite the improved diversification of our markets following the 2018 Listing Reforms, Hong Kong still lags behind the US and Mainland China in terms of listing of companies in the five industries below (referred to as Specialist Technology Industries in this paper):[20]

[18] HKEX, HKEX in Biotech Issue No.6, July 2021.

[19] Bonnie Y Chan, Head of Listing, HKEX, HKEX Insight - How can Hong Kong cement its position as a biotech listing hub?, 27th May 2021.

[20] In our preliminary discussions with them, stakeholders conveyed to us the high growth potential of these industries (see paragraph 63).

(a) next-generation information technology[21];

(b) advanced hardware;

(c) advanced materials;

(d) new energy and environmental protection; and

(e) new food and agriculture technologies.

51. The Shanghai Stock Exchange uses a similar list to determine eligibility for listing on its STAR Market[22], which is positioned to support innovative science and technology companies.

52. In Appendix I to this paper we provide examples of sectors that fall within each of the above five Specialist Technology Industries. For each example, we describe the state of development of the sector, the barriers to commercialisation faced by businesses within the sector and the applicable regulatory framework.

Specialist Technology listings in the US and Mainland China

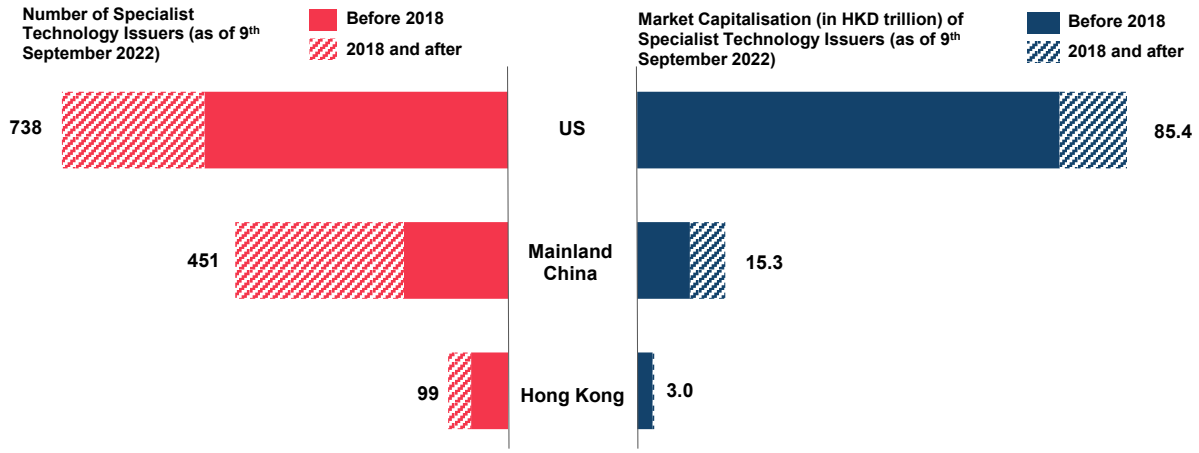
53. Our research shows that both the US and Mainland China markets currently host a large number of Specialist Technology Issuers, a substantial number of which were listed in the last four years (see Figure 4)[23].

[21] In this paper, "next-generation information technology" is distinguished from the wider "Information Technology" industry in that the former is confined to the software, platform, and infrastructure solutions powered by cloud computing and big data analytics (see Box 1 in Chapter 3 of this paper for the acceptable sectors included), whereas the latter is an umbrella term that covers all hardware, software, databases, and networks involved in computer-based information systems (see footnote 17 for the sectors included).

[22] See Table 9 on page 90 for a comparison of each Specialist Technology Industry with the most closely related STAR Industries.

[23] As the Specialist Technology Issuers were those with their primary business falling within one or more acceptable emerging sectors set out in Box 1 at the time of listing, most mega-cap mainstream IT companies (e.g., Microsoft, Apple) were excluded.

Figure 4: Number of Specialist Technology Issuers and their combined market capitalisation in the US, Mainland China and Hong Kong markets[24]



Source: HKEX, Bloomberg, and WIND database (as of 9th September 2022)

Current Initial Listing Requirements

54. Our Listing Rules currently require new applicants[25] to demonstrate that they meet either the Profit Test or one of two Alternative Tests to list on the Main Board, namely:

    (a) the Market Capitalisation / Revenue / Cash Flow Test; or

    (b) the Market Capitalisation / Revenue Test.

    The detailed requirements of each of these tests are set out in Table 2 on page 20.

The History of the Alternative Tests

55. The Alternative Tests were implemented in March 2004, following public consensus that the Profit Test alone was overly restrictive compared to the tests of other exchanges[26]. The Exchange determined, at the time, that there was a market need for alternative tests so that the Exchange could bring its initial listing requirements on par with international standards.

[24] Specialist Technology Issuers may be double counted in this figure if they are dual primary listed on two markets, or if they are primary listed on one market and secondary listed on another.

[25] Except for applicants seeking a listing under Chapters 18, 18A, 18B or 21.

[26] At the time of the 2002 Rule Amendments Consultation, other exchanges either do not have a profit requirement or have more than one set of alternative quantitative tests (on pre-tax income, assets, revenue or market capitalisation) to assess the financial performance of a listing applicant.

56. By introducing the Alternative Tests, the Exchange aimed to offer greater listing opportunities for capital investment intensive businesses with long development potential and large market capitalisations but without a track record of profit. The Exchange believed these listing applicants could attract sufficient market support and investor interest to justify their listing status.[27]

57. For this reason, the Alternative Tests do not require an applicant to demonstrate a track record of profit and instead require it to have a large market capitalisation and substantial revenue (see Table 2).

Table 2: Main Board Eligibility Tests

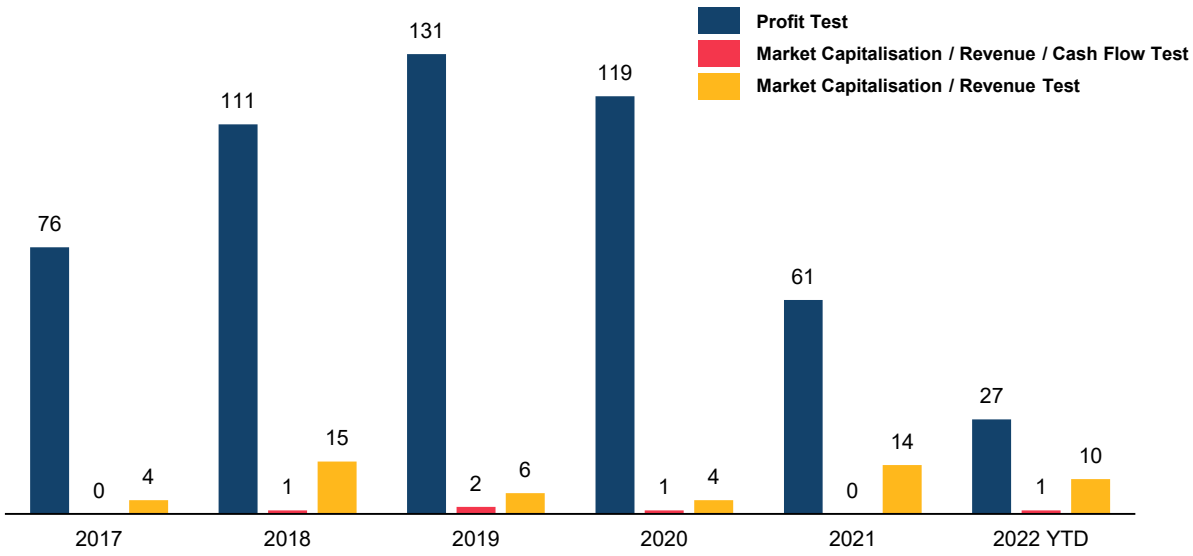
Main Board Eligibility Tests	Profit Test	Alternative Tests	
		Market Capitalisation / Revenue / Cash Flow Test	Market Capitalisation / Revenue Test
Trading record	≥ 3 financial years		
Profit attributable to shareholders	≥ HK$35 million in the most recent year; and ≥ HK$45 million in aggregate in the two preceding years	N/A	N/A
Market capitalisation at listing	N/A	≥ HK$2 billion	≥ HK$4 billion
Revenue	N/A	≥ HK$500 million for the most recent audited year	
Positive cash flow from operating activities	N/A	≥ HK$100 million in aggregate for the three preceding financial years	N/A

58. However, the number of issuers that have been listed under the Alternative Tests remains low (see Figure 5).[28] Of those listed under the Alternative Tests since 2017, only three (5.6%) operate in Specialist Technology Industries.

[27] See paragraph 49 of Part B of the 2002 Rule Amendments Consultation.

[28] Source: HKEX (as of 9th September 2022).

Figure 5: Use of Main Board Eligibility Tests by listing applicants to which these tests apply since 2017



Source: HKEX (as of 9th September 2022)

59. Our understanding is that Specialist Technology Companies face difficulties fulfilling the revenue or cash flow requirements of the Alternative Tests. This is because many of them are still engaged in R&D to bring their products and/or services to commercialisation and those that have commercialised are not able to meet our tests because of the nature of their businesses. For example, some require substantial R&D and capital investment in order to scale up their production. Others require a longer time to acquire customers due to the nature of their business models. This is despite the fact that some of these Specialist Technology Companies' valuations may greatly exceed the minimum market capitalisation threshold for a Hong Kong listing.

60. Our analysis of issuers in a Sample Cohort of Specialist Technology Issuers (see Appendix III to this paper) shows that a substantial portion of these US or Mainland China listed issuers would have been unable to meet the Main Board Eligibility Tests, even though many of them have high growth potential. This suggests that our Alternative Tests may not be well suited to the listing of Specialist Technology Companies.

Jurisdictional Comparison

61. Like the Exchange in Hong Kong, stock exchanges in the US, Mainland China, the UK and Singapore also provide financial eligibility tests that do not require applicants to demonstrate a track record of profit or cash flow to accommodate listings from new and emerging sectors. However, these markets generally set lower market capitalisation and revenue thresholds than our Alternative Tests. A summary comparison is set out in Table 3 below and a more detailed comparison is set out in Appendix II to this paper.

Table 3: Comparison of non-profit-based and non-cashflow-based financial eligibility tests of selected exchanges

Stock exchange	SEHK	NYSE	NASDAQ	LSE	SSE	SGX
Market segment	**Main Board**	**–**	**Global Select Market**	**New regime under consultation** [29]	**STAR Market**	**Mainboard**
Financial Eligibility Test	**Market Capitalisation / Revenue Test**	**Global Market Capitalisation Test**[30]	**Assets with Equity**[31]	**–**	**Listing Criterion 2**[32]	**–**[33]
Trading record	≥ 3 financial years	N/A	N/A	N/A	N/A	N/A
Market capitalisation at listing	≥ HK$4 billion	≥ US$200 million (HK$1.6 billion)	≥ US$160 million (HK$1.2 billion)	≥ £30 million (HK$296 million)	≥ RMB1.5 billion (HK$1.8 billion)[34]	≥ S$300 million (HK$1.65 billion)
Revenue for the most recent year	≥ HK$500 million	N/A	N/A	N/A[35]	≥ RMB200 million (HK$240 million)	Must have operating revenue (actual or pro-forma)

[29] In the FCA Discussion Paper, the FCA proposed, among others, to establish one single segment to replace two existing premium and standard listing segments.

[30] Section 102.01C(II) of NYSE Listed Company Manual.

[31] Rules 5315(e) and 5315(f)(3)(D) of the NASDAQ Rules 5300 Series (The NASDAQ Global Select Market). In addition to the requirements set out in Table 3, the test requires total assets at listing of at least US$80 million (HK$624 million) and shareholders' equity at listing of at least US$55 million (HK$429 million).

[32] Article 2.1.2(2) of the STAR Market Rules. In addition to the requirements set out in Table 3, this standard requires R&D investment of ≥ 15% of total revenue for the last three years.

[33] Rule 210(2)(c) of the SGX Mainboard Rules.

[34] The STAR Market has an alternative test requiring a larger market capitalisation of RMB4 billion (HK$4.8 billion) but without demonstrating any track record of revenue or profit, provided an applicant's main products or businesses are approved by national government authorities; will have a large market; and have achieved milestone progress, for example, demonstrating a distinctive competitive edge in their technologies. However, according to our stakeholders during the preliminary discussions, most applicants relying on this standard are biotech companies in practice (see Article 2.1.2(5) of the STAR Market Rules).

[35] In the FCA Discussion Paper, the FCA proposed to remove the three-year revenue earning track record requirement. The FCA noted that this would potentially benefit companies in technology and bioscience that are currently unable to meet the financial eligibility criteria of the premium listing segment (see paragraphs 3.23 to 3.25 of the FCA Discussion Paper).

Pre-Consultation Feedback

Preliminary discussions with stakeholders

62. Between April and May 2022, the Exchange conducted preliminary discussions with 27 stakeholders, including representatives from investment banks, private equity firms, public institutional investors, prospective listing applicants, market practitioners and industry associations to discuss a potential listing regime for companies in the Specialist Technology Industries.

Demand for Specialist Technology Regime

63. Most of these stakeholders agreed that companies from Specialist Technology Industries generally carry positive investment characteristics that attract strong investment demand. They noted that these companies attracted substantial investment from sophisticated investors in private funding rounds prior to listing and that the market size of Specialist Technology Industries had grown rapidly in recent years.

64. Some public institutional investors and private equity firms expressed concerns, particularly with regard to Pre-Commercial Companies. They cast doubt over whether there would be sufficient institutional investment demand in such companies. They also expressed the concern that they would not be suitable targets of investment for retail investors. This was because they often had no track record of revenue or profit and may never successfully commercialise their products and/or services.

Deficiencies in IPO price discovery process

65. Some public institutional investors and private equity firms are also concerned about the price discovery process for the IPO price of Specialist Technology Companies:

    (a) Due to their lack of a track record of revenue / profit and the newness of their industries, it is more difficult to reach a consensus on the valuation of Specialist Technology Companies (especially Pre-Commercial Companies) compared to companies from traditional industries (see paragraphs 69 to 74).

    (b) The existence of a Clawback Mechanism in Hong Kong means that high demand from retail investors often reduces the allocation of offer shares to institutional investors. They said this has the effect of: (i) creating a disincentive for institutional investors to devote sufficient resources to thorough research of the company as an investment prospect; and (ii) decreasing the proportion of investors that will insist on an IPO price that is in line with their research and increasing the effect on IPO prices of overly positive retail sentiment (see also paragraphs 75 to 76).

    (c) The small number of Specialist Technology Issuers currently listed in Hong Kong means that there is limited research expertise and experience to accurately evaluate Specialist Technology Companies in Hong Kong.

CHAPTER 2: KEY ISSUES

Issues Specific to Pre-Commercial Companies

Failure to successfully commercialise to achieve the Commercialisation Revenue Threshold

66. Investors in a Pre-Commercial Company are subject to the risk that the company is unable to successfully commercialise their products / services to achieve the Commercialisation Revenue Threshold. Despite their best efforts, the company may not be able to achieve this aim even though they claimed in their Listing Document that this would be possible. In these circumstances, their investors may lose most if not all of the value of their initial investment.[36]

Reliance on external funding to support operations

67. Pre-Commercial Companies will fund their working capital requirements through proceeds from equity or debt financing instead of from their operations. This means that Pre-Commercial Companies are subject to a higher risk of corporate failure if they are unable to secure sufficient external funding.

68. Additional funding raised through issuing additional shares or other equity securities after listing could result in the dilution of existing shareholders' ownership interest.

Issues Applicable to All Specialist Technology Companies

Difficulty in reaching a consensus on valuation

Difficulty in reaching a consensus on valuation

69. Specialist Technology Companies often operate in new markets that are at the early stages of their development. Consequently, when valuing a Specialist Technology Company, it may be difficult to accurately predict the potential market size of the company's products / services, as well as how successful the company will be in addressing the needs of that potential market. In comparison, for traditional industries where the market for their products / services is mature and has a long history, such predictions can be made with a higher degree of confidence.

[36] Our analysis of issuers in the Sample Cohort shows that, during 2021, the average price performance of Pre-Commercial Company shares was poorer than that of Commercial Company shares in the US (-49% vs -33%) and Mainland China (-10% vs +1%). Source: S&P Capital IQ (retrieved on 26th September 2022).

70. Companies are also often valued by comparison to their closest peers. Those that are competing in the same industry and producing similar products / services will often provide a useful reference to the future prospects of a company. Peers that are listed on exchanges provide a particularly useful benchmark because of their publicly available information. Specialist Technology Companies operating in newly emerging industries, however, may have few comparable peers, and none of them may be listed on public markets.

71. For these reasons, it may be difficult, even for institutional investors and intermediaries, to reach a consensus on the valuation of Specialist Technology Companies. This means that they are subject to a higher risk of share price volatility and trading illiquidity compared to companies from traditional industries.

Heightened risks for Pre-Commercial Companies

72. For Pre-Commercial Companies, the difficulty in reaching a consensus on valuation is increased because they may modify their business models significantly over time as they try to find one that is commercially successful.

73. The share price performance of Pre-Commercial Companies may also be more sensitive to market news and rumour, as the market may speculate on the status of their commercialisation progress[37].

Risk of overstated valuation at IPO

74. The difficulties inherent in valuing a Specialist Technology Company, as set out above, mean that new investors at IPO may be in a relatively weak position to challenge IPO valuations proposed by those with a vested interest in achieving the highest possible valuation. An applicant is incentivised to negotiate a high IPO valuation for its shares to raise the most funds for its future growth. Pre-IPO investors are also incentivised to negotiate for a high valuation as they wish to receive the highest possible return from their previous investment in the company. Consequently, there is a higher risk of overstated valuation of Specialist Technology Companies at IPO.

Robustness of the IPO price discovery process

75. In Hong Kong, a considerable proportion of investors are retail investors. HKEX's 2020 Cash Market Transaction Survey stated that retail investors represented 15.5% of cash market trading value.[38]

[37] Our analysis of issuers in the Sample Cohort shows that, during 2021, Pre-Commercial Company shares had a higher average annualised standard deviation of weekly price returns than Commercial Company shares in the US (96% vs 55%), whereas in Mainland China, the price volatility of Pre-Commercial Company shares was comparable to that of Commercial Company shares (51% vs 47%). Source: S&P Capital IQ (retrieved on 26th September 2022).

[38] HKEX, Cash Market Transaction Survey 2020, page 4, April 2022.

76. The Listing Rules currently require the minimum percentage of IPO shares allocated to the public to be adjusted upwards (to as high as 50% of the offer shares) if public demand for the IPO shares increases, known as the Clawback Mechanism. This, in turn, reduces the portion of shares allocated to institutional investors.

77. As retail investors do not have the time and resources available to institutional investors to conduct due diligence and research, retail investors cannot be expected to have the resources needed to accurately value a Specialist Technology Company, particularly given the difficulties that even professionals face when doing so (see paragraphs 69 to 74 above).

78. Consequently, the Clawback Mechanism can reduce the effectiveness of the price discovery process by increasing the risk of an IPO price being set improperly due to overly optimistic retail speculation and demand.

Absence of a Competent Authority

79. Biotech Companies are subject to Competent Authority regimes that set external milestones on the development progress of their Core Products through the three-phase clinical trial process. Even though this does not mitigate the risk that a Biotech Company may not successfully commercialise its products or generate sufficient revenue to sustain its operations after listing, it does provide investors with a frame of reference with which to judge the stage of development of Core Products, in the absence of commercial indicators such as revenue and profit.[39]

80. The products and/or services of Specialist Technology Companies are usually not required to be evaluated or approved by a Competent Authority equivalent to that required by our Biotech Company regime. Our research shows that regulators and authorities perform a similar role in only a few sectors, such as autonomous driving, and new food and agriculture technologies (see Appendix I to this paper).

81. The absence of a Competent Authority means that there will be no independent external body similar to those in the biotech industry setting milestones against which to mark the progress of the development of Specialist Technology Product(s). Consequently, neither investors nor intermediaries such as sponsors will be able to rely on such processes when judging the technical capabilities and commercial viability of the Specialist Technology Product(s), and how much progress a company has made towards commercialisation or in achieving its stated goals.

[39] HKEX, Consultation Paper on a Listing Regime for Companies from Emerging and Innovative Sectors, paragraph 73, February 2018.

82. The Exchange is also not in a position to vet or assess the truth or accuracy of the claims made by the Specialist Technology Company in its Listing Document regarding the technical capabilities, commercial viability or the stage of development of the Specialist Technology Products.

Viability of a Specialist Technology Product

83. Some Specialist Technology Companies apply technologies that are novel and require specialist expertise to assess their capabilities. This may lead to the risk that companies intentionally overstate the capabilities of their products and/or services in the knowledge that their claims cannot be easily refuted or proven false.

84. Also, in the circumstances of a Pre-Commercial Company, the deficiencies in the capabilities of its product and/or service may not be revealed until it is put to use by an end user. Consequently, the risk of damage to the interests of public investors through misrepresentation may be relatively higher.

Defining "Specialist Technology"

85. Whilst Specialist Technology Companies typically exhibit common characteristics, such as substantial R&D investment, it is difficult to define them using objective measures. It is common for Specialist Technology to be deployed by companies belonging to conventional industries (for example the use of aerospace technology and robotics by an agricultural company). Consequently, it is often necessary to use subjective judgement to determine the extent to which a company has applied Specialist Technology to its business.

86. Also, successful technologies considered state-of-the-art today can soon become commonplace. This means that the industries that the Exchange selects as Specialist Technology Industries may be superseded by newly emerging ones of which the Exchange is not currently aware.

87. The risk of not having an exhaustive definition of "Specialist Technology" is that companies with relatively conventional products / services may be able to list under the Specialist Technology Regime and, in doing so, circumvent the Main Board Eligibility Tests under which they would be ineligible for listing.

CHAPTER 3: PROPOSED REGULATORY FRAMEWORK

Purpose of this Chapter

88. This chapter sets out the proposed regulatory framework for the listing of Specialist Technology Companies, including additional requirements to address the key issues set out in Chapter 2.

89. Prior to formulating the proposals in this chapter, we have met with key stakeholders (see paragraph 62) to discuss the potential scope and requirements for the proposed regime. These discussions were held to help ensure that our proposals are practical and compatible with market practice and are tailored to the particular risks and requirements of the Hong Kong market. The views of the participants at these preliminary discussions are stated for each proposal.

A. Specialist Technology

I. Definition of "Specialist Technology Company"

Preliminary discussions with stakeholders

Specialist Technology Industries

90. A majority of stakeholders made reference to the STAR Market in view of its strong and consistent growth, and agreed that the proposed regime should cover companies from broad industry categories similar to the non-biotech STAR Industries. They thought that the industries chosen for the regime should enable the listing of a wide range of large-scale new economy companies with high growth potential.

91. In addition to the STAR Industries, stakeholders suggested including new food and agriculture technologies, in light of the substantial development of, and increasing demand for, these technologies to address global food security issues.

"Leading-edge" technologies

92. Some stakeholders noted that whilst certain Specialist Technology Industries within the scope of the proposed regime, such as the new energy industry, contained companies with "leading-edge" technologies (e.g. companies adopting floating solar photovoltaics and floating offshore turbines to generate solar and wind power), others focused on relatively mature technologies (e.g. companies using solar panels and land-based wind turbines to generate solar and wind energy). They suggested limiting the scope of the proposed regime to "leading-edge" companies only, as they had the highest growth potential.

93. Other stakeholders thought that the Exchange should keep the types of technologies falling within our regime as broad as possible, given that Specialist Technology Companies tended to apply more than one technology to developing their products and/or services, and, to the investor, the successful commercialisation of the core technology was often more important than the innovativeness of the technology itself.

Companies with multiple business segments

94. Some stakeholders commented that it is increasingly common for companies in traditional sectors to engage in or expand into a business segment involving Specialist Technology to enhance their overall competitiveness.

Proposals

Specialist Technology Industries

95. We are mindful of the difficulties in defining "Specialist Technology" (see paragraphs 85 to 87). Due to the ever evolving nature of technology, it is hard to have an exhaustive definition of "Specialist Technology" that is constantly up-to-date and can accurately identify the types of companies that have strong growth potential. Consequently, we propose to implement a broad definition for such term within the Listing Rules and then publish a guidance letter on the acceptable industries and sectors that would fall within that definition. This would give us the flexibility to update the guidance letter as Specialist Technology Industries evolve over time.

96. A new applicant seeking to list under the proposed regime must be a "Specialist Technology Company", which we propose to define as "a company primarily engaged (whether directly or through its subsidiaries) in the research and development of, and the commercialisation and/or sales of, Specialist Technology Products within an acceptable sector of a Specialist Technology Industry". We propose to define "Specialist Technology Product" as "a product and/or service (alone or together with other products or services) that applies Specialist Technology" and "Specialist Technology" as "science and/or technology applied to products and/or services within an acceptable sector of a Specialist Technology Industry".

97. We propose to publish a list of Specialist Technology Industries and acceptable sectors that may apply to list under the proposed regime as set out in Box 1 below (see also paragraph 4 of the Draft Guidance Letter that forms Appendix V to this paper for a description of the Specialist Technology Industries and the acceptable sectors). The list is non-exhaustive in nature given it may be updated[40] from time to time.

[40] See paragraphs 101 and 102.

98. We propose that a Biotech Company relying on a Regulated Product (as defined in Chapter 18A of the Listing Rules) as the basis of its listing application must submit an application under Chapter 18A of the Listing Rules and not this proposed regime. A Biotech Company relying on a Regulated Product as the basis of its listing application that fails to satisfy the requirements under Chapter 18A (and relevant guidance) is not permitted to submit an application under this proposed regime.

Box 1: Specialist Technology Industries and acceptable sectors

(a) Next-generation information technology, including:
- (i) cloud-based services;
- (ii) artificial intelligence;

(b) Advanced hardware, including:
- (i) robotics and automation;
- (ii) semiconductors;
- (iii) advanced communication technology;
- (iv) electric and autonomous vehicles;
- (v) advanced transportation technology;
- (vi) aerospace technology;
- (vii) advanced manufacturing;
- (viii) quantum computing;
- (ix) metaverse technology;

(c) Advanced materials, including:
- (i) synthetic biological materials;
- (ii) smart glass;
- (iii) nanomaterials;

(d) New energy and environmental protection, including:
- (i) new energy generation;
- (ii) new energy storage and transmission technology;
- (iii) new green technology;

(e) New food and agriculture technologies, including:
- (i) new food technology; and
- (ii) new agriculture technology.

99. The five Specialist Technology Industries we propose are based on the non-biotech STAR Industries with the following adjustments to fit our own market:

    (a) we have combined the STAR Industry "Energy conservation and environmental protection" with "New energy", as we envisage that there would be significant overlap in the companies belonging to these two categories; and

    (b) we have added a new industry category "New food and agriculture technologies", in light of the substantial development of, and increasing demand for, these technologies to address global food security issues.

100. Please refer to Table 9 on page 90 for a comparison of the acceptable sectors set out in Box 1 above with the most closely related STAR Industries and sector / subsector indices under the S&P Kensho New Economies Composite Index[41].

Updating of guidance on Specialist Technology Industries and acceptable sectors

101. To leave flexibility so that newly emerging industries and the latest technology trends can be quickly incorporated into the scope of the Specialist Technology Regime, we will update the guidance on the Specialist Technology Industries and acceptable sectors from time to time as necessary taking into account the following principles:

    (a) participants in the relevant sector must have high growth potential;

    (b) the success of participants in the sector can be demonstrated to be attributable to the application, to their core business, of new technologies and/or the application of the relevant science and/or technology within that sector to a new business model, which also serves to differentiate them from traditional market participants serving similar consumers or end users; and

    (c) research and development significantly contributes to the expected value and constitutes a major activity and expense of participants in the sector.

102. The Exchange may add new industries or sectors to the list of Specialist Technology Industries and acceptable sectors after consultation with the SFC and with its approval. When doing so, the Exchange will take into account any pre-IPO enquiry from potential listing applicants from the relevant industry or sector.

[41] The S&P Kensho New Economy Indices measure the performance of stocks listed in the US associated with a series of technologically enabled, often disruptive industries, generally referred to in aggregate as the "Fourth Industrial Revolution". See S&P Kensho Indices Methodology.

"Leading-edge" technologies

103. We propose not to limit eligible applicants to those with "leading-edge" technologies but reserve a right to reject an application for listing if it displays attributes inconsistent with the principle set out in paragraph 100 above (see paragraph 108).

104. Adopting a definition of "Specialist Technology" that is more inclusive in terms of the maturity of technology would be consistent with the approach for our Biotech Company listing regime, under which companies (whether Commercial Companies or Pre-Commercial Companies) adopting pre-existing technologies (e.g. those with in-licensed business models and those which focus on "biosimilar" products) can be listed. This is in line with stakeholders' view that the success of a Specialist Technology Company would often be attributed to the successful commercialisation of the core technology rather than the innovativeness of the technology itself (see paragraph 93).

105. We also believe that the proposed requirements for large expected market capitalisations at listing (see section B(I)), R&D investment (see section B(III)) and Sophisticated Independent Investors (see section B(V)) will help ensure the high quality of Specialist Technology Company applicants without a requirement for them to be "leading-edge".

Companies with multiple business segments

106. We do not propose to prevent companies from listing under the proposed regime if they have genuinely transitioned their primary business from one that belongs to a traditional industry into one belonging to a Specialist Technology Industry.

107. We propose that, where an applicant seeking to list under the proposed regime has multiple business segments some of which do not fall within one or more Specialist Technology Industries, the Exchange will, for the purpose of determining whether the company is "primarily engaged" in the relevant business (as referred to in the definition of "Specialist Technology Company"), take into account the following:

    (a) whether a substantial portion of the total operating expenditure of the company and senior management resources (including their time; number of directors and senior management personnel with relevant expertise and experience) was dedicated to the research and development of, and the commercialisation and/or sales of, Specialist Technology Product(s) in the company's Specialist Technology business segment(s)[42] for at least three financial years prior to listing;

[42] For companies with multiple business segments, the business activities attributable to a Specialist Technology business segment would normally be expected to constitute one or more operating and/or reporting segments under the applicable accounting and financial reporting standards (e.g., IFRS 8).

(b) whether the basis for investors' valuation and the expected market capitalisation of the company is based primarily on the company's Specialist Technology business segment(s), rather than its other business segments or assets unrelated to its Specialist Technology business segment; and

(c) whether the proposed use of proceeds for listing would primarily be applied to its Specialist Technology business segment.

Exchange's right to reject a listing application

108. The Exchange retains the discretion to reject an application for listing from an applicant within an acceptable sector if it displays attributes inconsistent with the principles referred to in paragraph 101. The Exchange will take into account all relevant circumstances in its assessment of the suitability of the applicant for listing.

Question 1	Do you agree with the proposed definitions of "Specialist Technology Company", "Specialist Technology Products" and "Specialist Technology"? Please give reasons for your views. If your answer is "No", please provide alternative suggestions.
Question 2	Do you agree with the list of Specialist Technology Industries and the respective acceptable sectors set out in paragraph 4 of the Draft Guidance Letter (Appendix V to the Consultation Paper)? Please give reasons for your views. If your answer is "No", please provide alternative suggestions.
Question 3	Do you agree that the Exchange should take into account the factors set out in paragraph 107 of the Consultation Paper to determine whether a company is "primarily engaged" in the relevant business as referred to in the definition of "Specialist Technology Company"? Please give reasons for your views.
Question 4	Do you agree that the Exchange should retain the discretion to reject an application for listing from an applicant within an acceptable sector if it displays attributes inconsistent with the principles referred to in paragraph 101 of the Consultation Paper? Please give reasons for your views.

II. Categorisation of Commercial / Pre-Commercial Companies

Preliminary discussions with stakeholders

109. Most stakeholders agreed that Specialist Technology Companies fall into two categories because of their different risk profiles:

(a) *Commercial Companies:* these are companies that have commercialised their Specialist Technology Products and have generated meaningful revenue. They have a large expected market capitalisation, but cannot meet other financial eligibility thresholds (profit, revenue or cash flow) of the Main Board Eligibility Tests. As these companies have achieved a track record of revenue, it is relatively less difficult to reach a consensus on the valuation of these companies; and

(b) *Pre-Commercial Companies:* these companies are primarily engaged in R&D and are raising funds to further their R&D to commercialise their Specialist Technology Products and/or have not yet generated meaningful revenue.

As stated in Chapter 2, these companies are subject to heightened risks, including: (i) the risk that they will not be able to commercialise their Specialist Technology Products to achieve the Commercialisation Revenue Threshold (see paragraph 66); (ii) a lack of available funding to support their operations, leading to a higher risk of corporate failure (see paragraph 67); and (iii) the risk of share price volatility and trading illiquidity (see paragraph 71).

110. Some stakeholders commented that Pre-Commercial Companies present high growth potential and, with additional requirements, should be allowed to list to provide investors (including retail investors) with good investment opportunities. However, a minority of stakeholders commented that the additional risks associated with Pre-Commercial Companies meant that they were unsuitable for investment by retail investors.

Proposals

Revenue threshold

111. We propose to set a revenue threshold as a “bright line” test to distinguish Pre-Commercial Companies from Commercial Companies (see Section B(II) below). Companies that do not meet this “bright line” test may seek to list as Pre-Commercial Companies.

More stringent requirements applied to Pre-Commercial Companies

112. As mentioned by our stakeholders, Pre-Commercial Companies present high growth potential and provide good investment opportunities to investors. However, we are mindful of the additional risks associated with early-stage Pre-Commercial Companies that have not yet generated revenue meeting the Commercialisation Revenue Threshold.

113. Therefore, we propose to accommodate the listing of Pre-Commercial Companies by imposing more stringent requirements on them than Commercial Companies, including requiring:

(a) a larger minimum market capitalisation at listing for Pre-Commercial Companies (see paragraph 120);

(b) higher third party investment thresholds to support their valuations (see paragraph 167(b));

(c) their demonstration of a credible path to achieving the Commercialisation Revenue Threshold (see paragraph 175);

(d) longer post-IPO lock up periods for certain shareholders (see paragraph 240); and

(e) additional disclosure requirements (both in a Listing Document and on an on-going basis) to facilitate the price discovery and better inform investors of the status of the company and its progress made towards achieving the Commercialisation Revenue Threshold after listing (see paragraphs 218 and 262).

Accessibility of Pre-Commercial Companies to all investors

114. On the basis of the more stringent requirements set out in paragraph 113 above, we propose that all investors, including retail investors, would be allowed to subscribe for, and trade in, the securities of Pre-Commercial Companies. This would be consistent with our existing listing regime for Biotech Companies, which are also accessible to retail investors subject to additional requirements (see paragraph 29) even though they are also companies primarily engaged in the R&D and the commercialisation of their products.

Question 5	Do you agree that the Specialist Technology Regime should accommodate the listings of both Commercial Companies and Pre-Commercial Companies? Please give reasons for your views.

Question 6 If your answer to Question 5 is “Yes”, do you agree with the proposed approach to apply more stringent requirements to Pre-Commercial Companies?

Please give reasons for your views.

Question 7 If your answer to Question 5 is “Yes”, do you agree with the proposal that all investors, including retail investors, should be allowed to subscribe for, and trade in, the securities of Pre-Commercial Companies?

Please give reasons for your views.

B. Qualifications for Listing

I. Minimum Expected Market Capitalisation

Preliminary discussions with stakeholders

115. A majority of stakeholders thought that a large expected market capitalisation at listing would help ensure listing applicants had already successfully raised a large amount of funds in the private market from sophisticated investors.

116. To ensure the quality of Commercial Companies applying to list under the Specialist Technology Regime, a majority of the stakeholders considered it reasonable to set the market capitalisation threshold with reference to the level at which they would be considered 'unicorns' within the investment industry (i.e. those with a valuation of over US$1 billion).

117. A minority of stakeholders suggested setting a lower market capitalisation threshold. They argued that the proposed thresholds of market capitalisation and revenue for Commercial Companies represented an implied historical price-to-sales (P/S) ratio of 32 times[43]. They pointed out that this is substantially higher than the implied P/S ratio of eight times[44] under the existing Market Capitalisation / Revenue Test.

118. Whilst most stakeholders agreed that a higher market capitalisation threshold should be imposed on Pre-Commercial Companies, they cautioned that the Exchange should not set an unrealistically high threshold. Otherwise, the competitiveness of the regime would be compromised.

119. Some stakeholders told us they were also concerned that a high threshold would put pressure on the Specialist Technology Companies to inflate their valuations to meet the requirements for listing, putting public investors who subscribe for Specialist Technology Companies' shares at or after the IPO at a higher risk of overstated valuations (see paragraph 74).

Proposals

120. We propose that Specialist Technology Company applicants must demonstrate the following minimum expected market capitalisation at the time of listing:

	Commercial Companies	*Pre-Commercial Companies*
Minimum expected market capitalisation at the time of listing	HK$8 billion	HK$15 billion

[43] Calculated based on the minimum expected market capitalisation of HK$8 billion divided by a minimum revenue threshold of HK$250 million (see paragraph 130).

[44] Calculated based on the minimum expected market capitalisation of HK$4 billion divided by a minimum revenue threshold of HK$500 million under the Market Capitalisation / Revenue Test.

121. In line with the views of most stakeholders and the Exchange's wish to uphold market quality, we propose setting the threshold for Commercial Companies at HK$8 billion, the valuation generally associated with a 'unicorn' company.

122. The high implied P/S ratio of 32 times is indicative of the nature of Specialist Technology Companies, which tend to achieve high valuations before generating substantial revenue. Stakeholders told us investors in such companies generally value them based on future growth and revenue, rather than past or current revenue already generated. We also found that out of the issuers in the Ineligible Sample Cohort with a market capitalisation of at least HK$8 billion, a majority of them had achieved the said implied P/S ratio of 32x or more at the time of listing.

123. Our price discovery optimisation proposals (see section C(I)) should mean that the expected market capitalisation of an applicant is strongly supported by independent due diligence, research and professional judgement, mitigating the risk of overly inflated valuations.

124. We propose setting the threshold for Pre-Commercial Companies at HK$15 billion. This proposed threshold is substantially higher than that proposed for Commercial Companies (almost two-fold).

Question 8	Do you agree that a Commercial Company applicant must have a minimum expected market capitalisation of HK$8 billion at listing? Please give reasons for your views.
Question 9	Do you agree that a Pre-Commercial Company applicant must have a minimum expected market capitalisation of HK$15 billion at listing? Please give reasons for your views.

II. Revenue Requirements

Preliminary discussions with stakeholders

Revenue threshold

125. Several stakeholders (from both the buy-side and sell-side) suggested setting a revenue threshold to distinguish Commercial Companies from Pre-Commercial Companies. Doing so would also reduce the risk of Pre-Commercial Companies manufacturing small amounts of revenue in support of a claim that they are Commercial Companies, so as to circumvent the additional requirements that would otherwise be imposed on them.

126. Stakeholders thought that the minimum revenue for commercialisation varied across different industries. They suggested minimum revenue thresholds ranging from HK$100 million to HK$300 million, taking into account the actual and projected revenue of prospective listing applicants and issuers in the Sample Cohort.

127. Several stakeholders also suggested applying additional qualitative requirements to determine whether a Commercial Company had genuinely commercialised its Specialist Technology Product(s).

Revenue growth

128. We note that Specialist Technology Companies usually have a high revenue growth rate prior to listing and asked stakeholders whether we should impose a minimum revenue growth rate threshold over the track record period as an eligibility requirement for the Specialist Technology Regime.

129. However, a number of stakeholders expressed reservations on imposing a bright line requirement. They argued that a company's revenue growth rate could be affected by a variety of factors outside of the control of the company (e.g. one-off macroeconomic factors). Also, some stakeholders believed that average revenue growth rates could vary greatly across different Specialist Technology Industries and so it would be inappropriate to apply a minimum revenue growth rate threshold, of a particular percentage, equally to all.

Proposals

Revenue threshold

130. We propose that a Commercial Company must have revenue of at least HK$250 million for the most recent audited financial year:

	Commercial Companies	*Pre-Commercial Companies*
Minimum revenue requirement for the most recent audited financial year	HK$250 million	No requirement

131. The proposed threshold was based on feedback from stakeholders. A number of stakeholders indicated that a revenue threshold of HK$250 million would reflect meaningful commercialisation to investors. We agree that this threshold would be sufficient to identify Commercial Companies that have genuinely commercialised their Specialist Technology Products and ensure that Pre-Commercial Companies are subject to more stringent requirements. The proposed threshold is also close to the revenue thresholds of RMB200 million to RMB300 million imposed by the STAR Market (see Appendix II to this paper).

Requirement on the source of revenue

132. We also propose that only revenue arising from a company's Specialist Technology business segment(s) (excluding any inter-segmental revenue from other business segments of the applicant), and not items of revenue and gains that arise incidentally or from other businesses (such as rental income from property investment), would be recognised for the purpose of determining whether the company meets the above revenue threshold.

133. For the purpose of determining the revenue of a new applicant, we propose that revenue arising from "book" transactions, such as banner barter transactions, the writing back of accounting provisions and other similar activities resulting from mere book entries, should be disregarded. We use the same method to recognise revenue for the purpose of the existing Alternative Tests.[45]

134. Such additional requirements minimise the risk that Pre-Commercial Companies manipulate sales unrelated or ancillary to their Specialist Technology business to meet the proposed revenue threshold.

Revenue growth

135. A Commercial Company is normally expected to demonstrate year-on-year growth of revenue arising from the Specialist Technology business segment throughout the track record period, with allowance for temporary declines in revenue due to economic, market or industry-wide conditions. The reasons for, and remedial steps taken (or to be taken) to address, any downward trend in the Commercial Company's annual revenue must be explained to the Exchange's satisfaction and disclosed in the Listing Document.

Question 10	Do you agree that a Commercial Company must have revenue of at least HK$250 million for the most recent audited financial year? Please give reasons for your views.
Question 11	Do you agree that only the revenue arising from the applicant's Specialist Technology business segment(s) (excluding any inter-segmental revenue from other business segments of the applicant), and not items of revenue and gains that arise incidentally, or from other businesses, should be recognised for the purpose of the Commercialisation Revenue Threshold? Please give reasons for your views.

[45] Rule 8.05(4).

Question 12 Do you agree that (a) a Commercial Company must demonstrate year-on-year growth of revenue derived from the sales of Specialist Technology Product(s) throughout the track record period, with allowance for temporary declines in revenue due to economic, market or industry-wide conditions; and (b) the reasons for, and remedial steps taken (or to be taken) to address, any downward trend in a Commercial Company's annual revenue must be explained to the Exchange's satisfaction and disclosed in the Listing Document?

Please give reasons for your views.

III. R&D Investment

Preliminary discussions with stakeholders

136. A majority of stakeholders considered R&D investment to be an essential component of a Specialist Technology Company. Some stated that a Specialist Technology Company should always be engaged in R&D. However, stakeholders suggested clearly specifying what constituted R&D investment as different accounting treatments could apply.

137. Other stakeholders highlighted that the level of resources devoted to R&D may depend on the stage of development and industry of a listing applicant. They noted that capital-intensive sectors or early-stage companies would generally have heavier R&D commitments.

Proposals

Minimum R&D period and investment

138. We propose to impose the following requirements on (a) the period of engagement in R&D; and (b) the amount of R&D investment:

	Commercial Companies	*Pre-Commercial Companies*
Minimum period of engagement in R&D of Specialist Technology Product(s)	Three financial years prior to listing	
Minimum total R&D investment (as a percentage of total operating expenditure) for each of the three financial years prior to listing	15%	50%

139. We expect a Specialist Technology Company to have been engaged in R&D to develop its Specialist Technology Product(s) throughout its track record period, as we believe that continuous R&D investment is an indispensable element to support its growth.

140. The percentage threshold of R&D investment was based on our analysis of issuers in the Sample Cohort and prospective listing applicants.

141. For the purpose of determining the amount of qualifying R&D investment and the total operating expenditure under the expenditure ratio test in paragraph 138:

    (a) the amount of R&D investment for a period includes costs that are directly attributable to the Specialist Technology Company's R&D activities during the period, including development costs for the period that have been capitalised as intangible assets for accounting purposes, but excluding general, administrative or other costs that are not clearly related to R&D activities;

    (b) the Exchange expects the amount of R&D investment to be primarily comprised of the following costs:

        (i) the costs of personnel engaged in R&D activities;

        (ii) the costs of R&D conducted by others on the company's behalf (including consulting or testing fees);

        (iii) the depreciation, service fees or other directly attributable costs of equipment or facilities used in R&D activities (including data centre operating costs, cloud-based service fees, rentals, utilities and maintenance costs);

        (iv) the amortisation of intangibles used in R&D activities; and

        (v) the costs of materials consumed in R&D activities.

        If any other type of costs is included as qualifying R&D costs, the basis on which such costs are directly attributable to the company's R&D activities must be clearly explained;

    (c) the amount of R&D investment should exclude the initial recognition of any fixed assets relating to the company's R&D activities (e.g. capital expenditures for acquiring an R&D centre); and

    (d) the total operating expenditure for a period is the sum of the total expenses of the company as reflected in the financial statements of the company during the period, excluding any expense of financial nature, and including any such costs that have not been recognised as expenses during the period but qualify as R&D investment as described in paragraph 141(b) above.

Disclosure requirements

142. We also propose to require a Specialist Technology Company to disclose in its Listing Document details of its R&D investment and experience (see paragraph 217(c)).

143. The expenditure ratio test in paragraph 138, together with the additional disclosure requirements should provide a sufficient basis for investors to make an informed assessment on the significance of R&D to a Specialist Technology Company.

Question 13	Do you agree that a Specialist Technology Company listing applicant must have been engaged in R&D of its Specialist Technology Product(s) for a minimum of three financial years prior to listing? Please give reasons for your views.
Question 14	Do you agree that, (a) for a Commercial Company, its total amount of R&D investment must constitute at least 15% of its total operating expenditure for each of its three financial years prior to listing; and (b) for a Pre-Commercial Company, its total amount of R&D investment must constitute at least 50% of its total operating expenditure for each of its three financial years prior to listing? Please give reasons for your views.
Question 15	Do you agree with the proposed method for determining the amount of qualifying R&D investment and the total operating expenditure as set out in paragraph 141 of the Consultation Paper? Please give reasons for your views.

IV. Minimum Operational Track Record

Preliminary discussions with stakeholders

144. A number of respondents commented that they normally require at least a track record of and management continuity for three years to evaluate the performance of a company and build a model to determine pricing.

Proposals

Operational track record and management continuity

145. We propose to require applicants under the Specialist Technology Regime to have been in operation in its current line of business for at least three financial years prior to listing under substantially the same management.

146. This requirement is consistent with our existing Main Board Eligibility Tests[46]. Based on our analysis on the issuers in the Sample Cohort, we do not foresee Specialist Technology Company applicants having any major difficulty meeting this requirement.

147. As with other issuers seeking to list under our existing Main Board Eligibility Tests, the Exchange may accept a shorter trading record of at least two financial years in exceptional circumstances[47].

Ownership continuity

148. We propose to require that there must be ownership continuity and control for a Specialist Technology Company listing applicant in the 12 months prior to the date of the listing application.

149. This requirement is consistent with the approach for our Biotech Company listing regime.[48]

Question 16	Do you agree that a Specialist Technology Company listing applicant must have been in operation in its current line of business for at least three financial years prior to listing under substantially the same management? Please give reasons for your views.
Question 17	Do you agree that there must be ownership continuity and control for a Specialist Technology Company listing applicant in the 12 months prior to the date of the listing application? Please give reasons for your views.

[46] Rules 8.05(1)(a)&(b); 8.05(2)(a)&(b); and 8.05(3)(a)&(b).

[47] Rule 8.05B(3).

[48] Paragraph 4.1 of Guidance Letter HKEX-GL92-18.

V. Third Party Investment Requirement

Preliminary discussions with stakeholders

150. Stakeholders generally agreed that independent third party institutional investment could help mitigate concerns related to the difficulty in valuing Specialist Technology Companies (see paragraphs 69 to 74).

151. Stakeholders mentioned that, when determining a Specialist Technology Company's valuation, they would take into account valuations in previous rounds of pre-IPO investments as well as the profiles of the previous investors (such as their size, identity and industry experience). They believed that multiple Sophisticated Independent Investors holding a substantial stake, and board representation from such investors, were indicators of a higher quality Specialist Technology Company.

152. Some were of the view that investment firms that specialise in Specialist Technology investments, even though they may be smaller in size, could more accurately identify attributes of quality Specialist Technology Companies than mainstream investment firms.

153. Some stakeholders also commented that third party investment helped support the commercial viability of a Specialist Technology Company's technology. They stated that it was particularly noteworthy if a market participant from the same industry (e.g. a large supplier or customer) had invested in a Specialist Technology Company. This was because such industry participant made its investment based on its superior industry expertise as to the capabilities of the company's products and/or services.

154. Stakeholders we talked to that were prospective listing applicants confirmed that they had been subject to extensive due diligence checks as part of their private funding rounds.

Proposals

Definition of "Sophisticated Independent Investor"

Independence requirement

155. We propose that a Sophisticated Independent Investor must not be a core connected person of the listing applicant for independence purpose.

156. A sophisticated investor who is a substantial shareholder of the applicant can be considered a Sophisticated Independent Investor if it is a core connected person only because of the size of its shareholding in the applicant (subject to paragraph 157 below).

157. A person who is a controlling shareholder (or within the group of persons who are considered as controlling shareholders) of the applicant will not be considered as having met this independence requirement.

158. The existence of a prior business relationship would not, by itself, result in a failure to meet the independence requirement, as it is not uncommon for an upstream or downstream market participant to invest in a Specialist Technology Company, as acknowledged by stakeholders.

Definition of a "sophisticated investor"

159. The Exchange will assess whether an investor is a "sophisticated investor" on a case-by-case basis by reference to its relevant investment experience, knowledge and expertise in the relevant field which could be demonstrated by its net assets, AUM, size of its investment portfolio or track record of investments, where applicable.

160. For this purpose, the Exchange would generally consider the following as examples, for illustrative purpose only, of the types of "sophisticated investors":

    (a) an asset management firm with AUM of, or a fund with a fund size of, at least HK$15 billion;

    (b) a company having a diverse investment portfolio size of at least HK$15 billion;

    (c) an investor of any of the types above with an AUM, fund size or investment portfolio size (as applicable) of at least HK$5 billion where that value is derived primarily from Specialist Technology investments; and

    (d) a key participant in the relevant upstream or downstream industry with substantial market share and size, as supported by appropriate independent market or operational data.

161. We propose to define "investment portfolio" for the purpose of paragraphs 160(b) and (c) as the aggregate value of investments in investee companies as determined under the prevailing accounting standards. We would not consider investee companies to include consolidated subsidiaries.

162. A fund managed by a fund manager that has AUM of an amount that meets the threshold set out in paragraph 160(a), or a wholly-owned subsidiary of an entity referred to in paragraph 160(b) would also be considered as a "sophisticated investor".

Rationale for the proposed definition

163. The proposed AUM / fund size thresholds for asset management firms and funds, and the proposed investment portfolio size threshold for a corporate investor (see paragraphs 160(a) and 160(b)) help ensure that these investors have an established scale and a track record of sourcing quality targets and have sufficient resources (e.g. a sizeable team of sophisticated professionals) to carry out extensive research and rigorous due diligence on their investment targets.

164. Based on data available to us, the proposed HK$15 billion threshold should capture a majority of the largest funds or asset management firms and established Greater-China corporate investors[49], including those specialising in investing in companies in the Specialist Technology Industries in recent years.

165. We also believe that an asset management firm, fund or corporate investor that meets the lower threshold value of HK$5 billion should be considered a Sophisticated Independent Investor where that value is derived primarily from Specialist Technology investments (see paragraph 160(c)). This is because such an investment firm could be expected to have the requisite experience to assess and identify attributes of quality Specialist Technology Companies even though they are relatively small in size.

166. We note that it is not uncommon for Specialist Technology Companies to receive investments from participants in the relevant upstream or downstream industries (e.g. autonomous driving technology developers receiving investments from traditional car manufacturers). Such investors will likely have made their investment in a Specialist Technology Company having assessed the commercial viability of its products and/or services based on their superior industry knowledge and experience. To help ensure that reliance can be placed on that judgement, we propose that such investors must have substantial market share and size.

Minimum investment requirement

167. We propose to require an applicant applying to list under the proposed regime to have received meaningful investment from Sophisticated Independent Investors. As an indicative benchmark, an applicant meeting the following requirement will generally be considered as having received "meaningful investment":

    (a) third party investment from at least two Sophisticated Independent Investors (see paragraphs 155 to 162) who have invested at least 12 months before the date of the listing application, each holding such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the listing applicant as at the date of the listing application and throughout the pre-application 12-month period (referred to as "Pathfinder SIIs" in this paper); and

    (b) the investment from all Sophisticated Independent Investors should result in them holding, in aggregate, such amount of shares or securities convertible into shares equivalent to at least the percentage of the issued share capital of the applicant at the time of listing set out in Table 4.

[49] We selected these asset management firms, funds and corporate investors based on information provided by our stakeholders during the preliminary discussions, and our research on third-party investors in Specialist Technology Issuers.

Table 4: Aggregate investment from all Sophisticated Independent Investors

Expected market capitalisation of the Specialist Technology Company at the time of listing	**Minimum total investment from all Sophisticated Independent Investors as a percentage of the issued share capital of the Specialist Technology Company at the time of listing**	
	Commercial Companies	*Pre-Commercial Companies*
HK$8 billion or more but less than HK$20 billion (*Commercial Companies*) HK$15 billion or more but less than HK$20 billion (*Pre-Commercial Companies*)	20%	25%
HK$20 billion or more and less than HK$40 billion	15%	20%
HK$40 billion or more	10%	15%

168. We propose to count investments by Sophisticated Independent Investors made before listing and any offer shares issued to Sophisticated Independent Investors in the IPO, towards the minimum aggregate investment requirement under paragraph 167(b).

Rationale for the proposals

169. Our rationale for requiring an applicant to demonstrate minimum investment from two Pathfinder SIIs as at the time of listing application (see paragraph 167(a)) is to help ensure that the applicant has been subject to extensive due diligence checks, prior to listing, by investors who have taken on significant investment risk. This investment also helps provide independent third-party validation in the absence of a Competent Authority.

170. We propose to apply the aggregate Sophisticated Independent Investor investment thresholds (see paragraph 167(b)) at the time of listing, to help ensure there is sufficient independent market support for the listing to proceed. Higher thresholds for the aggregate investment from Sophisticated Independent Investors for Pre-Commercial Companies are proposed, due to the need to mitigate the additional risks associated with these companies.

Question 18 Do you agree that an applicant applying to list under the proposed regime must have received meaningful investment from Sophisticated Independent Investors (SIIs)?

Please give reasons for your views.

Question 19 If your answer to Question 18 is "Yes", do you agree with the independence requirements for a Sophisticated Independent Investor as set out in paragraphs 155 to 157 of the Consultation Paper?

Please give reasons for your views.

Question 20 If your answer to Question 18 is "Yes", do you agree with the proposed definition of a sophisticated investor (including the definition of investment portfolio) as set out in paragraphs 159 to 162 of the Consultation Paper?

Please give reasons for your views.

Question 21 If your answer to Question 18 is "Yes", do you agree that as an indicative benchmark for meaningful investment, an applicant should have received third party investment from at least two Sophisticated Independent Investors who have invested at least 12 months before the date of the listing application, each holding such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the listing applicant as at the date of listing application and throughout the pre-application 12-month period?

Please give reasons for your views.

Question 22 If your answer to Question 18 is "Yes", do you agree that as an indicative benchmark for meaningful investment, the aggregate investment from all Sophisticated Independent Investors should result in them holding such amount of shares or securities convertible into shares equivalent to at least such percentage of the issued share capital of the applicant at the time of listing as set out in Table 4 and paragraph 168 of the Consultation Paper?

Please give reasons for your views.

VI. Additional Qualification Requirements for Pre-Commercial Companies

Preliminary discussions with stakeholders

Path to commercialisation

171. Stakeholders generally agreed that a Pre-Commercial Company should be required to demonstrate a path to commercialisation of its Specialist Technology Product(s) to justify its listing.

172. A number of stakeholders mentioned that Pre-Commercial Companies may not have binding contracts with customers before successful commercialisation. This was because prior to commercialisation, they usually co-developed products and/or underwent trial processes with customers before entering into binding contracts and/or generating revenue. Accordingly, it is common for Pre-Commercial Companies to only enter into non-binding framework agreements with customers. However, any such framework agreements should include sufficient specific details on the timeframe and milestones for commercialisation.

Working capital requirement

173. Stakeholders generally agreed that an enhanced working capital requirement should be imposed on a Pre-Commercial Company to reduce the risk that it is unable to meet its operational expenses after listing without the support of revenue and/or profits.

Proposals

Path to achieving the Commercialisation Revenue Threshold

174. We propose that a Pre-Commercial Company applicant must have as its primary reason for listing the raising of funds for the R&D of, and the manufacturing and/or sales and marketing of, its Specialist Technology Product(s) to bring them to commercialisation and achieving the Commercialisation Revenue Threshold.

175. We also propose that a Pre-Commercial Company must demonstrate to the Exchange, and disclose in its Listing Document, a credible path to the commercialisation of its Specialist Technology Product(s), appropriate to the relevant Specialist Technology Industry, that will result in it achieving the Commercialisation Revenue Threshold. For this purpose, a Pre-Commercial Company applicant must also:

(a) explain and disclose, in detail, the timeframe for, and impediments to, achieving the Commercialisation Revenue Threshold; and

(b) to the extent that its working capital (after taking into account the listing proceeds) is insufficient to meet its needs before it achieves the Commercialisation Revenue Threshold, describe the potential funding gap and how it plans to further finance its path to achieving the Commercialisation Revenue Threshold after listing.

176. A credible path to achieving of the Commercialisation Revenue Threshold could be demonstrated, for example, by binding contracts or non-binding framework agreements, with reasonably sufficient details on the timeframe and milestones for commercialisation, in respect of the Specialist Technology Product(s) that the applicant has in place.

177. Such binding contracts or non-binding framework agreements should be arranged with a reasonable number of independent customers for the development, testing or sales of the Specialist Technology Product(s) for such customers, with a substantial potential aggregate contract value realisable within 24 months from the date of listing.

178. The Exchange may, under exceptional circumstances, accept that a credible path to achieving of the Commercialisation Revenue Threshold is demonstrated by a binding contract or non-binding framework agreement with an expected timeframe of more than 24 months, in which case any independent customer engaged in such arrangement must also be a highly reputable customer.

179. For the purpose of paragraphs 177 and 178 above:

    (a) the same independence requirement applied to a Sophisticated Independent Investor (see paragraphs 155 to 157 above) would also apply to assess whether a customer is independent; and

    (b) a "highly reputable customer" means:

        (i) a key market participant in the relevant upstream or downstream industry with substantial market share, as supported by appropriate independent market or operational data; or

        (ii) a State[50] or State corporation[51] as defined under the Listing Rules.

180. The Exchange will retain the discretion to determine whether the evidence provided by an applicant demonstrates a credible path to achieving the Commercialisation Revenue Threshold.

[50] "State" includes any agency, authority, central bank, department, government, legislature, minister, ministry, official or public or statutory person of, or of the government of, a state or any regional or local authority thereof. See Rule 1.01.

[51] Any company or other legal person which is directly or indirectly controlled or more than 50% of whose issued equity share capital (or equivalent) is beneficially owned by, and/or by any one or more agencies of, a State or all of whose liabilities are guaranteed by a State or which is specified as such from time to time by the Exchange. See Rule 1.01.

181. The Exchange's approval for listing of a Pre-Commercial Company would not be an endorsement by the Exchange of the R&D and/or the technology, or the status of commercialisation, of the listing applicant, and would be no guarantee that the listing candidate would successfully commercialise its Specialist Technology Product(s) or that it would generate sufficient revenue or cash flows to sustain its operations after listing. A Pre-Commercial Company applicant must prominently highlight and adequately describe the risks relevant to these matters in its Listing Document.

Enhanced working capital requirement

182. We propose to require a Pre-Commercial Company applicant to have available working capital to cover at least 125% of its group's costs for at least the next 12 months (after taking into account the IPO proceeds of the applicant). These costs must substantially consist of the following:

    (a) general, administrative and operating costs; and

    (b) R&D costs.

183. This proposed requirement is consistent with that applicable to Biotech Companies[52], which are also subject to the risk of failure to commercialise and/or have yet to achieve meaningful revenue to support their operation. The purpose of this requirement is to ensure that a Pre-Commercial Company will be able to meet its operational expenses for one year after listing without the support of revenue and/or profit. A Pre-Commercial Company can include other costs (apart from those listed in paragraph 182(a) and (b)) in determining whether this requirement is met.

184. The purpose of the requirement is not to mitigate the risk that a Pre-Commercial Company may not successfully commercialise. A Pre-Commercial Company must disclose how it plans to finance its path to meeting the Commercialisation Revenue Threshold in its Listing Document (see paragraph 175(b)).

Question 23	Do you agree that a Pre-Commercial Company applicant must have as its primary reason for listing the raising of funds for the R&D of, and the manufacturing and/or sales and marketing of, its Specialist Technology Product(s) to bring them to commercialisation and achieving the Commercialisation Revenue Threshold? Please give reasons for your views.

[52] Rule 18A.03(4).

Question 24 Do you agree that a Pre-Commercial Company applicant must demonstrate to the Exchange, and disclose in its Listing Document, a credible path to the commercialisation of its Specialist Technology Products, appropriate to the relevant Specialist Technology Industry, that will result in it achieving the Commercialisation Revenue Threshold?

Please give reasons for your views.

Question 25 If your answer to Question 24 is "Yes", do you agree with the examples proposed in paragraphs 176 to 179 (including the definition of "highly reputable customer") of the Consultation Paper that a Pre-Commercial Company applicant could use to demonstrate a credible path to achieving the Commercialisation Revenue Threshold?

Please give reasons for your views.

Question 26 Do you agree that a Pre-Commercial Company applicant must: (a) explain and disclose, in detail, the timeframe for, and impediments to, achieving the Commercialisation Revenue Threshold; and (b) if its working capital (after taking into account the listing proceeds) is insufficient to meet its needs before it achieves the Commercialisation Revenue Threshold, describe the potential funding gap and how it plans to further finance its path to achieving the Commercialisation Revenue Threshold after listing?

Please give reasons for your views.

Question 27 Do you agree that a Pre-Commercial Company applicant must have available working capital to cover at least 125% of its group's costs for at least the next 12 months (after taking into account the IPO proceeds of the applicant), and these costs must substantially consist of the following: (a) general, administrative and operating costs; and (b) R&D costs?

Please give reasons for your views.

VII. Specialist Technology Companies with a WVR structure

Preliminary discussions with stakeholders

185. Stakeholders informed us that some prospective Specialist Technology Company applicants may seek a listing with a WVR structure as they share characteristics with companies that have previously sought WVR listings. These characteristics include a founder who has made a leading contribution to the growth of the company and its value but whose shareholding has been diluted through rounds of pre-IPO fundraising.

Proposals

186. Our Rule requirements on WVR were the outcome of a robust consultation process as part of the 2018 Listing Reforms and apply equally to all issuers (including Biotech Companies) applying for a primary listing on the Exchange. We do not see any new or exceptional circumstances arising from the proposed Specialist Technology regime that warrant the removal of or addition to our existing WVR Listing Rule requirements.

187. This means that a Specialist Technology Company applicant must meet a minimum market capitalisation threshold of either HK$40 billion or HK$10 billion (if it has at least HK$1 billion revenue in its last audited financial year) to list with a WVR structure.[53] Given applicants will be either Pre-Commercial Companies with less than HK$250 million in annual revenue or Commercial Companies that cannot meet the HK$500 million annual revenue requirement of the Alternative Tests, it is likely they will need to meet the HK$40 billion market capitalisation threshold to list with WVR.

188. Our guidance on the suitability for applicants to list with a WVR structure also requires, among others, that each WVR beneficiary must have been materially responsible for the growth of the business of a company applying to list with a WVR structure[54] and the applicant must demonstrate a track record of high business growth and that its high growth trajectory is expected to continue.[55] These requirements will also apply to Specialist Technology Companies listing with a WVR structure.

[53] Rule 8A.06.

[54] Paragraph 4.4 of Guidance Letter HKEX-GL93-18.

[55] Paragraph 4.3 of Guidance Letter HKEX-GL93-18.

C. IPO Requirements

I. More Robust Price Discovery Process

Preliminary discussions with stakeholders

189. Stakeholders noted the difficulties inherent in valuing Specialist Technology Companies (see paragraphs 69 to 73). They therefore thought it important for the IPO price of these companies to be determined with the benefit of professional experience and industry expertise by independent investors that had the resources to conduct due diligence and thorough research of the Specialist Technology Companies' capabilities and performance.

190. However, some stakeholders were concerned that Hong Kong's price discovery process was not suited to this task. They noted two characteristics of the process that may severely limit the shares allocated to independent institutional investors in an IPO:

    (a) the Listing Rules trigger a Clawback Mechanism if an IPO has strong retail demand, which can result in the public subscription tranche of an IPO taking up as much as 50% of the offer shares. Retail investors have limited influence on the price discovery process, as their subscription is made based on the maximum offer price under the indicated price range stated in the Listing Document, and hence are "price-takers" in an IPO; and

    (b) a company may allocate shares to "cornerstone investors", who receive a guaranteed allocation in return for the reputational support their participation brings to the IPO. These are sometimes independent institutional investors who choose to participate as cornerstone investors to ensure they receive a meaningful allocation, but also include investors whose primary objective is to support the listing applicant's listing and who are relatively insensitive to the level at which the IPO is priced.

191. Stakeholders informed us that institutional investors were less inclined to invest in an IPO where the portion available in the placing tranche was insufficient to meet their minimum investment mandate. They require a reasonable certainty that a meaningful allocation would be offered to them to justify devoting time and resources to the due diligence and research of a listing applicant and the ongoing monitoring of that investment after the IPO.

192. Institutional investors may also be reluctant to participate if the IPO price is driven upwards in a "hot" IPO by retail sentiment and "cornerstone" investment to a level that is not justified by their research.

Current requirements on the size of the public subscription tranche

193. PN 18 prescribes that, where an IPO includes both a placing tranche and a public subscription tranche: (i) a minimum initial allocation of 10% of the securities offered in an IPO must be made for the public subscription tranche; and (ii) subscriptions over a certain number of times the initial offer size in the public subscription tranche must be subject to the Clawback Mechanism (see Table 5 below).

194. The initial allocation and Clawback Mechanism were codified in the Listing Rules in 1998[56] when global equity offerings that involved fund raising in both Hong Kong and international markets were becoming more common in Hong Kong IPOs. The intention was to ensure that there is sufficient supply of securities in the public subscription tranche, particularly in circumstances of high demand (see paragraph 195 below), to ensure fair allocation between retail and institutional investors.

195. At the time when PN 18 was introduced, retail investors contributed to a significantly higher proportion of cash markets activity. HKEX's Members Transaction Survey 1997 states that these investors represented 56% of cash market trading value, as compared to 15.5% in 2020 (see paragraph 75).[57]

196. Since the introduction of PN 18, the Exchange has granted waivers from PN 18 where the initial size of an offering is considered sufficiently large (typically greater than HK$10 billion).[58] This is on the basis that there will still be sufficient supply of securities to satisfy retail investor demand.

Table 5: Initial allocation and Clawback Mechanism under (a) PN 18 and (b) a typical waiver (where the initial offering size is above HK$10 billion)

	Initial	**Number of times (x) of over-subscription in the public subscription tranche**		
		15x to less than 50x	*50x to less than 100x*	*100x or more*
Minimum retail allocation as a percentage of total offer shares under PN 18	10%	30%	40%	50%
Minimum retail allocation as a percentage of total offer shares under typical clawback waivers (where the initial offering size is above HK$10 billion)	5%	7.5%	10%	20%

[56] SFC, Offer Mechanisms Consultation Conclusion, February 1998.

[57] HKEX, Members Transaction Survey 1997, page 2, 10th February 1998.

[58] Paragraph 13 of Listing Decision HKEx-LD60-1 and paragraph 7 of Listing Decision HKEX-LD60-2.

Jurisdictional comparison

STAR Market

197. The STAR Market has put in place measures to ensure that professional institutional investors play a dominant role in the bookbuilding process.[59] For example, compared with the Main Board of the SSE, it requires: (a) a larger portion of offer shares to be allocated to the placing tranche of an IPO;[60] and (b) a more restrictive clawback mechanism with a maximum of around 20% of offer shares to be allocated to the subscription tranche[61] of a sizeable IPO[62] or the IPO of a pre-profit issuer.

US

198. In the US, there is no requirement on the size of the placing tranche or strategic / cornerstone investment. However, without a mandatory clawback mechanism, the allocation of offer shares to institutional professional investors is less likely to be compromised.

Proposals

199. Given the inherent difficulties in valuing Specialist Technology Companies (see paragraphs 69 to 74), we propose that there should always be a sizeable allocation to Independent Institutional Investors to ensure a robust price discovery process that fully benefits from the institutional investors' research and professional assessment.

Larger allocation to Independent Institutional Investors

200. It is proposed that a Specialist Technology Company must, in addition to meeting the existing requirements on public float[63], ensure that at least 50% of the total number of shares offered in the initial public offering (excluding any shares to be issued pursuant to the exercise of any over-allotment option) must be taken up by Independent Institutional Investors.

[59] See "Pricing and Placement, Key Features, Getting Started" on the STAR Market website.

[60] Articles 12(1) and (2) of Implementation Measures for the Offering and Underwriting of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange.

[61] Assuming the number of shares subscribed for by investors under the subscription tranche is more than 100 times the initial size of the subscription tranche and strategic investors subscribe for a maximum of 30% of offer shares. See Articles 12(2), 13 and 16 of Implementation Measures for the Offering and Underwriting of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange.

[62] An IPO after which the issuer's enlarged share capital is more than 400 million shares.

[63] At least 25% of the issuer's total number of issued shares must at all times be held by the public, subject to any waiver granted under Rule 8.08(1)(d). See Rule 8.08(1).

201. It is proposed that Independent Institutional Investors for this purpose mean Institutional Professional Investors that participate in the placing tranche of an IPO (whether as cornerstone investor or otherwise), excluding existing shareholders and any of their close associates, and core connected persons of the applicant.

202. For the avoidance of doubt, this definition of "Institutional Professional Investor" would exclude corporate professional investors and individual professional investors (i.e. the professional investors referred to in the SFO PI Rules (see Note to Table 8 on page 88)).

203. The proposed requirement would also apply to a Specialist Technology Company listing by way of a De-SPAC Transaction. At least 50% of the total number of shares issued by the Successor Company as part of the De-SPAC Transaction (excluding any shares issued to the existing shareholders of the De-SPAC Target as consideration for acquiring the De-SPAC Target) would need to be taken up by Independent Institutional Investors. The existing independent third party investor requirement[64] for a De-SPAC Transaction would continue to apply.

204. In the case of a Specialist Technology Company seeking to list by introduction[65], the Exchange will consider granting waivers, on a case-by-case basis, from the requirement for the applicable minimum allocation of offer shares to Independent Institutional Investors. The applicant must demonstrate that it is expected to meet the applicable minimum market capitalisation at the time of listing (see paragraph 120), having regard to its historical trading price (for at least a six-month period) on a Recognised Stock Exchange with sufficient liquidity and a large investor base (a substantial portion of which are independent Institutional Professional Investors).

Initial retail allocation and clawback mechanism

205. We propose to apply the initial retail allocation and clawback mechanism as set out in Table 6 to the initial listings of Specialist Technology Companies.

Table 6: Initial allocation and clawback mechanism specific to Specialist Technology Companies

	Initial	**No. of times (x) of over-subscription in the public subscription tranche**	
		10x to less than 50x	*50x or more*
Minimum retail allocation as a percentage of total offer shares	5%	10%	20%

[64] Rule 18B.41.

[65] Such companies must comply with the existing Listing Rules and guidance relating to listing by introduction, including Rules 7.13, 7.14 and 7.15; and Guidance Letter HKEX-GL53-13.

Question 28 Do you agree that Independent Institutional Investors should be given a minimum allocation of offer shares in the IPO of Specialist Technology Companies to help ensure a robust price discovery process?

Please give reasons for your views.

Question 29 If your answer to Question 28 is "Yes", do you agree with the definition of Independent Institutional Investors as set out in paragraphs 201 to 202 of the Consultation Paper?

Please give reasons for your views. Please provide any alternative definition you believe appropriate with reasons for your suggestions.

Question 30 If your answer to Question 28 is "Yes", do you agree that a Specialist Technology Company must, in addition to meeting the existing requirements on public float, ensure that at least 50% of the total number of shares offered in the initial public offering (excluding any shares to be issued pursuant to the exercise of any over-allotment option) must be taken up by Independent Institutional Investors?

Please give reasons for your views.

Question 31 If your answer to Question 28 is "Yes", do you agree that in the case where a Specialist Technology Company is listed by way of a De-SPAC Transaction, at least 50% of the total number of shares issued by the Successor Company as part of the De-SPAC Transaction (excluding any shares issued to the existing shareholders of the De-SPAC Target as consideration for acquiring the De-SPAC Target) must be taken up by Independent Institutional Investors?

Please give reasons for your views.

Question 32 Do you agree that in the case of a Specialist Technology Company seeking to list by introduction, the Exchange will consider granting waivers, on a case-by-case basis, from the requirement for the minimum allocation of offer shares to Independent Institutional Investors, if the applicant is able to demonstrate that it is expected to meet the applicable minimum market capitalisation at the time of listing (see paragraph 120 of the Consultation Paper), having regard to its historical trading price (for at least a six-month period) on a Recognised Stock Exchange with sufficient liquidity and a large investor base (a substantial portion of which are independent Institutional Professional Investors)?

Question 33 Do you agree that there should be a new initial retail allocation and clawback mechanism for Specialist Technology Companies to help ensure a robust price discovery process?

Please give reasons for your views.

Question 34 If your answer to Question 33 is "Yes", do you agree with the proposed initial allocation and clawback mechanism for Specialist Technology Companies as set out in paragraph 205 of the Consultation Paper?

Please give reasons for your views. If your answer is "No", please provide alternative suggestions and provide reasons for your suggestions.

II. Free Float and Public Float Requirements

Preliminary discussions with stakeholders

206. Stakeholders commented that liquidity in the shares of a Specialist Technology Company after listing could aid price discovery for companies that were difficult to value, and could mitigate market manipulation and price volatility concerns.

Proposals

Minimum free float requirement

207. We propose that a Specialist Technology Company seeking an initial listing must ensure that a portion of its issued shares with a market capitalisation of at least HK$600 million is free from any disposal restrictions (whether under: contract; the Listing Rules; applicable laws; or otherwise) upon listing (referred to as its "free float").[66]

Offer size

208. The Exchange would expect the listing of a Specialist Technology Company to be accompanied by an offer (including both the placing tranche and the public subscription tranche) of a meaningful size and reserves the right not to approve the listing of a Specialist Technology Company if its offer size is not significant enough to facilitate post-listing liquidity, or may otherwise give rise to orderly market concerns.

[66] The size of the proposed minimum free float was determined after analysing past IPOs of certain issuers with a market capitalisation of at least HK$8 billion.

209. The Exchange's principal function is to provide a fair, orderly and efficient market for the trading of securities.[67] An IPO with a small offer size may give rise to concerns as to whether proper bookbuilding for the purpose of valuation discovery process is possible, even under our proposed more robust price discovery process (see paragraph 200). This is because an IPO price could be set by a few Independent Institutional Investors each taking a small stake to meet the requirement to allocate 50% of shares to Independent Institutional Investors.

210. A meaningful offer size is also more likely to ensure a robust price discovery process as it will allow Independent Institutional Investors to subscribe for a sufficiently large amount of shares in the IPO to justify their devoting time and resources to the due diligence and research of a listing applicant.

211. In the case of a Specialist Technology Company listed on another stock exchange seeking to list by introduction, we propose to implement our existing Rules and guidance to ensure sufficient liquidity arrangements are in place.[68]

Question 35	Do you agree that a Specialist Technology Company seeking an initial listing must ensure that a portion of its issued shares with a market capitalisation of at least HK$600 million is free from any disposal restrictions (whether under: contract; the Listing Rules; applicable laws; or otherwise) upon listing (referred to as its "free float")? Please give reasons for your views.
Question 36	Do you agree that the Exchange should reserve the right not to approve the listing of a Specialist Technology Company if it believes the company's offer size is not significant enough to facilitate post-listing liquidity, or may otherwise give rise to orderly market concerns? Please give reasons for your views.

[67] Rule 2.01.

[68] Guidance Letter HKEX-GL53-13.

III. IPO Disclosure Requirements

Preliminary Discussions with stakeholders

Specific disclosure to facilitate determination of valuation

212. Given the difficulty in valuing Specialist Technology Companies (see paragraphs 69 to 73), a number of stakeholders suggested strengthening the disclosures required for Specialist Technology Companies, at IPO, to facilitate investors' assessment of their financial position and prospects to enable them to determine a valuation.

213. For a Pre-Commercial Company, they thought these disclosures should include the company's commercialisation plans (e.g. the size of its addressable market, target market share, contracted sales, business model and monetisation strategy). They also stressed the importance of the company providing revenue and profit projections.

214. Some stakeholders suggested requiring Pre-Commercial Companies to define their own milestones and metrics for commercialisation over a period of time that is appropriate for their particular industry, and requiring ongoing disclosure to hold them accountable for their Listing Document disclosures after listing. They thought this would help ensure that the Listing Document disclosures on future prospects are more realistic and achievable.

Intellectual property

215. Most stakeholders agreed that Specialist Technology Companies' success is often attributable to the unique technologies they possess. However, most did not suggest imposing any mandatory requirement for a Specialist Technology Company to possess a minimum number or certain type of intellectual property rights, as the prevalence of registration of intellectual property rights varies by industry.

216. Instead, they suggested that Specialist Technology Companies should be required to make qualitative disclosures of their intellectual property. This should be sufficient for investors to gain an understanding of the source (whether in-licensed or self-developed) of the intellectual property and how it materially contributed to the company's products / services.

Proposals

Specific disclosure to facilitate determination of valuation

217. We propose that a Specialist Technology Company disclose the following additional information in its Listing Document (as set out in paragraph 32 of the Draft Guidance Letter) due to it being a Specialist Technology Company:

(a) *Pre-IPO investments, cash flow-related disclosures*:

In addition to the existing requirements on pre-IPO investments[69], the implied valuation for each pre-IPO investment round, reasons for material fluctuations in valuation, and cash flow-related disclosures (such as burn rate and cash operating costs).[70]

Rationale: Such information, together with the existing requirements on pre-IPO investments[71] would provide transparency on changes in the Specialist Technology Company's valuation over time, and how much cash the company has burned over the track record period and its expected burn rate.

(b) *Products and commercialisation status and prospects*:

(i) A summary of Specialist Technology Product(s), the technical capabilities and commercial viability of the technology applied, their respective commercialisation status, addressable market and market share, both for the current and for a reasonable future period, and the basis for determination[72]; and (ii) key aspects of the Specialist Technology Company's business model, and key metrics relevant to its business model.[73]

Rationale:

(i) The proposed requirements seek to facilitate investors' assessment of the future prospects and monetisation strategy of the Specialist Technology Company.

(ii) To minimise the risk of companies' cherry-picking disclosures, the proposal requires disclosure of key metrics that are relevant to the company's business model. The Draft Guidance Letter provides example disclosures for subscription-based and transaction-based companies, which are the most common business models for Specialist Technology Companies. This approach is consistent with the approach suggested by an academic paper[74], and the example disclosures cover the key metrics for valuing Specialist Technology Companies as mentioned by some stakeholders in our preliminary discussions with them. These metrics will be updated from time to time as in listing Specialist Technology Companies.

[69] Guidance Letter HKEX-GL43-12.

[70] Paragraph 32(a) to (c) of the Draft Guidance Letter.

[71] See Guidance Letters HKEX-GL29-12, HKEX-GL43-12 and HKEX-GL44-12 for guidance on pre-IPO investments. This requires details of each pre-IPO investor, cost per share paid by each pre-IPO investor and the respective discount to the IPO price, use of proceeds from the pre-IPO investments and whether they have been fully utilised.

[72] Paragraph 32(d) to (f) of the Draft Guidance Letter.

[73] Paragraph 32(g) of the Draft Guidance Letter.

[74] Damodaran, Aswath and McCarthy, Daniel and Cohen, Maxime C., Initial Public Offerings: Dealing with the Disclosure Dilemma, 5th October 2021.

(c) *R&D:*

Details of a Specialist Technology Company's R&D activities (including composition of R&D investment) and experience.[75]

Rationale: the proposed disclosure seeks to facilitate informed assessment by investors of the significance of R&D to the Specialist Technology Company, and its R&D capabilities.

(d) *Industry specific information:*

Details of any industry-specific standards, definitions or classifications, and requirements for regulatory approval.[76]

Rationale: Given each Specialist Technology Industry or acceptable sector has its own industry milestones and pathway to commercialisation (some of which are subject to review or approval by competent authorities), the proposed disclosure seeks to facilitate investors' assessment of the stage of development of an applicant's Specialist Technology Product(s).

(e) *Intellectual property*:

Details of material intellectual property, including (i) the part of the Specialist Technology Product to which the intellectual property is attributing or protecting; and (ii) the extent and form to which such intellectual property is protected; and for intellectual property rights not registered, the procedures put in place to protect such intellectual property.[77]

Rationale: We believe a more detailed qualitative disclosure focusing on the protective measures to avoid infringement or duplication of a Specialist Technology Company's innovations will help provide investors with material information as to how defensible its technologies and market position would be.

(f) *Warning statements*

A prominent warning statement on the cover of its Listing Document that it is a Specialist Technology Company and so investment in its securities carries additional risks[78], and for a Pre-Commercial Company, the warning statement on the cover of the Listing Document should also draw investors' attention to the risk that it may not successfully commercialise to generate sufficient revenue to sustain its operations after listing and the heightened risk that it may fail due to a lack of available funds.

[75] Paragraph 32(h) of the Draft Guidance Letter.

[76] Paragraph 32(i) of the Draft Guidance Letter.

[77] Paragraph 32(j) of the Draft Guidance Letter.

[78] Paragraph 32(l) of the Draft Guidance Letter.

Additional disclosures for Pre-Commercial Companies

218. In addition to the required disclosures set out in paragraph 217, we propose that a Pre-Commercial Company must make the following disclosures in its Listing Document[79]:

(a) the stage of research and development for each of its Specialist Technology Product(s);

(b) development details by key stages and milestones for its Specialist Technology Product(s) to achieving the Commercialisation Revenue Threshold;

(c) all relevant risks associated with the commercialisation of each of its Specialist Technology Product(s);

(d) additional warning statement (see paragraph 217(f) above).

219. These additional disclosures are based on those required for Biotech Companies[80]. The development details by key stages and milestones to achieving the Commercialisation Revenue Threshold disclosed in the Listing Document serve as the stated goals a Pre-Commercial Company is expected to achieve after listing. A Pre-Commercial Company would be obliged to provide updates on its progress towards achieving such goals on an ongoing basis after listing (see paragraph 262).

Profit forecast

220. We note that investors may also rely on projection of revenue or profit to determine a company's valuation when such information is available. We do not propose to require a Specialist Technology Company to include a profit forecast in its Listing Document and if a profit forecast is included, the company must comply with existing requirements under the Rules[81] .

Question 37	Do you agree that a Specialist Technology Company applicant's Listing Document must include the additional information set out in paragraph 32 of the Draft Guidance Letter (Appendix V of the Consultation Paper) due to it being a Specialist Technology Company? Please give reasons for your views.

[79] Paragraph 32(m) of the Draft Guidance Letter.

[80] Rule 18A.04(2)(d) and Rule 18A.05.

[81] Rule 11.17.

Question 38 Do you have any other suggestions for additional information that a Specialist Technology Company should include in its Listing Document in order to allow an investor to properly assess and value the company?

If so, please provide your suggestion.

IV. Sponsor's Due Diligence

221. Practice Note 21 of the Listing Rules and paragraph 17 of the Code of Conduct for Persons Licensed by or Registered with the SFC sets out the standard of conduct on sponsors when undertaking due diligence inquiries. No change is proposed to the scope of sponsors' duties in the context of the listing of Specialist Technology Companies.

V. Subscription of IPO Shares by Existing Shareholders

Preliminary discussions with stakeholders

222. Some stakeholders commented that it was not uncommon for existing shareholders of a Specialist Technology Company to subscribe for IPO shares to provide funding to support the growth and development of the company.

Proposals

223. We believe that the continued participation of existing shareholders in the IPO of a Specialist Technology Company can demonstrate their ongoing commitment to its future development and their confidence in its prospects and growth. Such support from existing shareholders is particularly important for Specialist Technology Companies that are at a relatively early-stage of their development and have significant ongoing funding needs.

224. Consistent with our existing regime for Biotech Companies[82], we propose to allow existing shareholders (including controlling shareholders) of a Specialist Technology Company to participate in its IPO provided that the company complies with our existing public float requirement [83], the requirement for minimum allocation to Independent Institutional Investors(see paragraph 200) and the minimum free float requirement (see paragraph 207).

225. We propose that:

(a) the "Existing Shareholder Conditions" referred to in Guidance Letter HKEX-GL85-16[84] do not apply to a Specialist Technology Company, such that:

[82] Paragraph 5.2 of Guidance Letter HKEX-GL92-18.

[83] Rule 8.08(1).

[84] Paragraph 4.20 of Guidance Letter HKEX-GL85-16.

(i) an existing shareholder holding less than 10% of shares[85] in the Specialist Technology Company may subscribe for shares in the IPO as either a cornerstone investor or as a placee.

In the case of subscription as a placee, the applicant and its sponsor must confirm that no preference in allocation was given to the existing shareholder. In the case of subscription as a cornerstone investor, the applicant and its sponsor must confirm that no preference was given to the existing shareholder other than the preferential treatment of assured entitlement at the IPO price and the terms must be substantially the same as other cornerstone investors; and

(ii) an existing shareholder holding 10% or more of shares in the Specialist Technology Company may subscribe for shares in the IPO as a cornerstone investor; and

(b) where allocations will be made to core connected persons, the Specialist Technology Company must apply for, and the Exchange will ordinarily grant, a related Rule 9.09 waiver, if applicable.

226. An existing shareholder with a contractual anti-dilution right may continue to exercise such right and subscribe for shares in the IPO in accordance with the existing requirements.[86] Any shares subscribed for by existing shareholders at IPO will not be counted towards the requirement for the minimum allocation to Independent Institutional Investors (see paragraph 200).

Question 39 Do you agree that existing shareholders should be allowed to participate in the IPO of a Specialist Technology Company provided that the company complies with the existing public float requirement under Rule 8.08(1), the requirement for minimum allocation to Independent Institutional Investors (see paragraph 200 of the Consultation Paper) and the minimum free float requirement (see paragraph 207 of the Consultation Paper)?

Please give reasons for your views.

Question 40 If your answer to Question 39 is "Yes", do you agree with the proposals set out in paragraph 225 of the Consultation Paper regarding the conditions for existing shareholders subscribing for shares in an IPO?

Please give reasons for your views.

[85] The 10% is measured before the IPO.

[86] Paragraph 3.10 of Guidance Letter HKEX-GL43-12.

D. Post-IPO Requirements

I. Post-IPO Lock-ups on Existing Shareholders

Preliminary discussions with stakeholders

Persons that should be subject to post-IPO lock-ups

227. Some stakeholders suggested that, in addition to the existing Listing Rule lock-up requirements on controlling shareholders, the shares held by other key persons should also be subject to lock-ups after an IPO. They suggested that lock-ups should apply to founders (who may not have controlling interests at listing due to dilution after multiple fundraising rounds) and persons involved in the day-to-day management of a Specialist Technology Company and its R&D function. They believed that placing restrictions on the disposal of these key persons' securities for a certain period after listing would help incentivise their ongoing involvement in the company. They believed this to be particularly necessary for Pre-Commercial Companies as these key persons would help achieve the company's commercialisation plans.

228. In addition, some stakeholders suggested a lock-up on securities held by certain long-term pre-IPO investors, upon whose investment public investors may place reliance on when making their own investment in the shares of a Specialist Technology Company.

Lock-up period

229. In respect of the post-IPO lock-ups on controlling shareholders and key persons of a Specialist Technology Company, stakeholders generally considered one to two years appropriate. For Pre-Commercial Companies, some suggested that the lock-up period should generally be longer.

230. Some stakeholders commented that any lock-up period imposed on pre-IPO investors should not unnecessarily discourage investment from reputable investors and should take into account their need to realise their investment gains within their stipulated investment horizons.

Concerns with imposing additional lock-up requirements

231. Some stakeholders expressed the following concerns on imposing additional lock-up requirements:

(a) excessive lock-up requirements would reduce free float and so have an adverse effect on the post-IPO liquidity;

(b) the expiry of lock-ups on a large portion of securities at the same time may cause a sudden drop in share price;

(c) in practice, many underwriters would require voluntary lock-up undertakings from some or all of the existing shareholders (including pre-IPO investors) for around six-months after listing to prevent an excessive amount of selling activity immediately after an IPO and so an extension to the existing regulatory lock-up requirements may not be necessary; and

(d) lock-ups may not be effective in ensuring the commitment of a shareholder, as a shareholder is free to sell down in an IPO as a selling shareholder.

Jurisdictional comparison

STAR Market

232. Shareholders of issuers listed on the STAR Market are subject to various lock-up requirements embodied in different legislations, listing rules and regulations imposed by the STAR Market, the SSE and other relevant authorities. The summary below sets out the requirements that are most relevant to our proposals and are not exhaustive.

Key persons

233. Pre-IPO securities held by (a) controlling shareholders[87] and de facto controllers[88]; and (b) directors, supervisors, senior officers and key technicians are subject to respective lock-up periods of 36 months[89] and 12 months[90] from the date of listing. Where an issuer does not record any profit at listing, its pre-IPO securities are subject to a lock-up period of three full financial years from listing (or until the issuer makes a profit[91]). This restriction continues to apply to the key persons in (b) even after their resignation.

234. After the expiry of the respective lock-up periods, the key persons described above are further subject to volume limitations on securities disposal as prescribed under the relevant PRC rules and regulations.[92]

[87] "Controlling shareholder" refers to a shareholder who holds more than 50 percent of the total capital stock of a company, or a shareholder who holds less than 50 percent of the total capital stock of a company, but is in a position to have a material impact on the resolutions of the shareholders' general meeting by virtue of the voting rights represented by the stocks the shareholder holds.

[88] "De facto controller" refers to a person who, though not a shareholder of the company, has de facto control over corporate actions through investment relationship, agreements or other arrangements.

[89] Article 2.4.4 of the STAR Market Rules.

[90] Article 141 of the PRC Company Law (2018 Revision).

[91] For pre-profit issuers, shareholders may reduce their pre-IPO holdings from the date immediately following the disclosure of its annual report for the year the issuer makes a profit.

[92] For volume limitations imposed on controlling shareholders and de facto controllers, and key technicians, please refer to Articles 2.4.3 and 2.4.5 of the STAR Market Rules respectively. For those imposed on directors, supervisors and senior management, please refer to Article 141 of the PRC Company Law (2018 Revision) and Article 12 of the Detailed Implementing Rules of the Shanghai Stock Exchange for Shareholding Reduction by Shareholders, Directors, Supervisors and Senior Executives of Listed Companies.

Investors

235. All shares issued prior to an IPO are generally subject to a one-year lock-up period from listing.[93] Where an investor first invested in an issuer within six months prior to its listing application, the relevant securities acquired are subject to a lock-up period of 36 months from the date on which the issuer filed with the relevant authorities with respect to such investment.[94]

236. For strategic investors subscribing for shares at IPO[95], they are required to hold the offer shares placed to them for a period of no less than 12 months from listing.[96]

US

237. US securities law prohibits holders of restricted securities[97] of a reporting company from disposing of such securities within six months after they are fully paid for[98].

238. In practice, it is common, based on Listing Document disclosures of the issuers in the Sample Cohort listed in the US, for existing shareholders to agree with underwriters to a lock-up period of up to 180 days after listing, subject to some limited carve-outs (for example, pre-agreed share price thresholds). The lock-up period would either be a single lock-up period or staggered periods with volume limitations applicable to different types of shareholders, such as employees, directors, officers and pre-IPO investors.

[93] Article 141 of the PRC Company Law (2018 revision).

[94] Question 4 of Certain Questions and Answers on IPO Business (I) (Simplified Chinese version only) issued by the China Securities Regulatory Commission on 25th March 2019.

[95] See a list of persons who are eligible to be strategic investors as provided under Article 8 of Guidelines for the Offering and Underwriting of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange.

[96] Article 17 of Implementation Measures for the Offering and Underwriting of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange.

[97] "Restricted securities" generally refer to those securities acquired (a) prior to an IPO; (b) through private sales, e.g. private placement offering of an issuer or sales from affiliates of the issuer; and (c) through employment stock benefit plans. Restricted securities also include securities held by an executive officer, a director or a controlling shareholder, which are referred to as "control securities".

[98] Rule 144 of Securities Act of 1933. In addition, upon the expiry of the six-month holding period, securities held by affiliates of an issuer available for sale within any three-month period cannot exceed the greater of 1% of the number of outstanding stock; or 1% of the average weekly trading volume during the past four weeks.

Proposals

Founding shareholders

Controlling shareholders

239. The rationale for placing restrictions on the disposal of securities after an IPO by controlling shareholders is to give assurance to the statements that are made in a Listing Document. This gives potential investors a "snap shot" view of an issuer's current financial position and a general indication of the controlling shareholders' intentions for the issuer. A lock-up helps ensure that those involved in the creation of the Listing Document vouch for this information by aligning their economic interests with those of other shareholders throughout the lock-up period.[99]

240. We propose that the controlling shareholders of a Specialist Technology Company be subject to a lock-up period of 12 months (for a Commercial Company) and 24 months (for a Pre-Commercial Company), during which they must not dispose of, nor enter into any agreement to dispose of any of the securities held by them.

241. This is a more stringent lock-up period than that currently imposed on the controlling shareholders[100]. We believe that this would give more assurance that the controlling shareholders of a Specialist Technology Company are committed to its long-term development where the company, compared with other listing applicants, is more likely to be at an earlier stage of its development.

Key persons

242. The following key persons will have made a material contribution to the past performance of a Specialist Technology Company, its current financial position and future prospects, as stated in its Listing Document:

(a) founders;

(b) beneficiaries of weighted voting rights[101];

(c) executive directors and senior management; and

[99] Paragraph 5.2 of Guidance Letter HKEX-GL89-16.

[100] See Rule 10.07(1)(a).

[101] See also Rule 8A.18.

(d) key personnel responsible for the Specialist Technology Company's technical operations and/or the R&D of its Specialist Technology Product(s) (including the head and the key personnel of its R&D department) whose expertise is primarily relied upon by the company for the development of its Specialist Technology Product(s), and the lead developer(s) of the core technologies in relation to the Specialist Technology Product(s).

243. We propose that these persons and their close associates be subject to a restriction on the disposal of their holdings in the Specialist Technology Company following its listing of 12 months (for a Commercial Company) and 24 months (for a Pre-Commercial Company).

244. Applicants should identify the key persons referred to in paragraph 242 above having regard to the specific facts and circumstances of each listing applicant, and disclose the basis for their determination. The Exchange may request an applicant to provide supporting documentation to substantiate the basis on which such key persons have been identified.

245. The Exchange reserves the right to deem any person to be a key person (falling within the scope of paragraph 242) based on the individual facts and circumstances of a case.

246. We also propose that a lock-up on the disposal of the holdings of a person identified as a key person of the Specialist Technology Company as at the time of its listing continue to apply even if the person changes position at the company or resigns. This is to prevent circumvention of the lock-up restriction through such action.

Pre-IPO investors

Pathfinders SIIs

247. We propose that Pathfinder SIIs will be subject to a post-IPO lock-up of six months (for a Commercial Company) and 12 months (for a Pre-Commercial Company).

248. The purpose of the lock-up would be to help ensure that the faith that these long-term investors have previously demonstrated in the applicant's prospects prior to listing, on which public investors may have place reliance, would continue to be demonstrated for a period after listing.

Securities subject to lock-up

249. It is proposed that, with regards to shareholders subject to lock-up requirements (and consistent with current requirements for controlling shareholders[102]):

(a) only the securities in respect of which such persons are shown by the Listing Document to be the beneficial owner(s) would be subject to lock-ups;

[102] See Rule 10.07(1) and Note (1) to Rule 10.07.

(b) they would not be restricted from disposing of their shares prior to listing or offering them for sale as part of the IPO, i.e. only the securities retained by them after listing would be subject to the lock-up restrictions; and

(c) shareholders subject to a lock-up would be able to purchase additional securities in the IPO and dispose of them during the lock-up period, subject to the issuer's compliance with requirements to maintain an open market in the securities, a sufficient public float.[103] Additional securities purchased in the IPO are also subject to the limitations on "double dipping" set out above (see paragraph 224).

250. An existing shareholder (including the persons subject to the lock-ups described above) that holds 10% or more of shares in the Specialist Technology Company (immediately before the offer) should subscribe as a cornerstone investor if they wish to subscribe for shares in the IPO (see paragraph 225(a)(ii)). Similar to other cornerstone investors, such existing shareholders would be subject to the usual lock-up requirement of six-months[104] on the securities allotted to them in the IPO because of their assured entitlement under the cornerstone investment.

251. We do not propose to impose a limit on the amount of shares that could be disposed of by the relevant persons as selling shareholders at the IPO. This would mean that they could sell down at the IPO to minimise the number of their shares that are subject to a post-IPO lock-up, which is consistent with the existing position for the lock-up on controlling shareholders[105].

252. Whilst this may reduce the effect of lock-ups (i.e. undermine the demonstration of continued confidence), we are mindful of the legitimate right of shareholders to realise their gains at an IPO. For example, some venture capital investors may need to realise their investment gains after an IPO in order to have sufficient resources to invest in other private companies within their investment mandate. Any such disposal at an IPO would be disclosed in the Listing Document so investors will be able to take this into account when making their own investment decisions.

253. Specialist Technology Company applicants would also still need to meet the thresholds for aggregate Sophisticated Independent Investor investment at the time of the IPO (see paragraph 167(b)). This would likely place a cap on the amount that the Pathfinder SIIs would sell down in the IPO.

[103] Rule 8.08.

[104] Paragraph 2.2(b) of HKEX Guidance Letter GL51-13.

[105] Rule 10.07(1).

Deemed disposal of securities

254. Given the significant funding needs of Specialist Technology Companies, they may wish to raise funds through the issue of new securities after the Rule restriction on doing so (in the first six months of listing)[106] has expired. However, under our proposals, lock-ups may still apply to certain persons for up to 24 months after listing and, under the existing Rules and guidance, the issue of new securities may constitute deemed disposals breaching lock-up restrictions due to the dilution of shareholding resulting from such issue.

255. To provide more flexibility to Specialist Technology Companies to issue securities to raise funds after listing, we propose that any deemed disposal of securities by a person resulting from the allotment, grant or issue of new securities by a Specialist Technology Company during a lock-up period not be regarded as a breach of the lock-up restrictions.

Persistence of existing lock-ups upon removal of designation as a Pre-Commercial Company

256. We propose that any lock-up period in effect as at the time of the removal of designation as a Pre-Commercial Company continue to apply unchanged. This is to validate the reliance public investors have placed upon the lock-ups, as stated in the Listing Document, when investing in the company.

Disclosure of shareholding at listing and on an ongoing basis

257. We propose that a Specialist Technology Company must disclose in its Listing Document the total number of securities in the issuer held by the persons (as identified in the Listing Document) subject to the lock-up requirements under the Listing Rules. The same information must also be disclosed in the interim and annual reports of the Specialist Technology Company. Such ongoing obligation would continue to apply for so long as such persons remain as shareholders, irrespective of whether the person ceased to hold the relevant positions and whether the lock-up period has expired.

258. These proposed disclosure requirements would inform existing and potential investors and shareholders of the interest held by controlling shareholders, key persons and Pathfinder SIIs on an ongoing basis to assess whether they are continuing to demonstrate commitment or confidence in a Specialist Technology Company.

[106] Rule 10.08.

Table 7: Summary of post-IPO lock-up proposals

<table>
<tr><th rowspan="2">Persons</th><th rowspan="2">Securities subject to disposal restriction</th><th colspan="2">Post-IPO Lock-up Period</th></tr>
<tr><th>Commercial Companies</th><th>Pre-Commercial Companies</th></tr>
<tr><td rowspan="2">(a) Controlling shareholders
(b) Key persons, comprising:
(i) Founders;
(ii) WVR beneficiaries;
(iii) EDs and senior management;
(iv) Key personnel responsible for Specialist Technology Company's technical operations and/ or R&D of the Specialist Technology Products</td><td>Securities beneficially owned as disclosed in listing document (excluding those sold under any offer for sale contained in the listing document)</td><td>12 months from the date of listing</td><td>24 months from the date of listing</td></tr>
<tr><td>Securities subscribed for in the IPO</td><td colspan="2">if the shareholder subscribes as a cornerstone investor, the applicable lock-up period for the cornerstone investment[107] would apply (including an existing shareholder holding 10% or more of shares in the company before the offering and who subscribe for shares in the IPO, in which case the shareholder is required to subscribe as a cornerstone investor (see paragraph 225(a)(ii)))</td></tr>
</table>

[107] The lock-up period for cornerstone investment is generally for at least six months (see paragraph 2.2(b) of Guidance Letter HKEX-GL51-13)

Persons	Securities subject to disposal restriction	Post-IPO Lock-up Period	
		Commercial Companies	***Pre-Commercial Companies***
(c) All Pathfinder SIIs	Securities beneficially owned as disclosed in listing document (excluding those sold under any offer for sale contained in the listing document)	6 months from the date of listing	12 months from the date of listing
	Securities subscribed for in the IPO	if the shareholder subscribes as a cornerstone investor, the applicable lock-up period for the cornerstone investment[108] would apply (including an existing shareholder holding 10% or more of shares in the company before the offering and who subscribe for shares in the IPO, in which case the shareholder is required to subscribe as a cornerstone investor (see paragraph 225(a)(ii)))	

Question 41 Do you agree that the controlling shareholders of a Specialist Technology Company should be subject to a lock-up period of (a) 12 months (for a Commercial Company) and (b) 24 months (for a Pre-Commercial Company)?

Please give reasons for your views.

Question 42 Do you agree with the scope of key persons (as described in paragraph 242 of the Consultation Paper) that should be subject to a restriction on the disposal of their holdings after listing?

Please give reasons for your views.

[108] The lock-up period for cornerstone investment is generally for at least six months (see paragraph 2.2(b) of Guidance Letter HKEX-GL51-13)

Question 43 If your answer to Question 42 is "Yes", do you agree with the proposed lock-up periods on the securities of such key persons and their close associates of (a) 12 months (for a Commercial Company) and (b) 24 months (for a Pre-Commercial Company)?

Please give reasons for your views.

Question 44 Do you agree with the proposed lock-up period on the securities of Pathfinders SIIs of (a) six months (for a Commercial Company) and (b) 12 months (for a Pre-Commercial Company)?

Please give reasons for your views.

Question 45 Do you agree that controlling shareholders, key persons and Pathfinder SIIs should be permitted (in accordance with current Rules and guidance) to sell their securities prior to an IPO and offer them for sale in the IPO, such that only the securities retained by them after listing would be subject to the lock-up restrictions?

Please give reasons for your views.

Question 46 Do you agree that any deemed disposal of securities by a person resulting from the allotment, grant or issue of new securities by a Specialist Technology Company during a lock-up period would not constitute a breach of the lock-up requirements?

Please give reasons for your views.

Question 47 Do you agree that a lock-up period in force at the time of the removal of designation as a Pre-Commercial Company should continue to apply unchanged?

Please give reasons for your views.

Question 48 Do you agree that a Specialist Technology Company must disclose in its Listing Document the total number of securities in the issuer held by the persons (as identified in the Listing Document) that are subject to the lock-up requirements under the Listing Rules, and that the same information must also be disclosed in the interim and annual reports of the Specialist Technology Company for so long as such persons remain as a shareholder?

Please give reasons for your views.

II. Additional Continuing Obligations for Pre-Commercial Companies

Preliminary discussions with stakeholders

259. Most stakeholders agreed that Pre-Commercial Companies should be subject to requirements regarding ongoing interim and annual report disclosure, material change of business, sufficiency of operations and assets, and stock marker that were consistent with those imposed on Biotech Companies. [109]

260. As stated above (see paragraph 214), some stakeholders suggested that Pre-Commercial Companies also disclose, on an ongoing basis, their performance against the milestones and metrics they have set for themselves to achieve commercialisation, as disclosed in their Listing Document. They believed ongoing disclosure requirements would enable public investors to track the company's business growth more easily and determine how well the company is adhering to its intentions as disclosed in its Listing Document, taking into account any changes in its circumstances. They thought this would also ensure transparency and be conducive to an orderly, informed and fair market.

Proposals

Ongoing disclosure requirements for Pre-Commercial Companies

261. We propose to require that a Pre-Commercial Company disclose information in its Listing Document relating to its stage of development, including details on its R&D activities and commercialisation progress (see paragraph 218).

262. We also propose that a Pre-Commercial Company include in its interim and annual reports details of its R&D activities and commercialisation progress during the period under review, including the following:

(a) details of the development progress of its Specialist Technology Product(s) under development;

[109] Rules 18A.08 to 18A.11; and HKEX, Consultation Paper on a Listing Regime for Companies from Emerging and Innovative Sectors, paragraph 15, February 2018.

(b) the timeframe for, and any progress made towards, achieving the Commercialisation Revenue Threshold, including updates on the amount of contract value realised and/or realisable in respect of the agreements with customers, as previously disclosed to demonstrate its path to achieving such threshold in its Listing Document or any subsequent update as published by the Pre-Commercial Company;

(c) updates on any revenue, profit and other business and financial estimates as provided in the Listing Document and any subsequent updates to those estimates as published by the Pre-Commercial Company;

(d) a summary of its R&D investment during the relevant period; and

(e) a prominently disclosed warning that the company may not achieve the Commercialisation Revenue Threshold.

263. We propose that the details to be provided by a Pre-Commercial Company in such ongoing disclosure should be consistent with that disclosed in its Listing Document. This means that the Pre-Commercial Company should adopt the same milestones and metrics used, with information presented in substantially the same format as the information disclosed in the Listing Document, to enable its shareholders and potential investors to assess how well the company is adhering to its intentions as disclosed in its Listing Document.

264. A Pre-Commercial Company may change the use of proceeds due to certain contingencies if these are discussed specifically and the alternatives are clearly described in the "Use of Proceeds" section in the Listing Document. However, where any material change of use of proceeds was not previously disclosed in the Listing Document, the Pre-Commercial Company must make an announcement to notify investors of the change after listing. This is in line with our current requirement on the use of proceeds by other issuers on the Exchange.[110]

Other obligations

265. As we have stated elsewhere in this paper, there can be no guarantee that Pre-Commercial Companies will achieve their commercialisation goals. If they do not do so, there is a risk that they become listed shell companies. As we have stated publicly in the past, shell companies carry the risk of undesirable regulatory outcomes, including share price volatility on speculation that they will be the subject of takeover and that they will become targets of attempts to list new assets or businesses in circumvention of the listing requirements for new applicants.

[110] See paragraph 3.13 of Guidance Letter HKEX-GL33-12.

266. In this respect, it is proposed that Pre-Commercial Companies be subject to the same obligations as Biotech Companies[111], as set out below:

(a) *Sufficiency of operations and assets and delisting process:* where the Exchange considers that a Pre-Commercial Company has failed to meet its continuing obligation to maintain sufficient operations or assets, the Exchange may give the issuer a period of up to 12 months to re-comply with the requirement. If the issuer fails to do so, the Exchange will cancel its listing. This means that the remedial period is shorter than the usual 18-month period imposed on other issuers[112];

(b) *Material change of business:* a Pre-Commercial Company must not effect any transaction that will result in a fundamental change to its principal business without the prior consent of the Exchange. This restriction is more stringent than that imposed on other issuers[113] in that it will apply for so long as a company remains as a Pre-Commercial Company; and

(c) *Stock marker:* Pre-Commercial Companies be prominently identified through a unique stock marker "PC" at the end of their stock names.

Cessation of application of continuing obligations

267. The Exchange recognised that the above continuing obligations would no longer be appropriate once a Pre-Commercial Company has met the requirements in paragraph 270 and ceases to be regarded as a Pre-Commercial Company as set out in Section D(III) below.

Question 49	Do you agree with the scope of the additional disclosure in the interim and annual reports of Pre-Commercial Companies as set out in paragraphs 262 and 263 of the Consultation Paper? Please give reasons for your views. If your answer is "No", please provide alternative suggestions and provide reasons for your suggestions.
Question 50	Do you agree that only Pre-Commercial Companies should be subject to the ongoing disclosure requirements referred to in Question 49? Please give reasons for your views.

[111] Rules 18A.09 and 18A.10.

[112] Rule 6.01A.

[113] Rule 14.89, which imposes a similar requirement for the first 12 months from listing.

Question 51 Do you agree that Pre-Commercial Companies should be subject to a remedial period of 12 months to re-comply with the sufficiency of operations and assets requirement before delisting, in the event that the Exchange considers that a Pre-Commercial Company has failed to meet its continuing obligation to maintain sufficient operations or assets?

Please give reasons for your views.

Question 52 Do you agree that Pre-Commercial Companies must not effect any transaction that would result in a fundamental change to their principal business without the prior consent of the Exchange?

Please give reasons for your views.

Question 53 Do you agree that Pre-Commercial Companies must be prominently identified through a "PC" marker at the end of their stock names?

Please give reasons for your views.

Question 54 Do you agree that the continuing obligations for Pre-Commercial Companies no longer apply once a Pre-Commercial Company has met the requirements in paragraph 270 of the Consultation Paper and ceases to be regarded as a Pre-Commercial Company*?*

Please give reasons for your views.

III. Removal of Designation as Pre-Commercial Companies

Proposals

268. We propose that the additional ongoing obligations imposed on a Pre-Commercial Company by the Listing Rules (as set out in Section D(II) above) would cease to apply once it is able to demonstrate to the Exchange that it has met the Commercialisation Revenue Threshold or at least one of the Main Board Eligibility Tests. Any lock-up period in force on the relevant persons of a Pre-Commercial Company (see Section D(I) above) as at the time of removal of designation of a Pre-Commercial Company would continue to apply unchanged.

Process

269. We propose that a Pre-Commercial Company that wishes to cease being regarded as a Pre-Commercial Company after listing must make an application to the Exchange for that purpose.

270. A Pre-Commercial Company must provide the Exchange with published audited financial statements in support of its application demonstrating that:

(a) in its most recent audited financial year it has met the Commercialisation Revenue Threshold (see Section B(II)); or

(b) as a result of its operations as a whole, it has met at least one of the Main Board Eligibility Tests (including the track record period requirements of those tests).

271. Upon notification by the Exchange confirming that an issuer will no longer be regarded as a Pre-Commercial Company, the issuer must publish an announcement.

272. At that time, the Exchange will remove the “PC” stock marker from the stock name of the company.

Question 55 Do you agree with the proposed requirements for Pre-Commercial Companies to demonstrate to the Exchange that they should no longer be regarded as a Pre-Commercial Company (see paragraphs 269 to 272 of the Consultation Paper)?

Please give reasons for your views.

DEFINITIONS

TERM	DEFINITION
"2002 Rule Amendments Consultation"	the Consultation on Proposed Amendments to the Listing Rules relating to Initial Listing and Continuing Listing Eligibility and Cancellation of Listing Procedures published by the Exchange in July 2002
"2018 Listing Reforms"	the changes to the Listing Rules that were implemented in April 2018
"Listing Reform Chapters"	Chapter 8A, Chapter 18A, and Chapter 19C of the Listing Rules
"Alternative Tests"	the Market Capitalisation / Revenue / Cash Flow Test and the Market Capitalisation / Revenue Test
"AUM"	assets under management
"AV"	autonomous vehicle
"Biotech Company"	as defined in Rule 18A.01 and which are listed or seeking to list under Chapter 18A of the Listing Rules
"Biotech Disclosure Guidance"	HKEX Guidance Letter HKEX-GL107-20 "Disclosure in listing documents for Biotech Companies"
"CAGR"	cumulative annual growth rate
"**Clawback Mechanism**"	the mechanism of reallocation of securities from the placing tranche to the public subscription tranche of an IPO based on the level of demand in the subscription tranche, as set out in PN 18
"Commercial Company"	a Specialist Technology Company that has met the Commercialisation Revenue Threshold at the time of listing
"Commercialisation Revenue Threshold"	the proposed minimum revenue threshold for a Commercial Company, being HK$250 million for the most recent audited financial year arising from the Company's Specialist Technology business segment (see Section B(II) in Chapter 3)
"Competent Authority"	as defined in Rule 18A.01
"Consultation Paper"	this Consultation Paper on a Listing Regime for Specialist Technology Companies
"Core Product"	as defined in Rule 18A.01
"De-SPAC Target"	as defined in Rule 18B.01
"De-SPAC Transaction"	as defined in Rule 18B.01

TERM	DEFINITION
"Draft Guidance Letter"	the draft guidance letter for Specialist Technology Companies as set out in Appendix V
"ED"	executive director
"EV"	electric vehicle
"Exchange" or "SEHK"	the Stock Exchange of Hong Kong Limited, a wholly owned subsidiary of HKEX
"FCA"	the Financial Conduct Authority in the UK
"FCA Discussion Paper"	the discussion paper titled "Primary Markets Effectiveness Review: Feedback to the discussion of the purpose of the listing regime and further discussion" (DP22/2) published by the FCA in May 2022
"FSDC"	the Financial Services Development Council
"GEM"	GEM operated by the Exchange
"HKEX"	Hong Kong Exchanges and Clearing Limited
"HSICS"	Hang Seng Industry Classification System
"**Independent Institutional Investor**"	Institutional Professional Investors that participate in the placing tranche of an IPO (whether as cornerstone investor or otherwise), excluding existing shareholders and any of their close associates, and core connected persons of the applicant
"Ineligible Sample Cohort"	Issuers in the Sample Cohort which would have not been able to meet the Main Board Eligibility Tests, based on their respective market capitalisation and the latest audited financial results at the time of listing
"**Institutional Professional Investors**"	persons falling under paragraphs (a) to (i) of the definition of "professional investor" in Section 1 of Part 1 of Schedule 1 to the SFO (see Table 8 on page 88) *Note: For the avoidance of doubt, corporate professional investors and individual professional investors (see Note to Table 8 on page 88) shall not be recognised as Institutional Professional Investors.*
"IPO"	an initial public offering
"IoT"	Internet of Things
"Listing Document"	a prospectus, a circular or any equivalent document (including a scheme of arrangement and introduction document) issued or proposed to be issued in connection with an application for listing
"Listing Rules" or "Rules"	the Rules Governing the Listing of Securities on the Exchange (Main Board unless otherwise stated)

TERM	DEFINITION
"LSE"	London Stock Exchange Plc.
"Main Board Eligibility Tests"	the financial eligibility requirements of the Main Board, being: (a) Rule 8.05(1) (the Profit Test); (b) Rule 8.05(2) (the Market Capitalisation / Revenue / Cash Flow Test); and (c) Rule 8.05(3) (the Market Capitalisation / Revenue Test) of the Listing Rules
"Main Board"	the main board of the SEHK
"Mainland China"	for the purpose of this paper, means the People's Republic of China, other than the regions of Hong Kong, Macau and Taiwan
"Market Capitalisation / Revenue / Cash Flow Test"	the market capitalisation / revenue / cash flow test as defined in Rule 8.05(2)
"Market Capitalisation / Revenue Test"	the market capitalisation / revenue test as defined in Rule 8.05(3)
"NASDAQ"	the NASDAQ Stock Market
"NYSE"	the New York Stock Exchange LLC
"Pathfinder SIIs"	Sophisticated Independent Investors who have invested at least 12 months before the date of the applicant's listing application, each holding such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the applicant as at the date of the listing application and throughout the pre-application 12-month period
"PN 18"	Practice Note 18 (*Initial Public Offer of Securities*) of the Listing Rules (Practice Note 6 of the GEM Rules)
"PRC"	the People's Republic of China
"Pre-Commercial Company"	a Specialist Technology Company that has not yet met the Commercialisation Revenue Threshold at the time of listing
"Profit Test"	the profit test as defined in Rule 8.05(1)
"Qualifying Exchange"	as defined in Rule 1.01
"R&D"	research and development
"Recognised Stock Exchange"	as defined in Rule 1.01

TERM	DEFINITION
"Sample Cohort"	507 Specialist Technology Issuers listed in the US and Mainland China between January 2019 and March 2022 identified by the Exchange for research and analysis (see Appendix III for the analysis and selection methodology)
"SAE"	the Society of Automotive Engineers
"SFC"	the Securities and Futures Commission
"SFO"	Securities and Futures Ordinance (Cap. 571)
"SFO PI Rules"	Securities and Futures (Professional Investor) Rules (Cap 571D)
"SGX"	the Singapore Exchange Limited
"SME"	small and medium enterprise
"**Sophisticated Independent Investor**"	third party investors referred to in paragraphs 155 to 160
"SPAC"	special purpose acquisition company as defined in Rule 1.01
"Specialist Technology"	science and/or technology applied to products and/or services within an acceptable sector of a Specialist Technology Industry
"Specialist Technology Company"	a company primarily engaged (whether directly or through its subsidiaries) in the research and development of, and the commercialisation and/or sales of, Specialist Technology Product(s) within an acceptable sector of a Specialist Technology Industry
"Specialist Technology Industries"	industries considered to be within the scope of the Specialist Technology Regime and updated from time to time. It is proposed that the initial Specialist Technology Industries will comprise: (a) next-generation information technology; (b) advanced hardware; (c) advanced materials; (d) new energy and environmental protection; and (e) new food and agriculture technologies. *Note: See second column of Table 9 on page 90 for the acceptable sectors that would fall within each of these industries, and third and fourth columns for a comparison with the STAR Industries and S&P Kensho Sector and Subsector Indices.*
"Specialist Technology Issuers"	companies (a) currently listed in the US, Mainland China and Hong Kong as of 30th April 2022; and (b) primarily engaged in one or more acceptable sectors set out in second column of Table 9 on page 90 at the time of listing (see Appendix III for the selection methodology)

TERM	DEFINITION
"Specialist Technology Product"	the product and/or service (alone or together with other products or services) that applies Specialist Technology
"Specialist Technology Regime"	the proposed regime under which a Specialist Technology Company could apply to list on the Exchange
"SSE"	Shanghai Stock Exchange
"STAR Industries"	six industries that emerged as the STAR Market's key areas as stipulated in Article 4 of the "Interim Provisions on Application and Recommendation of Enterprises for Issuance and Listing on SSE STAR Market" (Shang Zheng Fa [2021] No. 23 Document), namely: (a) next-generation information technology; (b) high-end equipment; (c) new materials; (d) new energy; (e) environmental protection; and (f) bio-pharmaceuticals
"STAR Market"	the Shanghai Stock Exchange Science and Technology Innovation Board
"STAR Market Rules"	Rules Governing the Listing of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange (Revised in 2020) (Simplified Chinese version only)
"UK"	the United Kingdom
"US"	the United States of America
"WVR"	weighted voting rights as defined in Rule 8A.02
"WVR Issuer"	an issuer with a WVR structure
"WVR structure"	a structure of an issuer that results in WVR

Table 8: Definition of "professional investor" in Section 1 of Part 1 of Schedule 1 to the SFO

Institutional Professional Investors	(a)	any recognized exchange company, recognized clearing house, recognized exchange controller or recognized investor compensation company, or any person authorized to provide automated trading services under section 95(2) of the SFO;
	(b)	any intermediary, or any other person carrying on the business of the provision of investment services and regulated under the law of any place outside Hong Kong;
	(c)	any authorized financial institution, or any bank which is not an authorized financial institution but is regulated under the law of any place outside Hong Kong;
	(d)	any insurer authorized under the Insurance Ordinance (Cap. 41), or any other person carrying on insurance business and regulated under the law of any place outside Hong Kong;
	(e)	any scheme which— (i) is a collective investment scheme authorized under section 104 of the SFO; or (ii) is similarly constituted under the law of any place outside Hong Kong and, if it is regulated under the law of such place, is permitted to be operated under the law of such place, or any person by whom any such scheme is operated;
	(f)	any registered scheme as defined in section 2(1) of the Mandatory Provident Fund Schemes Ordinance (Cap. 485), or its constituent fund as defined in section 2 of the Mandatory Provident Fund Schemes (General) Regulation (Cap. 485 sub. leg. A), or any person who, in relation to any such registered scheme, is an approved trustee or service provider as defined in section 2(1) of that Ordinance or who is an investment manager of any such registered scheme or constituent fund;
	(g)	any scheme which— (i) is a registered scheme as defined in section 2(1) of the Occupational Retirement Schemes Ordinance (Cap. 426); or (ii) is an offshore scheme as defined in section 2(1) of that Ordinance and, if it is regulated under the law of the place in which it is domiciled, is permitted to be operated under the law of such place, or any person who, in relation to any such scheme, is an administrator as defined in section 2(1) of that Ordinance;
	(h)	any government (other than a municipal government authority), any institution which performs the functions of a central bank, or any multilateral agency;

	(i) except for the purposes of Schedule 5 to the SFO, any corporation which is— (i) a wholly owned subsidiary of— (A) an intermediary, or any other person carrying on the business of the provision of investment services and regulated under the law of any place outside Hong Kong; or (B) an authorized financial institution, or any bank which is not an authorized financial institution but is regulated under the law of any place outside Hong Kong; (ii) a holding company which holds all the issued share capital of— (A) an intermediary, or any other person carrying on the business of the provision of investment services and regulated under the law of any place outside Hong Kong; or (B) an authorized financial institution, or any bank which is not an authorized financial institution but is regulated under the law of any place outside Hong Kong; or (iii) any other wholly owned subsidiary of a holding company referred to in subparagraph (ii); or
Non-Institutional Professional Investors (See Note below)	(j) any person of a class which is prescribed by rules made under section 397 of the SFO for the purposes of this paragraph as within the meaning of this definition for the purposes of the provisions of the SFO, or to the extent that it is prescribed by rules so made as within the meaning of this definition for the purposes of any provision of the SFO.

Note: The SFO PI Rules were promulgated pursuant to the SFC's rule making power under section 397 of the SFO. Under the existing SFO PI Rules, the following persons are prescribed as professional investors for the purposes of paragraph (j) of the definition of "professional investor" in section 1 of Part 1 of Schedule 1 to the SFO:

(i) ***Corporate professional investors****: trust corporations, corporations or partnerships falling under sections 4, 6 and 7 of the SFO PI Rules, which include (i) a trust corporation with total assets of not less than HK$40 million; and (ii) a corporation or partnership which have a portfolio of not less than HK$8 million or total assets of not less than HK$40 million.*

(ii) ***Individual professional investors:*** *individuals as specified in section 5 of the SFO PI Rules, which include an individual having a portfolio of not less than HK$8 million.*

For details, please refer to the SFO PI Rules.

Table 9: Comparison of the acceptable sectors falling within each Specialist Technology Industry with the most closely related STAR Industries and S&P Kensho Sector and Subsector Indices[114]

Specialist Technology Industry *Note 1*	Acceptable sectors falling within each Specialist Technology Industry	Most closely related STAR Industries *Note 2*	Most closely related S&P Kensho Sector / Subsector Indices *Note 3*
Next-generation information technology	Cloud-based services	Next-generation information technology	Robotics, Artificial Intelligence, and Cloud (RAIC)
	Artificial intelligence		
Advanced hardware	Robotics and automation		RAIC / Robotics / Intelligent Infrastructure
	Semiconductors		N/A *Note 4*
	Advanced communication technology		
	Electric and autonomous vehicles	High-end equipment / Energy conservation and environmental protection *Note 5*	Smart Transportation / Autonomous Vehicles / Electric Vehicles
	Advanced transportation technology	High-end equipment	Smart Transportation / Advanced Transport Systems
	Aerospace technology		Space
	Advanced manufacturing		Advanced Manufacturing
	Quantum computing		N/A
	Metaverse technology	N/A	Virtual Reality
Advanced materials	Synthetic biological materials	New materials	N/A
	Smart glass		
	Nanomaterials		Nanotechnology

[114] The S&P Kensho New Economy Indices measure the performance of stocks listed in the US associated with a series of technologically enabled, often disruptive industries, generally referred to in aggregate as the "Fourth Industrial Revolution". See S&P Kensho Indices Methodology.

Specialist Technology Industry *Note 1*	Acceptable sectors falling within each Specialist Technology Industry	Most closely related STAR Industries *Note 2*	Most closely related S&P Kensho Sector / Subsector Indices *Note 3*
New energy and environmental protection	New energy generation	New energy	Clean Power / Clean Energy / Cleantech
	New energy storage and transmission technology		
	New green technology	Energy conservation and environmental protection	Smart Grids / Smart Buildings
New food and agriculture technologies	New food technology	N/A	N/A
	New agriculture technology		Sustainable Farming

Notes:

1. *For the avoidance of doubt, the above mapping only serves to illustrate the relationship between the Specialist Technology Industries and acceptable sectors proposed by the Exchange and other industry classifications, and does not override the definition of "Specialist Technology" set out in this paper.*
2. *For details of each STAR Industry's classification and requirements, see Article 4 of the "Interim Provisions on Application and Recommendation of Enterprises for Issuance and Listing on the SSE STAR Market" (Shang Zheng Fa [2020] No. 21 Document).*
3. *See S&P Global's methodology document on S&P Kensho Indices.*
4. *"N/A" means the acceptable sector is not expressly covered under the corresponding industry classification system.*
5. *The STAR Market classifies "new energy vehicles" under the "energy conservation and environmental protection" industry.*

APPENDIX I: OVERVIEW OF CERTAIN ACCEPTABLE SECTORS FROM THE SPECIALIST TECHNOLOGY INDUSTRIES

1. To aid respondents' understanding of the types of companies targeted by the Specialist Technology Regime, this appendix describes the nature of certain acceptable sectors within the Specialist Technology Industries (see paragraph 50 in Chapter 1) and how companies in these sectors may commercialise their products and services.

2. With reference to the acceptable sectors as set out in Box 1 (see page 30 in Chapter 3) of this paper, we have selected the following acceptable sectors from each Specialist Technology Industry for illustration purposes:

Acceptable sector for illustration purposes	Corresponding Specialist Technology Industry
Cloud-based services	Next-generation information technology
Electric and autonomous vehicles	Advanced hardware
Semiconductors	
Synthetic biological materials	Advanced materials
New energy	New energy and environmental protection
New food and agriculture technologies	New food and agriculture technologies

Cloud-based Services

Industry overview

3. Cloud computing is the access and use of servers, networks, storage capacity, development tools and applications via the internet.[1] The public "cloud" enables end users to access data and application programmes almost anytime and anywhere without having to be in physical proximity to computer hardware. In this way, it can be differentiated from an on-premises model that requires a user to install a computer programme on their own hardware and access data files on physical storage devices in their physical possession.

4. Although cloud technology has been in use since the 2000s, software companies have more recently started offering software through the cloud and business models built on subscriptions rather than outright purchase of software.[2] Without the need to provide on-premises hardware, cloud computing companies have been able to provide their services by way of an "as-a-service" model, on a scale and complexity that is much larger than on-premises providers.[3]

Business model types

5. Cloud technology has enabled "as-a-service" business models, including the ones set out in Table 10 below.

Table 10: Examples of "as-a-service" business models enabled by cloud technology[4]

Business model	Description	Examples
Software as a service (SaaS)	delivery of pre-built software applications on cloud infrastructure	Dropbox, Salesforce, Cisco WebEx
Platform as a service (PaaS)	delivery of a platform for the creation of software, which is then delivered over cloud infrastructure	Windows Azure, Heroku, Google App Engine
Infrastructure as a service (IaaS)	delivery of servers, storage and networks as an on-demand cloud-based service	Amazon Web Services, Google Computer Engine

[1] National Institute of Standards and Technology of the US Department of Commerce, "The NIST Definition of Cloud Computing" (Special Publication 800-145), September 2011.

[2] MSCI, Disruptive Technology: Innovation meets society and business.

[3] Deloitte, Cloud and the age of continuous disruption, June 2021.

[4] National Institute of Standards and Technology of the US Department of Commerce, "The NIST Definition of Cloud Computing" (Special Publication 800-145), September 2011.

Commercialisation

Obstacles to commercialisation

6. The cloud computing market is highly competitive, with a few US companies dominating the global market.[5] In order to achieve long-term success, a company needs to be able to scale up its service offering quickly and sustain high revenue growth in its early years of operation.[6]

7. However, unlike an on-premises installation model, a cloud-based service model generates recurring revenue from subscriptions rather than one-off upfront revenue. Consequently, the revenue and profitability potentials of cloud computing companies may be challenged by deferred revenue, which will only be recognised when services are rendered rather than when they are booked and billed at the start of a subscription.[7]

8. Other key obstacles for a cloud-based software company to achieve meaningful commercialisation could include the following factors:[8]

   (a) Costly expansion: the costs of scaling a software business may rise exponentially with the number of customers. These costs include: back-end software which is price-dependent on the needs of customers; servers and the infrastructure required to facilitate software; and analytics tools that base prices on the volume of traffic;

   (b) Challenging customisation: as new customers come on board, so are new market needs and requirements and it becomes increasingly challenging to customise the software for each end user; and

   (c) Need for recruitment: in order to bring in new customers and serve emerging market needs, a software enterprise has to recruit new sales and marketing staff and R&D personnel, the costs of which may counterbalance the revenue generated from the new customers.

Pathway to commercialisation

9. Successful cloud-based service providers generally exhibit the following attributes:

   (a) high revenue growth, particularly in the early years, partly due to the compounding impact of customer renewals and add-on sales; and

   (b) predictable revenue streams (such as annual recurring subscription revenue).[9]

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[5] Forrester, Competition In The Global Cloud Market Intensifies, And Europe Is Very Much In Focus, 20th July 2022.

[6] McKinsey, Grow fast or die slow, 1st April 2014.

[7] KPMG, Transforming your SaaS business, July 2016.

[8] Precursive, The Pitfalls to Avoid in Fast-scaling SaaS, 27th May 2022.

[9] KPMG, Transforming your SaaS business, July 2016.

10. A majority of cloud-based service providers have already developed their offerings for sale in the market by the time they are listed. Of the 300 issuers in the Sample Cohort that operate in the cloud-based services sector, at their respective time of listing, 234 (78%) were Commercial Companies that had commercialised their services and had achieved the Commercialisation Revenue Threshold, while the remaining 66 (22%) were Pre-Commercial Companies in the pre-commercialisation or early commercialisation phase.

Competent authority

11. To date, our research has not identified any global or regional authority that governs the construction of a cloud infrastructure or the development of applications within the cloud. This is partly due to the borderless nature of cloud computing in the free and open internet. However, the global distribution of data may fuel privacy and data security legislation and regulation as the market size and customer demand grow.[10]

[10] Perkins Coie LLP, Chapter 2 "Cloud Computing" of the 2022 Emerging Technology Trends report, January 2022.

Electric and Autonomous Vehicles

Industry overview

Electric vehicles

12. There are two types of electric vehicles (EVs), namely:

    (a) all-electric vehicles, or battery electric vehicles (BEVs) that operate in all-electric mode using a battery that can be charged by plugging the vehicle into charging equipment; and

    (b) plug-in hybrid electric vehicles (PHEVs) that can operate either in all-electric mode or powered by an internal combustion engine.[1]

13. Automobile manufacturers in the EV value chain can be divided into the following three categories according to their business models:

    (a) traditional manufacturers (e.g., BMW, GM, Ford, Toyota, etc.) expanding their businesses to include EV business segments;

    (b) EV-only manufacturers (e.g., Tesla, NIO, BYD, etc.); and

    (c) specialist EV manufacturers (e.g., Rivian Automotive, which develops fully electric sport utility and off-road vehicles).[2]

Autonomous vehicles

14. Autonomous driving is defined as "*the capability of a car to drive partly or fully by itself, with limited or no human intervention*".[3] Recent technological breakthroughs in driving systems and components such as computer vision, radio detection and ranging (radar), light detection and ranging (lidar) and global positioning systems (GPS) have brought autonomous driving closer to mainstream commercial use.

15. Founded in 2014, the Society of Automotive Engineers (SAE) established levels ranging from L0 (no automation) to L5 (full automation) to describe the capabilities of automotive automation (see Table 11).[4]

[1] Alternative Fuels Data Center of the US Department of Energy, Electric Vehicles, accessed on 27th June 2022.

[2] FTI Consulting, The EV Drive to Profitability: Unearthing Value in an Overcharged Market, June 2021.

[3] SAE, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (J3016_202104), 30th April 2021.

[4] SAE, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (J3016_202104), 30th April 2021.

Table 11: Six levels of automotive automation defined by the SAE

Category	Level	Execution of steering and acceleration/ deceleration	Monitoring of driving environment	Fallback performance of dynamic driving task	System capability (driving modes)
Advanced driver-assistance systems (human monitors environment)	**L0 (no automation)**	Human driver	Human driver	Human driver	N/A
	L1 (driver assistance)	Human driver and system	Human driver	Human driver	Some driving modes
	L2 (partial automation)	System	Human driver	Human driver	Some driving modes
Autonomous driving (car monitors environment)	**L3 (conditional automation)**	System	System	Human driver	Some driving modes
	L4 (high automation)	System	System	System	Some driving modes
	L5 (full automation)	System	System	System	All driving modes

Source: SAE (as of 30th April 2021)

State of development

Electric vehicles

16. Transition to the widespread adoption of EVs is likely to disrupt the automotive industry in the following ways:

    (a) the core of a vehicle's architecture may shift from traditional internal combustion engine components to e-drive modules and systems;

    (b) cable harness and braking systems will be replaced by other technologies like active suspension;

    (c) much of the automotive R&D will focus on battery and charging solutions, such as smart and flexible charging, smart energy management, and battery usage optimisation and recycling.[5]

[5] EY, How auto suppliers can navigate EV technology disruption in four steps, 14th December 2021.

Autonomous vehicles

17. Many vehicles today are already equipped with some level of automated operation (mostly in the "human monitors environment" category in Table 11, i.e. SAE L0 to L2) in circumstances such as motorway driving, car parking, or stop-and-go congestion traffic. These automation technologies require the human driver to resume active control when prompted to do so. Autonomous driving in the "car monitors environment" category in Table 11 (i.e. SAE L3 or beyond) enables a vehicle to handle a much greater range of driving scenarios.[6]

Commercialisation

Obstacles to commercialisation

18. The main challenges to the successful commercialisation of EV and AV business models are the huge investments required for capital expenditures and R&D, and the relatively long payback period (for a specialist start-up EV manufacturer, for example, it may take five to seven years[7] to break-even since the launch of the first commercial product).[8]

19. Meanwhile, owing to the complexity of automobile technologies, EV and AV development hinges on factors including a stable supply of raw materials, successful R&D, and the availability of core technologies[9] such as fast charging batteries and machine learning algorithms.[10] Immaturity in these innovations may hinder the commercialisation of EVs and AVs.[11]

20. In addition to financial and technological barriers, the development of autonomous driving technology is subject to potential regulatory hurdles, as set out in paragraphs 24 to 26 below. Commercial autonomous vehicles and robotaxi services with the SAE L3 features or beyond have yet to be commercialised on a large scale.[12]

[6] Future applications of autonomous driving include urban mobility, automated private vehicles, and truck automation. See Automated and Autonomous Driving: Regulation under Uncertainty published by the International Transport Forum on 30th April 2015.

[7] FTI Consulting, The EV Drive to Profitability: Unearthing Value in an Overcharged Market, page 2, June 2021.

[8] Bain & Company, Focusing R&D and Capex to Win, 15th September 2020.

[9] PwC, Digital automotive R&D, February 2021.

[10] AZO Materials, Harnessing Machine Learning to Accelerate Fast-Charging Battery Design, 24th March 2021.

[11] For example, EVs require high energy density battery technology to cover longer range, which has not been able to achieve with current technologies. See Sharma, S., Panwar, A. K., Tripathi, M. M., Storage technologies for electric vehicles, June 2020.

[12] BCG, Heading to a Future with Driverless Freight Transportation, August 2021.

Pathway to commercialisation

21. Of the 39 Sample Cohort issuers within the EV and AV sectors, at their respective time of listing:

    (a) 14 (36%) were Commercial Companies that had commercialised their products and had achieved the Commercialisation Revenue Threshold. These Commercial Companies are mostly EV infrastructure enablers (e.g. charging infrastructure) or traditional manufacturers that also operate an EV business segment; and

    (b) 16 (41%) were Pre-Commercial Companies in the early commercialisation phase, and nine (23%) were in the pre-commercialisation phase (i.e. they were pre-revenue companies). These Pre-Commercial Companies are mainly EV-only manufacturers or specialist start-up manufacturers of EVs and AVs.

22. Whilst EV sales made up only 8.6% of the global automobile market in 2021[13], the EV industry is believed to be able to benefit from the following trends:

    (a) Investments in charging infrastructure: a ramp-up of investments in charging infrastructure has made charging stations more widespread and publicly accessible to support a growing EV market;[14]

    (b) Increasing customer demand: global EV sales have experienced substantial growth in recent years, with sales in 2021 more than double the amount in 2020;[15]

    (c) Supportive government policies: governments have introduced incentives to accelerate the shift to sustainable mobility;[16] and

    (d) Breakthroughs in emerging technologies: new technologies such as quantum computing will fuel the growth of the EV market.[17]

[13] Electrek, Global market share of electric cars more than doubled in 2021 as the EV revolution gains steam, 2nd February 2022.

[14] Research shows that fast-charging installations have doubled from 2018 to 2021. See IDTechEx, EV Charging Investments, Interoperability, and Innovations, 24th February 2022.

[15] Source: International Energy Agency (as of January 2022).

[16] For example, the European Union seeks to align climate, energy, land use, transport, and taxation policies to reduce net greenhouse gas emissions by at least 55% by 2030, and the US introduced a 50% EV target for 2030. See McKinsey's article titled "Why the automotive future is electric" on 7th September 2021.

[17] For example, quantum computing technologies emerged in 2022 and may accelerate EV charging speed by 200 times. See PV Magazine's article titled "The mobility rEVolution: Quantum physics-based tech to cut EV charging time to nine seconds" on 25th March 2022.

Competent authority

Electric vehicles

23. Our research has not found any authority, at the global, national or local level, that provides regulatory approvals for the manufacturing and sales of EVs.

Autonomous vehicles

24. As the autonomous driving industry develops, there has been increasing regulatory oversight on the safety of AVs globally, with a focus on their testing and operations.

25. In the US, both the federal government and states have issued autonomous driving related regulations. California currently has the most comprehensive regulatory oversight among all the US states, as it permits autonomous driving tests and self-driving vehicle deployment.[18]

26. In Mainland China, government authorities are introducing policies to require autonomous driving companies to pass certain tests and expert reviews to obtain permits for autonomous driving testing on public roads, and to deploy robotaxi services for the general public. As of January 2022, 27 provinces and cities in China have issued regulations on autonomous driving.[19]

[18] Reuters, Autonomous Vehicle Regulation across the US, 16th June 2022.

[19] Source: Global Times, 18th January 2022.

Semiconductors

Industry overview

27. Semiconductors are materials (usually comprised of silicon) whose electrical properties allow them to be integrated into electric components like integrated circuits (ICs) and used for numerous technological applications such as amplification, switching and energy conversion. They fuel cutting-edge technological advances in next-generation communications (such as 5G), IoT and quantum computing.[20]

28. The semiconductor production process consists of three phases:

    (a) Design: specification, logic design, physical design, and validation and verification;

    (b) Fabrication: front-end manufacturing process that turns designs into chips; and

    (c) Assembly, testing, and packaging (ATP): back-end process that integrates chips into other circuit components. [21]

29. Production of semiconductors also relies on a supply chain of the following:

    (a) Semiconductor manufacturing equipment: examples include lithography tools (used for drawing circuit patterns in material layers), process control tools, and testing tools;

    (b) Materials: raw materials (such as silicon and other compound materials), fabrication materials (such as "wafers" formed into chips), and packaging materials;

    (c) Electronic design automation (EDA): design software that simulates chip behaviour, designs complex circuits, and validates whether chip designs can meet manufacturing requirements; and

    (d) Core intellectual property (IP): IP related to chip designs that allow semiconductor blocks to be reused and redesigned.[22]

[20] Accenture, Harnessing the power of the semiconductor value chain, 1st February 2022.

[21] Centre for Security and Emerging Technology, The Semiconductor Supply Chain: Assessing National Competitiveness, January 2021.

[22] Centre for Security and Emerging Technology, The Semiconductor Supply Chain: Assessing National Competitiveness, January 2021.

State of development

30. New technologies have driven innovations in the chip making industry in the following ways:[23]

(a) Smaller chip structures: leading semiconductor companies have constantly decreased the size of chip nodes for use in next-generation technologies such as 5G infrastructure and quantum computing;

(b) Compound semiconductors: some semiconductor companies have developed semiconductors based on non-silicon materials (e.g. silicon carbide (SiC) and gallium nitride (GaN)) for applications requiring high power and frequency; and

(c) Specialised applications: some semiconductor companies have developed application-specific integrated chips, which are specialised for artificial intelligence and cloud computing applications.

Commercialisation

Obstacles to commercialisation

31. The semiconductor business has long development and production cycles because its design and fabrication processes are usually complex. It can take a semiconductor company ten years or more to complete R&D, and the time can be even longer for developing smaller chip nodes or application-specific integrated chips.[24] The fabrication process can also be long (which can be six months or longer) as it involves thousands of process steps where highly specialised inputs and equipment are required.[25]

32. The long development cycle means that a semiconductor company needs a sustainable inflow of capital (typically for several years or even longer) in order to fund its pathway to commercialisation. However, investors may be sceptical of providing funding over an extended period and may find the payback period too long (particularly for companies engaged in leading-edge chip innovations). Accordingly, companies in their pre-commercialisation phase require investors with an appetite for long-term investment without seeing immediate returns.[26]

[23] McKinsey, Strategies to lead in the semiconductor world, 15th April 2022.

[24] McKinsey, Strategies to lead in the semiconductor world, 15th April 2022.

[25] Semiconductor Industry Association, Chipmakers Are Ramping Up Production to Address Semiconductor Shortage. Here's Why that Takes Time, 26th February 2021.

[26] McKinsey, Strategies to lead in the semiconductor world, 15th April 2022.

33. Less mature semiconductor companies are burdened by high R&D and fabrication costs.[27] In particular, chip fabrication is highly capital-intensive, especially for small-node chips.[28] This has caused a drop in the number of companies producing leading-edge chips from a historical peak of roughly 20 to just three (TSMC, Samsung and Intel) today, limiting the possibility for new manufacturers to enter the fabrication market.[29]

34. The development of intellectual property is central to creating values for a semiconductor company. This requires intensive R&D and hence a robust local talent pool[30] and large capital investments[31]. Companies may fail if they cannot attract sufficient high quality research talents or develop marketable chip technologies with their limited capital.

Pathway to commercialisation

35. Despite the obstacles highlighted above, new markets driven by end applications such as EVs and IoT devices have created opportunities for the semiconductor business,[32] where companies across all product segments and value chain processes strive to develop faster and more powerful chips that would help generate greater revenue.[33] Spurred by increased demand for semiconductors, rapid technological development and increased cloud usage, profitability has also improved significantly in the semiconductor industry.[34]

36. As explained in paragraphs 33 and 34, success in commercialisation lies in a semiconductor company's ability to raise sufficient funds for long-term R&D investments and talent recruitment.[35] Those that have focused on specialised applications may also find their products in high demand if they invest in developing leading-edge chips for areas with burgeoning growth (including AVs, IoT, artificial intelligence and quantum computing[36]).

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[27] European Parliament, Strengthening EU chip capabilities, page 5, July 2022.

[28] For example, Samsung plans to spend US$151 billion (HK$1.2 trillion) through 2030 to delve deeper into advanced chip making. See Bloomberg's news article titled "Samsung to Spend $360 Billion on Chips, Biotech Over 5 Years" on 24th May 2022.

[29] Accenture, Harnessing the power of the semiconductor value chain, 1st February 2022.

[30] Running a foundry producing the most advanced chips could require as many as 2,000 semiconductor engineers. See European Parliament, Strengthening EU chip capabilities, page 5, July 2022.

[31] Semiconductor companies invest 20% of sales on average into R&D. See Accenture, Driving semiconductor growth through as-a-service models, page 6, 22nd February 2022.

[32] KPMG, Global Semiconductor Industry Outlook 2022, page 2, April 2022.

[33] McKinsey, Strategies to lead in the semiconductor world, 15th April 2022.

[34] World Economic Forum, When the chips are down: How the semiconductor industry is dealing with a worldwide shortage, 9th February 2022.

[35] McKinsey, Strategies to lead in the semiconductor world, 15th April 2022.

[36] For example, the creation of specialised chips for quantum computing could improve pharmaceutical development, sustainability programs, and other initiatives across industries.

37. Semiconductor companies which focus on relatively mature chips may also reap the benefit from the industry's high growth potential by expanding their production capacity to meet the increased demand for semiconductors in recent years. In doing so, these companies would need to fund their fabrication facilities and equipment with sufficient capital.

38. Of the 12 issuers in the Sample Cohort that operate in the semiconductor industry, those that had commercialised their products and had achieved the Commercialisation Revenue Threshold at the time of listing were primarily engaged in designing and selling chips[37] for specialist use in IoT, automobiles, and 5G communication networks, whereas those that were still in the pre-commercialisation or early commercialisation phase at the time of listing had focused on more research-intensive business segments such as semiconductor materials and EDA software development.

Competent authority

39. Our research has not found any authority at the global, national or local level that provides regulatory approvals for the design, manufacturing, and sales of semiconductor products.

[37] These companies are mostly "fabless" chip makers who design and sell chips but do not manufacture the silicon wafers or chips used in their products. Instead, they outsource the fabrication to manufacturing plants or foundries.

Synthetic Biological Materials

Industry overview

40. Synthetic biology, which can be defined as "*the design and construction of novel artificial biological pathways, organisms and devices or the redesign of existing natural biological systems*",[38] has emerged to integrate with material science to redesign living systems as dynamic and responsive materials with emerging and programmable functionalities.[39]

41. It is anticipated that synthetic biology will transform materials science by:[40]

    (a) giving access to a rapid expansion of materials diversity (e.g. using genetic synthesis, editing and assembly methods to create new proteins and biopolymers quickly [41]);

    (b) creating new biological materials with unique features (e.g. production of biological layers for hard and soft hybrid materials); and

    (c) lessening environmental impact in the manufacturing of materials (e.g. saving the greenhouse gas emissions required for mining, transporting and preparing building materials[42]).

State of development

42. Synthetic biological materials are genetically encoded and generated by harnessing synthetic biology platforms. Examples include biopolymers, fibres, optical materials, adhesives, and other materials for specialist applications (e.g. responsive structures and behavioural materials for robotics or actuators engineered as artificial muscle).[43]

43. Synthetic biological materials are likely to be more widely used across society, with potential applications (such as alternative glues) in architectural materials. Living cells may also be designed to work together or be integrated into non-living materials or electronics.[44]

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[38] Royal Academy of Engineering, Synthetic Biology.

[39] Tang, T., An, B., Huang, Y. et al., Materials design by synthetic biology, 23rd December 2020.

[40] Le Feuvre, R. A., Scrutton, N. S., A living foundry for Synthetic Biological Materials: A synthetic biology roadmap to new advanced materials, 17th April 2018.

[41] Roberts, A. D., Finnigan, W., Wolde-Michael, E. et. al., Synthetic biology for fibres, adhesives and active camouflage materials in protection and aerospace, 24th April 2019.

[42] Columbia Climate School, How Synthetic Biology Can Help the Environment, 14th August 2019.

[43] Le Feuvre, R. A., Scrutton, N. S., A living foundry for Synthetic Biological Materials: A synthetic biology roadmap to new advanced materials, 17th April 2018.

[44] For example, architectural materials could be embedded with living engineered cells that provide responsive functions, such as self-healing or to clear air pollution. See Voigt C. A.'s article titled "Synthetic biology 2020–2030: six commercially-available products that are changing our world" published on 11th December 2020.

Commercialisation

Obstacles to commercialisation

44. Significant opportunities have been seen in the development of synthetic biological materials as evidenced by the proliferation of synthetic biology companies over the past decade.[45] However, synthetic biology is still relatively new,[46] and development periods and approval cycles can be long (including the time required for the discipline to evolve from laboratory-based discovery to a commercial technology that can be applied at an industrial scale).[47]

45. Because of its long journey to commercialisation, the synthetic biological materials R&D sector has conventionally remained capital intensive.[48] In particular, engineering new materials requires dedicated research effort and advanced manufacturing and process technologies. Substantial investments are required in research expertise as well as in plants and equipment.[49] Production can also be costly if a company does not have abundant supplies of feedstock sources near its production facility.[50]

46. Much of the research effort in synthetic biology has focused on enabling new technologies and products rather than standardising and scaling up production, which is crucial to the successful commercialisation of new materials.[51] Even if a technology works in the development phase, commercialisation may fail if the technology cannot be scaled.[52]

[45] Meng, F., Ellis, T., The second decade of synthetic biology: 2010–2020, 14th October 2020.

[46] World Economic Forum, Realizing the potential of synthetic biology to help people and the planet, 5th April 2021.

[47] BCG, Synthetic Biology Is About to Disrupt Your Industry, 10th February 2022.

[48] Genetic Engineering & Biotechnology News, Overview of the Synthetic Biology Market, 1st November 2021.

[49] Deloitte, Reigniting growth: Advanced Materials System, 12th March 2012.

[50] BCG, Synthetic Biology Is About to Disrupt Your Industry, 10th February 2022.

[51] El Karoui M, Hoyos-Flight M and Fletcher L, Future Trends in Synthetic Biology — A Report, 7th August 2019.

[52] More than 90% of synthetic biology technologies fail because they cannot be scaled, even though they could be promising at the lab stage. See BCG, Synthetic Biology Is About to Disrupt Your Industry, 10th February 2022.

Pathway to commercialisation

47. In recent years, demand for greater sustainability (e.g. energy security, feedstock availability and carbon-emission limits) has created new markets for synthetic biological materials that possess new and extended functional properties and have a minimal adverse environmental impact. [53] Examples include bio-rubber tyres[54] and bio-based cosmetic materials[55].

48. For the successful commercialisation of synthetic biological materials, an increase in market acceptance will also be critical. This would depend on favourable government regulations and a supporting ecosystem (such as the availability of scientific talent, academic partners, and supply chains).[56]

49. Meanwhile, other factors have favoured the potential up-scaling of synthetic biological materials:

    (a) growing initiatives in synthetic biology;[57]

    (b) declining costs of DNA sequencing and synthesis;[58] and

    (c) the development of artificial intelligence and modelling tools.[59]

Competent authority

50. Our research has not found any authority at the global, national or local level that prescribes any permitting or legal requirement on the safety of the advanced materials industry.

[53] In 2018, the University of Manchester published a roadmap setting out potential pathways for rolling out synthetic biological materials. See Le Feuvre, R. A., Scrutton, N. S., A living foundry for Synthetic Biological Materials: A synthetic biology roadmap to new advanced materials, 17th April 2018.

[54] A synthetic biology company has partnered with a producer in the polymers and elastomers industry to produce a bio-rubber with potential applications in the tyre industry. See the news release of Versalis and Genomatic titled "Versalis and Genomatica Produce Bio-Rubber With Bio-Butadiene From Sugars" on 16th February 2016.

[55] Synthetic biology companies have produced ingredients found in personal care products using biosynthesis process, resulting in more sustainable and bio-based. See Forbes, Synthetic Biology Is Disrupting Personal Care, Making It More Sustainable — And More Personal, 10th September 2019.

[56] BCG, Synthetic Biology Is About to Disrupt Your Industry, 10th February 2022.

[57] Genetic Engineering & Biotechnology News, Overview of the Synthetic Biology Market, 1st November 2021.

[58] Genetic Engineering & Biotechnology News, Overview of the Synthetic Biology Market, 1st November 2021.

[59] For example, artificial intelligence can produce accurate predictions in bioengineering outcomes, enabling effective design and generation of new materials. See Eslami, M., Adler, A., Caceres, R. S. et. al., Artificial Intelligence for Synthetic Biology, 25th April 2022.

New Energy

Industry overview

51. "New energy" can be defined as the production of energy from natural sources or processes that are constantly replenished, where the use of such energy generates no or low greenhouse gas emissions. Examples of new energy sources include wind, solar, bioenergy, hydropower, and hydrogen.[60]

52. The new energy value chain is composed of three main stages:

    (a) Upstream process: the collection, storage, and pre-processing of new energy sources (see examples in Table 12);

    (b) Production process: the transformation of new energy sources into different forms of energy (e.g., electricity, fuel, and heat) (see examples of production activities and forms of energy product in Table 12, and the use of hydrogen as a form of energy in paragraph 55 below);

    (c) Downstream process: the transmission and distribution of the relevant forms of energy for end usage (e.g. industry, domestic, and transportation) (see paragraph 56 below).[61]

53. The stability of energy generation, transmission and distribution relies on robust energy storage systems (see paragraph 57 below).

Energy production

54. We set out in Table 12 below examples of new energy sources and the respective elements along the value chain.

Table 12: Examples of new energy sources

Energy source	Upstream process	Production process	Downstream process (i.e. forms of energy product for distribution)
Solar	Sunlight	Photovoltaic technology	Electricity
	Thermal energy from the sun	Concentrating solar-thermal power technology	Heat and electricity

[60] Natural Resources Defense Council, Renewable Energy: The Clean Facts, 1st June 2022.

[61] Faissal, J., Allouhi, A., Buker, M. S., Saadani, R., A., J., Renewable Power Generation: A Supply Chain Perspective, January 2021.

Energy source	Upstream process	Production process	Downstream process (i.e. forms of energy product for distribution)
Wind	Collection of wind's kinetic energy	Implementation of land-based, offshore, or distributed wind turbines	Electricity
Bioenergy	Biological materials (e.g., residues from agriculture and forestry, municipal solid waste, sewage, and energy crops)	Fermentation, deconstruction and upgrading	Biofuels (e.g. ethanol and biodiesel) for transportation
		Direct combustion, bacterial decomposition, and conversion to gas/liquid fuel	Heat and electricity
		Bio-refinery	Bio-based chemicals and materials (e.g. fertilisers)
Hydropower	Natural flow of moving water	Implementation of a dam or diversion structure	Electricity

Source: Office of Energy Efficiency and Renewable Energy of the US Department of Energy

55. Beyond the new energy sources set out in Table 12, interest in using hydrogen as a clean energy source has surged in recent years. For example, "green" hydrogen, which is obtained through the use of renewable electricity and water electrolysis, can be further processed and used in fuel cells or as an alternative source of heat.[62]

Energy transmission and distribution

56. On the downstream, energy is transmitted from the electricity generating site to distribution networks through power grids (i.e. networks of transmission lines) and transformers.[63] As the new energy industry develops, demands for transmission and distribution networks have increased. This has led to improvement in modern power grid infrastructure with an expanded transmission capacity and increased adaptability with renewable energy.[64]

[62] Source: Farias, C.B.B., Barreiros, R.C.S., da Silva, M.F., Casazza, A.A., Converti, & A., Sarubbo, L.A., Use of Hydrogen as Fuel: A Trend of the 21st Century, January 2022.

[63] US Energy Information Administration, Electricity explained: How electricity is delivered to consumers, 3rd November 2021.

[64] REN21, Renewables 2022 Global Status Report, 15th June 2022.

Energy storage

57. Energy storage technologies are deployed in both upstream and downstream processes of the new energy value chain:

(a) Upstream applications: to deliver energy only when the grid requires it, so that electricity will be continuously available;[65] and

(b) Downstream applications: to store electricity in rechargeable batteries and large batteries (which may use lithium ion, lead acid or other battery technologies).[66]

State of development

Energy production

58. Investment in renewable power and fuels has seen substantial growth in recent years, as organisations internationally work towards global net zero emissions. Solar and wind power now provide more than 10% of the world's electricity. New infrastructure and technologies are being deployed to improve production processes. For example, conventional solar and wind energy farms have struggled to find adequate land for installations. The next-generation solar and wind energy technologies address this through floating solar photovoltaics and floating offshore turbines.[67]

Energy transmission and distribution

59. Increasing investments and research efforts have focused on energy transmission and distribution technologies, such as:

(a) Decentralised energy systems: for example, solar photovoltaic and storage are implemented at residential and commercial buildings rather than at a photovoltaic power plant; and

(b) Smart grids: digitalised technology that can manage variations in energy sourcing and energy consumption by using cloud computing technology.[68]

[65] For example, pumped storage hydropower allows water to flow between reservoirs at different elevations so that power can be recharged and discharged; and compressed air energy storage allows wind power to be stored in compressed air and to be released through an expansion turbine generator. See the US Environmental Protection Agency's website on "Electricity Storage".

[66] US Environmental Protection Agency, Electricity Storage, 22nd November 2021.

[67] REN21, Renewables 2022 Global Status Report, 15th June 2022.

[68] Bhatti, H. J., Danilovic, M., Business Model Innovation Approach for Commercializing Smart Grid Systems, September 2018.

Energy storage

60. Innovations in energy storage have emerged to support increasing renewable energy integration on the supply side, while energy storage costs are declining owing to the growing demand for consumer electronics and electric vehicles.[69] Set out below are examples of recent developments in energy storage:

(a) Distributed energy storage: many small energy storage systems are deployed in distribution grids to prevent power fluctuation and power quality problems;[70]

(b) Long-duration energy storage: massive battery storage of ten hours or longer can support wind and solar power generation at lower system costs;[71] and

(c) Shift from lithium-ion batteries: due to performance limitations of conventional lithium-ion technologies and challenges in obtaining raw materials, manufacturers are considering alternative materials in batteries.[72]

Commercialisation

Obstacles to commercialisation

61. A new energy project typically requires high upfront capital input and long construction and development timeframes. For example, it may take up to ten years from project initiation to launch an offshore wind farm, and it is about two to three times more expensive than that required for an onshore wind project.[73]

62. Since non-renewable energy still makes up the majority of the global energy mix, the cost of replacing fossil fuels by renewable energy sources remains high.[74] The higher capital investments needed for building a renewable energy plant (compared to a fossil fuel plant) have also deterred the deployment of smart grids whose infrastructure relies on robust energy generation.[75]

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[69] Kebede, A. A., Kalogiannis, T., Mierlo, J. V., Berecibar, M., A comprehensive review of stationary energy storage devices for large scale renewable energy sources grid integration, 10th February 2022.

[70] Aktaş, A., Chapter 10 of "Advanced in Clean Energy Technologies", 25th September 2020.

[71] Dowling, J. A., Rinaldi, K. Z., Ruggles, T. H., Davis, S. J., Yuan, M., Tong, F., Lewis, N. S., Caldeira, K., Role of Long-Duration Energy Storage in Variable Renewable Electricity Systems, 16th September 2020.

[72] CIC energiGUNE, Beyond lithium: other potential technologies that battery manufacturers are betting on, 26th October 2021.

[73] Deloitte, Establishing the investment case – Wind power, pages 6 to 7, April 2014.

[74] Bhatti, H. J., Danilovic, M., Business Model Innovation Approach for Commercializing Smart Grid Systems, September 2018.

[75] Rangelov, Y., Nikolaev, N., Stanev, R., A low-cost smart grid - Is it possible?, September 2019.

63. A lack of investments has also hindered the development of some energy storage solutions.[76] On the other hand, the more mature EV-battery market has benefited from a wealth of investments seeking immediate growth opportunities.[77]

Pathway to commercialisation

64. Growing concerns for energy security issues and a global climate crisis have called for a transition into emissions-free new energy.[78] Meanwhile, technological innovations and policy initiatives have continued to bring down renewable energy costs.[79] These favourable factors will likely create markets for new energy technologies and fuel the industry's long-term growth.

65. Companies in the relatively mature solar and wind energy sectors have already commercialised their technologies over the past two decades. Their success could be attributed to continuous cost reductions and the emergence of new downstream markets.[80] Likewise, the bio-energy business has benefited from the increasing use of biofuel in aircraft.[81] Increasing investments in such compelling business cases are likely to fuel the new energy industry's growth and profitability.

66. New energy companies may also commercialise their technologies through innovative business models. Take smart grid technology as an example:

    (a) Renewable energy integration: companies providing solar panel and wind turbine transportation and installation services may also generate revenue through leasing smart grid utilities; and

    (b) Residential power generation: "demand response" service providers may generate revenue by controlling electricity loads to regulate grid systems for residential consumers.[82]

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[76] European Commission, Support to R&D Strategy and accompanying measures for battery based energy storage, page 43, 16th April 2018.

[77] EV companies are expanding their production capacity to scale up EV-battery production, and other businesses in the downstream (e.g. battery-recycling companies) are also planning an expansion. See Tony Blair Institute for Global Change, Go Big or Go Home: The UK's Chance to Win at Energy-Storage Innovation, 25th August 2022.

[78] International Renewable Energy Agency, Energy Transition Holds Key to Tackle Global Energy and Climate Crisis, 29th March 2022.

[79] World Economic Forum, Renewable energy is cheaper than previously thought, says a new report - and could be a gamechanger in the climate change battle, 18th October 2021.

[80] Costs for renewables continued to fall in 2021 as supply chain challenges and rising commodity prices have yet to show their full impact on project costs. The costs of electricity from onshore wind fell by 15%, offshore wind by 13% and solar photovoltaic by 13% compared to 2020. See International Renewable Energy Agency, Renewable Power Generation Costs in 2021, page 15, July 2022.

[81] International Energy Agency, Are aviation biofuels ready for take off?, 18th March 2019.

[82] Bhatti, H. J., Danilovic, M., Business Model Innovation Approach for Commercializing Smart Grid Systems, September 2018.

67. On the energy transition agenda, battery storage plays a pivotal role in ensuring the efficiency and resilience of grid systems. Whilst investments and commercial research are currently concentrated in areas such as integrating intermittent wind and solar output (see paragraph 60(b)) and improving lithium-ion batteries in EVs (see paragraph 63), the broader support for renewable energy and emissions reduction will help enable wider implementation of storage solutions in other parts of the energy value chain, regardless of the generation sources and the end use cases.[83] We have also seen a considerable portion of energy storage technology developers in the Sample Cohort having achieved meaningful commercialisation at the time of listing.[84]

Competent authority

68. Our research has not found any authority at the global, national or local level that prescribes any permitting or legal requirement on the safety of the new energy industry.

[83] Deloitte, Challenges and opportunities of battery storage, November 2020.

[84] Of the 19 issuers in the Sample Cohort with a business segment in energy storage technology, seven (37%) had achieved the Commercialisation Revenue Threshold at the time of listing.

New Food and Agriculture Technologies

Industry overview

69. The food and agriculture industry (abbreviated as the agri-food industry) comprises agriculture, farming and food processing activities. Technological shifts in food and agriculture aim to deliver an efficient and productive system while limiting the adverse impact on the environment.[85]

70. Table 13 sets out the key stages along the agri-food value chain and examples of new technologies applicable to each of these processes.

Table 13: Examples of new food and agriculture technologies along the value chain

Value chain processes	Description	Examples of new food and agriculture technologies
Agricultural inputs	*Agricultural machinery, equipment, and supplies (such as seeds, pest control products and fertilisers)*	Agriculture biotechnology (including genetics, microbiome, breeding, and animal health), agricultural synthetic biology (e.g. the application of synthetic biology in fertilisers and pesticides, and animal feedstock), bioenergy, biomaterials, and genetically modified organisms
On-farm and aquaculture	*Planting or fishing, irrigation, growing, harvesting, storing, and distribution of crops and animal products*	Farming technology (including hydroponic crop farming, vertical farming, insect farming, and microbe growing systems), and crop efficiency technology (e.g. crop nutrition diagnostics)
Food processing	*Transformation of agricultural outputs into food for human and animal consumption*	Artificial meat (e.g. cultured meat and plant-based meat and egg substitution), sustainable protein technology (e.g. plant-based and fungi-based proteins), genome engineering, livestock genetics, and macronutrient products
Food supply chain	*Transportation, storage, distribution, and wholesale of food to the downstream end*	New technology for agricultural waste reuse or upcycling, and food safety and traceability technology

[85] European Commission, Advanced Technologies for Industry: Technological trends in the agri-food industry, September 2020.

Value chain processes	Description	Examples of new food and agriculture technologies
Downstream delivery	*Delivery of food to consumers through grocery stores, restaurants, and international markets*	New technology for food waste reduction, shelf-life enhancing and monitoring technology, and food testing devices

Sources: Deloitte (2016), and AgFunder (as of March 2022)

State of development

71. Next-generation information technology and advanced hardware innovations have supported the development of new food and agriculture technologies. For example:

(a) Synthetic biology: this new discipline of modern biotechnology enables bio-pesticide and bio-fertiliser engineering, and alternative protein production;[86]

(b) Artificial intelligence: artificial intelligence driven sensors inform the optimal time to fertilise, irrigate, plant, or harvest, hence enabling precision agriculture and food production automation;[87]

(c) Robotics and IoT: advanced connectivity unlocks the potential for drone farming and autonomous farming machinery;[88] and

(d) Aerospace technology: satellite infrastructure provides statistical data for monitoring soil, snow cover, drought and crop development.[89]

Commercialisation

Obstacles to commercialisation

72. Like in any other cutting-edge field, new food and agriculture technology developers (e.g. alternative protein innovators) require substantial R&D investment.[90] These companies are facing, amongst others, the following challenges:

[86] The Mills Fabrica, Synthetic Biology Opportunities in Fashion and Food, July 2021.

[87] Forbes, Artificial Intelligence And Precision Farming: The Dawn Of The Next Agricultural Revolution, 7th January 2021.

[88] McKinsey, Agriculture's connected future: How technology can yield new growth, 9th October 2020.

[89] United Nations Office for Outer Space Affairs, Benefits of Space: Agriculture.

[90] Good Food Institute, Reducing the price of alternative proteins, page 12, December 2021.

(a) Technical limitations: some regions lack the necessary connectivity infrastructure to deploy digital tools;[91]

(b) Declining global investments: investments in food and agriculture research have declined when sustained investment is required to realise the full potential of such research; [92] and

(c) Talent shortage: some researchers in the industry fail to secure their jobs because of a lack of funding for research grants.[93]

73. Whilst many venture capital funds (especially sovereign wealth funds) have made early-stage investments in the agri-food industry, it has been a challenge for mid- to late-stage companies to access sufficient funding resources.[94] This means that agri-food companies would need to look for alternative sources of capital in order to commercialise their technologies and scale up their production.

Pathway to commercialisation

74. New food and agricultural technologies are often too expensive for "smallholder" farmers to purchase outright. To successfully commercialise such technologies, companies need to devise appropriate business models that are resilient, sustainable and scalable in the target region. Such business models should end up in a "multiple-win" situation where stakeholders will be able to recover their capital costs invested in the new technologies and reap a profit from streamlined processes or increased productivity.[95]

75. For example, new agriculture technologies such as smart irrigation systems, soil quality monitoring technology, and automated farm machinery and robotics have already been commercialised and implemented in farms, with successes in generating greater returns on investments in farms and land use with fewer inputs, accompanied by more farmers adapting to the transformation.[96]

[91] McKinsey, Agriculture's connected future: How technology can yield new growth, 9th October 2020.

[92] SciDev.Net, R&D in agriculture and food declining, experts say, 19th August 2022.

[93] SciDev.Net, R&D in agriculture and food declining, experts say, 19th August 2022.

[94] According to Pitchbook, only a small number of capital providers have led more than one investment round of US$100 million (HK$780 million) or more in the agri-food industry as of November 2021.

[95] Suffian, S., Reus, A., Eckard, C., Copley, A., Mehta, K, Agricultural technology commercialisation: stakeholders, business models, and abiotic stressors-Part 1, January 2013.

[96] Forbes, New Technologies In Agriculture Are Increasing Farm Profitability, 8th June 2021.

76. Similarly, new food technologies such as meat substitutes were more prevalently marketed worldwide and have seen considerable market prospects.[97] Their success can be attributed to the following factors:

(a) Proven technical viability: research shows that culture meat technology can achieve industrial production scale, with the private sector steadily interested in filing patent applications globally in the past decade;[98]

(b) Strong capital investments: both the capital market and government agencies worldwide are increasing their investments in the cultured meat industry;[99]

(c) Falling costs: new food technology companies are optimistic about significant cost cuts once they have achieved economies of scale; [100] and

(d) Growing market acceptance: growing food crisis concerns and heightened health consciousness have favoured the mainstreaming of alternative protein for example.[101]

Competent authority

77. The agri-food industry is highly regulated, especially in aspects relating to health and safety. For example, the US Food Safety and Inspection Service and the US Food and Drug Administration have oversight on the development and commercialisation of food from new plant varieties[102] and food made with cultured animal cells[103] in the US.

78. However, it is noteworthy that these food products do not have to undergo clinical trials and tests on human subjects before they are commercialised. This would mean that relevant food manufacturers would not be eligible to list under Chapter 18A of the Listing Rules (see paragraph 28 in Chapter 1 of this paper).

[97] Market analysis shows that the global market for market substitutes would grow from US$1.9 billion (HK$14.8 billion) in 2021 to a projected US$4 billion (HK$31.2 billion) in 2027. See MarketsandMarkets, Meat Substitutes Market worth $4.04 billion by 2027, 9th September 2021.

[98] Fernandes, Alice Munz, et al. Technological Prospecting: The Case of Cultured Meat, 11th June 2022.

[99] Ye, Y., Zhou, J., Guan, X., Sun, X., Commercialization of cultured meat products: Current status, challenges, and strategic prospects, 9th August 2022.

[100] For example, Future Meat Technologies, a food technology start-up, announced a plan to reduce cost of cultivated meat products in May 2021, with the cost of its cultivated meat decreasing from US$36 (HK$281) per kg in July 2021 to US$3.5 (HK$27.2) per kg in December 2021. See Food Navigator's article tilted "'The second it's up, it's going to change everything': Future Meat Technologies raises $347m Series B to open US facility and drive down cost of cultivated meat" on 20th December 2021.

[101] ADM, Emerging Trends that will Shape the Protein Alternatives Market in the Year Ahead, page 1, January 2022.

[102] US Food and Drug Administration, New Plant Variety Regulatory Information, 30th March 2020.

[103] US Food and Drug Administration, Food Made with Cultured Animal Cells, 10th June 2020.

APPENDIX II: COMPARISON OF NON-PROFIT BASED FINANCIAL ELIGIBILITY TESTS OF SELECTED EXCHANGES

The following table shows a comparison of non-profit based financial eligibility tests for listings on selected securities markets in the US, Mainland China, Singapore, the UK and Hong Kong:

US		Mainland China	Singapore	UK	Hong Kong
NYSE / NYSE American	**NASDAQ**	**STAR Market**	**SGX**	**LSE**	**Main Board**
NYSE Global market capitalisation test[1] • Global market capitalisation: ≥ US$200 million (HK$1.6 billion) ***NYSE American***	***NASDAQ Global Select Market*** Must meet one of the following standards:[3] (a) Standard 2: Capitalisation with Cash Flow • Market capitalisation: average ≥ US$550 million (HK$4.3	***For domestic enterprises (without WVR structure)*** Must meet one of the following four tests:[6] (a) Listing Criterion 2 • Market capitalisation: ≥ RMB 1.5 billion (HK$1.8 billion);	***Mainboard*** Must have[8]: Market capitalisation: ≥ S$300 million (HK$1.65 billion) Revenue: operating	Must have: Market capitalisation: ≥ £30 million (HK$296 million) Three-year revenue earning track record requirement [9]	Must meet one of the following tests:[10] (a) Market Capitalisation / Revenue / Cash Flow Test • Track record of operations: three years;

[1] Section 102.01C(II) of NYSE Listed Company Manual.

[3] Rules 5315(e) and 5315(f)(3) of the NASDAQ Rules 5300 Series (The Nasdaq Global Select Market).

[6] Article 2.1.2 of the STAR Market Rules.

[8] Rule 210(2)(c) of the SGX Mainboard Rules.

[9] See LR 3.6 of the FCA Listing Rules.

[10] Rules 8.05(2) and 8.05(3).

Must meet one of the following standards:[2] (a) Initial Listing Standard 2 • History of operations: two years; and • Market value of publicly held shares: ≥ US$15 million (HK$117 million) OR (b) Initial Listing Standard 3 • Market capitalisation: ≥ US$50 million (HK$390 million); and • Market value of publicly held shares: ≥ US$15 million (HK$117 million) OR (c) Initial Listing Standard 4 • Market capitalisation: ≥ US$75 million	billion) over the prior 12 months; • Cash flows: (i) aggregate ≥ US$27.5 million (HK$215 million) over the prior three fiscal years; and (ii) ≥ 0 for each of the prior three fiscal years; and • Revenue:≥ US$ 110 million (HK$858 million) for the previous fiscal year OR (b) Standard 3: Capitalisation with Revenue • Market capitalisation: average ≥ US$850 million (HK$6.6 billion) over the prior 12 months; and • Revenue:≥ US$ 90 million (HK$702 million) for the previous fiscal year OR (c) Standard 4: Assets with Equity	• Revenue: ≥ RMB 200 million (HK$240 million) for the most recent year; and • R&D investment: ≥ 15% of total revenue for the last three years; OR (b) Listing Criterion 3 • Market capitalisation: ≥ RMB 2 billion (HK$2.4 billion); • Revenue: ≥ RMB 300 million (HK$360 million) for the most recent year; and • Net operating cash flows: Aggregate ≥ RMB100 million (HK$120 million) for the last 3 years OR (c) Listing Criterion 4 • Market capitalisation: ≥ RMB 3 billion	revenue (actual or pro-forma) for the latest completed financial year	would be removed if the proposals in the FCA Discussion Paper were adopted.	• Market capitalisation: ≥HK$2 billion; • Revenue:≥ HK$500 million for the most recent audited financial year; and • Operating cash flow: aggregate ≥ HK$100 million in aggregate for the last 3 years OR (b) Market Capitalisation / Revenue Test • Track record of operations: three years; • Market capitalisation: ≥HK$4 billion; and • Revenue:≥ HK$500 million for the recent financial year

[2] Section 101(b) to (d) of NYSE American Company Guide.

(HK$585 million); or Total assets and total revenue: ≥ US$75 million (HK$585 million) each for the most recent year; or two of the last three years; and • Market value of publicly held shares: ≥ US$20 million (HK$156 million)	• Market capitalisation: ≥ US$160 million (HK$1.2 billion); • Total assets: ≥ US$80 million (HK$624 million); and • Stockholders' equity: ≥ US$55 million (HK$429 million) ***NASDAQ Global Market*** Must meet one of the following standards:[4] (a) Equity Standard Stockholders' equity: ≥US$ 30 million (HK$234 million); Market value of publicly held shares:≥ US$18 million (HK$133 million); and History of operations: two years OR (b) Market Value Standard • Market capitalisation: ≥ US$75 million (HK$585 million); and	(HK$3.6 billion); and • Revenue: ≥ RMB 300 million (HK$360 million) for the most recent year OR (d) Listing Criterion 5 • Market capitalisation: ≥ RMB 4 billion (HK$4.8 billion); and • Main products or businesses: (i) required to be approved by national government authorities; (ii) will have a big market; and (iii) currently have achieved a milestone progress *Note: New applicants are also required to demonstrate their research inputs and revenue growth by*			*Notes:* *1. Both tests require management and ownership continuity as set out under Rules 8.05(2)(a) and (b) / 8.05(3)(a) and (b).* *2. The Exchange may, under exceptional circumstances, accept a shorter trading record period of at least two financial years or waive other financial standards if it is satisfied that the listing of the issuer is desirable in the interests of the issuer and investors and that investors have the necessary information available to arrive at an informed judgement concerning the issuer and the securities for which listing is sought.*

[4] Rule 5405 of the NASDAQ Rules 5400 Series (The NASDAQ Global Market).

	• Market value of publicly held shares: ≥ US$20 million (HK$156 million) OR (c) Total Assets/ Total Revenue Standard • Total assets and total revenue: ≥ US$75 million (HK$585 million) each in the latest fiscal year, or in two of last three fiscal years; and • Market value of publicly held shares: ≥ US$20 million (HK$156 million) ***NASDAQ Capital Market*** Must meet one of the following standards[5]: (a) Equity Standard • Stockholders' equity: ≥US$ 5 million (HK$39 million); • Market value of publicly held shares: ≥ US$15 million (HK$117 million); and	*satisfying the following criteria when they apply to list on the STAR Market:–* *1. the aggregate investment in R&D for the most recent three years must account for 5% or more of the aggregate revenue for the same period, or the aggregate investment in R&D for the most recent three years must be at least RMB 60 million (HK$72 million); in particular, for a software enterprise, the aggregate investment in R&D for the most recent three years must account for 10% or more of the aggregate revenue for the same period;* *2. R&D personnel headcounts must not be less than 10% of the total number of*			

[5] Rule 5505 of the NASDAQ Rules 5500 Series (The NASDAQ Capital Market).

	• History of operations: two years; OR (b) Market Value of Listed Securities Standard • Stockholders' equity: ≥US$4 million (HK$31.2 million); • Market value of publicly held shares: ≥ US$15 million (HK$117 million); and • Market value of listed securities: ≥ US$50 million (HK$390 million)	*employees in the current year;* *3. the applicant must own five or more invention patents (including national defence patents) that have contributed to a substantial part of its revenue; and* *4. the compound annual revenue growth rate for the most recent three years must be at least 20%, or the revenue for the most recent year must be at least RMB 300 million (HK$360 million), unless the applicant is pre-revenue at the time of listing (in which case such applicant must satisfy Listing Criterion 5).*[7]			

[7] Article 5 of the "Interim Provisions on Application and Recommendation of Enterprises for Issuance and Listing on SSE STAR Market" (Shang Zheng Fa [2020] No. 21 Document).

APPENDIX III: ANALYSIS OF SPECIALIST TECHNOLOGY ISSUERS IN THE SAMPLE COHORT

Sample Cohort

Issuers in the Sample Cohort

1. Based on market data available,[1] we have identified a Sample Cohort of 507 issuers which were listed in the US and Mainland China between January 2019 and March 2022 for further analysis. Table 14 shows a breakdown of the Sample Cohort by listing venue and Specialist Technology Industry.

Table 14: Sample Cohort with breakdown by listing venue and Specialist Technology Industry

	Number of issuers in the Sample Cohort		
Specialist Technology Industry	**US**	**Mainland China**	**Total**
Next-generation information technology	238	88	**326**
Advanced hardware	86	45	**131**
Advanced materials	3	4	**7**
New energy and environmental protection	20	20	**40**
New food and agriculture technologies	2	1	**3**
Total	**349**	**158**	**507**

2. We analysed whether these issuers would have been able to meet any of our Main Board Eligibility Tests (including the Alternative Tests) based on their market capitalisation and the most recent audited financial results at the time of their listing, if they (including 349 issuers listed in the US and 158 listed in Mainland China) were to seek a listing in Hong Kong.

[1] Including the market capitalisation at the time of listing and the audited financial results in the three financial years prior to listing.

Issuers in the Ineligible Sample Cohort

3. Of these 507 issuers in the Sample Cohort, 212 (42%) would not have been able to meet our Main Board Eligibility Tests. These issuers (including 189 issuers listed in the US and 23 listed in Mainland China) had a combined market capitalisation of HK$2.26 trillion as of 31st March 2022.[2]

4. This suggests that our current eligibility requirements may not address the needs of Specialist Technology Companies (see paragraph 59 in Chapter 1 of this paper). That said, we understand that in choosing the listing venue, issuers would take into account factors in addition to the listing requirements of stock exchanges, such as where their business operations are primarily based and where their peers are listed, as well as whether analysts in the relevant market have the expertise and/or experience to evaluate their business. This is evidenced by the fact that 295 (58%) of the 507 issuers in the Sample Cohort were listed in the US or Mainland China despite being able to meet the Main Board Eligibility Tests.

Post-listing performance of issuers in the Ineligible Sample Cohort

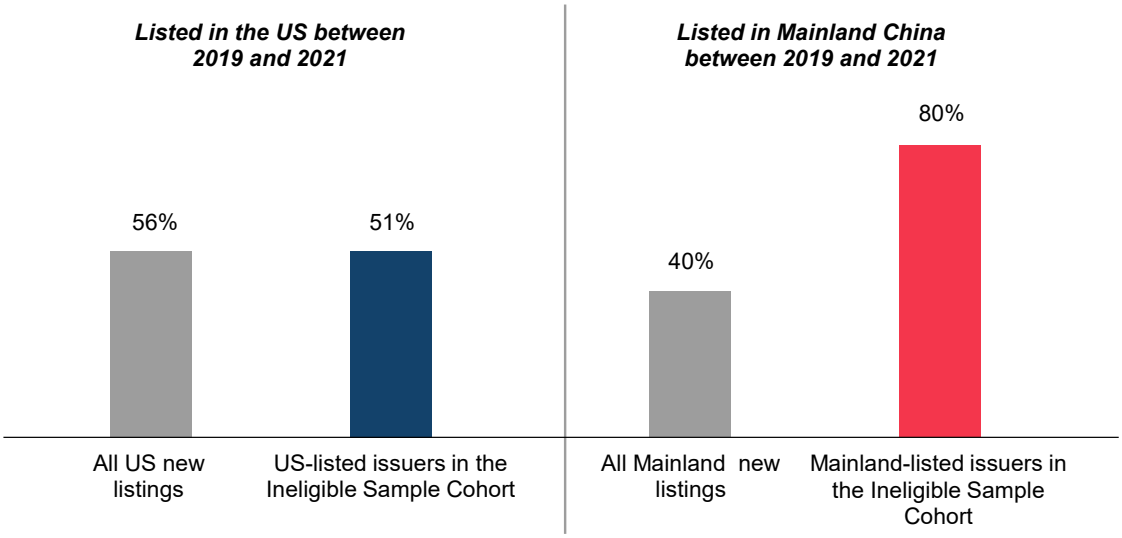
5. Our analysis shows that, in the US, the proportion of high growth[3] issuers in the Ineligible Sample Cohort (212 issuers) that listed between 2019 and 2021 was roughly equal to the proportion of high growth issuers in the overall new listing population (51% vs 56% respectively).

6. However, in Mainland China (the source of the majority of Hong Kong listings), the proportion of high growth issuers in the Ineligible Sample Cohort was much greater compared to those within new listings as a whole (80% vs 40% respectively) (see Figure 6).

[2] The analysis is based on the market capitalisation and the latest audited financial results of each Overseas Specialist Technology Issuer at the time of listing.

[3] Based on the preliminary discussions with our stakeholders, Specialist Technology Companies with revenue CAGR over 30% are considered high growth and also as a positive investment characteristic by institutional investors.

Figure 6: Proportion of issuers with revenue CAGR (since listing)[4] over 30% listed in the US and Mainland China between 2019 and 2021

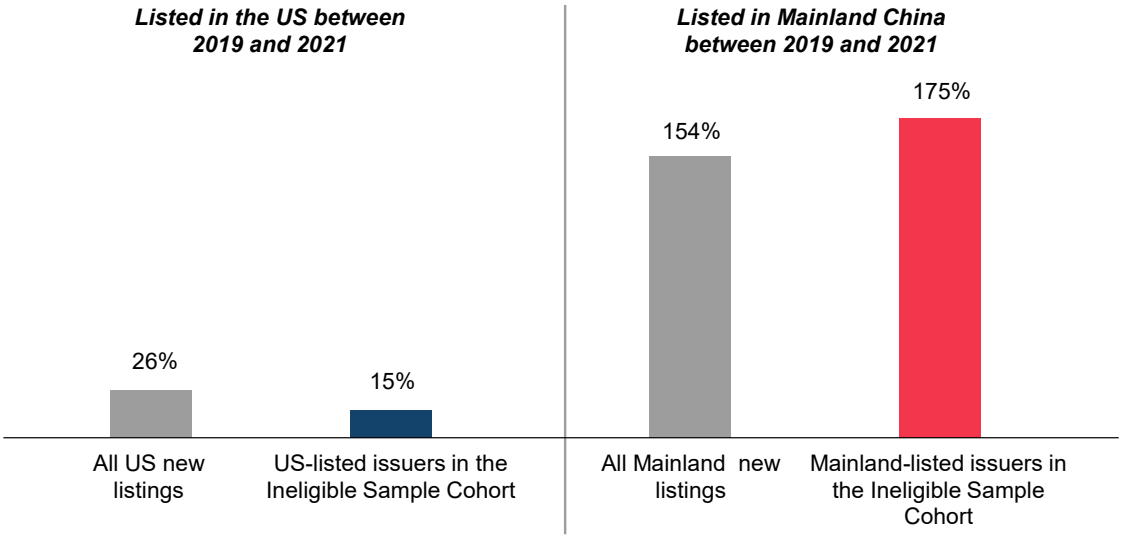


Source: S&P Capital IQ (retrieved on 30th August 2022)

7. With regard to share price, in the US, the new listings in the Ineligible Sample Cohort performed worse than all new listings between 2019 and 2021 (see Figure 7). However, in Mainland China, these companies performed better than new listings overall (an average percentage return in the first three months since listing of 175% vs. 154% respectively).

[4] Revenue CAGR was derived from revenue between the last audited financial year prior to listing and the latest audited financial year to date.

Figure 7: Comparison between the share price performance (average percentage return in the first three months since listing) of new listings in the Ineligible Sample Cohort and all new listings between 2019 and 2021

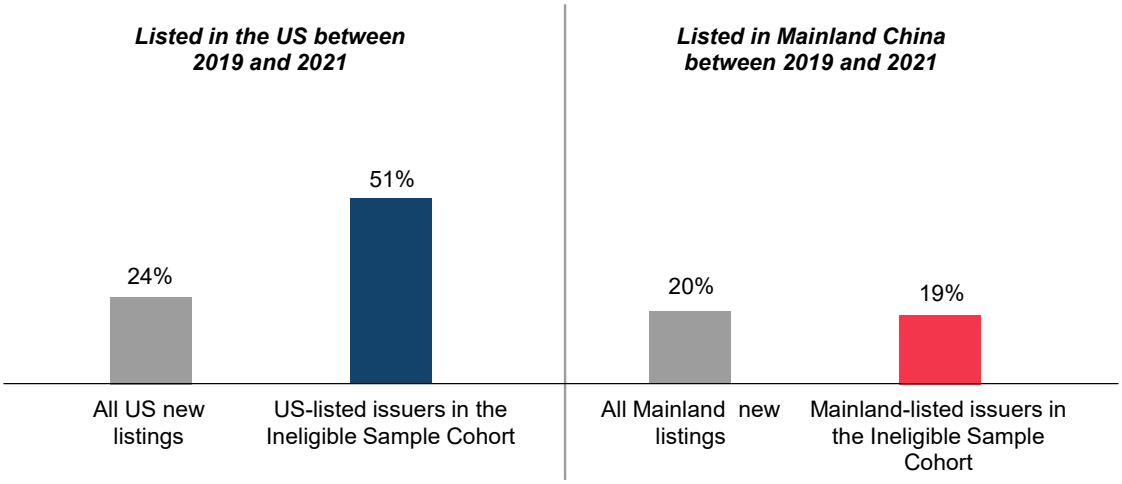


Source: S&P Capital IQ (retrieved on 30th August 2022)

8. We found that, in the US, the post-listing liquidity[5] of issuers in the Ineligible Sample Cohort was much higher than that of all new listings between 2019 and 2021 (see Figure 8). In Mainland China, whether or not a company is in the Ineligible Sample Cohort has little effect on the average post-listing liquidity.

[5] This is measured by the average monthly market turnover ratio of securities in the relevant group during 2021. The market turnover ratio for each month is calculated by dividing the monthly total trading turnover (in value of shares traded) by the total market capitalisation at the end of the month.

Figure 8: Comparison between the post-listing liquidity (average monthly turnover ratio[6] during 2021) of new listings in the Ineligible Sample Cohort and all new listings between 2019 and 2021



Source: S&P Capital IQ (retrieved on 31st August 2022)

Methodology

9. The selection of Specialist Technology Issuers was reflective of the acceptable sectors we have identified under each Specialist Technology Industry (see Box 1 on page 30 in Chapter 3 of this paper). The Exchange identified Specialist Technology Issuers listed in the US, Mainland China and Hong Kong taking into account the following factors:

   (a) the industry and sector (with reference to the Global Industry Classification Standard, the WIND Industry Classification Standard and the Hang Seng Industry Classification System) to which an issuer belongs;

   (b) Specialist Technology related keywords identified in the company profile and business description of an issuer; and

   (c) whether an issuer is a constituent share of an exchange traded fund or an equity index with a theme relevant to any Specialist Technology Industry.

[6] See footnote 5 for the methodology.

APPENDIX IV: DRAFT RULE AMENDMENTS

Chapter 8

EQUITY SECURITIES

QUALIFICATIONS FOR LISTING

Preliminary

8.01 …

Further conditions are set out in Chapters 8A, 18, 18A, 18B, 18C, 19, 19A, 19B and 19C for issuers seeking a listing of equity securities under those chapters.

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8.21A (1) …

…

Note 3: This rule is modified for a new applicant which is a Pre-Commercial Company under Chapter 18C which must comply with the requirements of rule 18C.06.

…

Chapter 11

EQUITY SECURITIES

LISTING DOCUMENTS

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Contents

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11.08 Special requirements for listing documents are set out in Chapters 8A, 18, 18A, 18B, 18C, 19, 19A, 19C and 21 for issuers with, or seeking, a listing of equity securities under those chapters.

…

Chapter 18B

EQUITY SECURITIES

SPECIAL PURPOSE ACQUISITION COMPANIES

…

DE-SPAC TRANSACTION REQUIREMENTS

Application of New Listing Requirements

…

18B.36 A Successor Company must meet all new listing requirements of these rules.

Note: These include all the applicable requirements under Chapter 8, and the application procedures and requirements for a new listing set out in Chapter 9. The Successor Company will be required, among other things, to issue a listing document and pay the non-refundable initial listing fee. Chapters 8A, 18, ~~and~~ 18A and 18C will also apply where applicable.

…

Chapter 18C

EQUITY SECURITIES

SPECIALIST TECHNOLOGY COMPANIES

Scope

The Exchange Listing Rules apply as much to Specialist Technology Companies with, or seeking, a listing as they do to other issuers, subject to the additional requirements, modifications and exceptions referred to in this Chapter.

This Chapter sets out rules and modifications to existing rules applicable to Specialist Technology Companies that seek to list on the basis that they are unable to satisfy either the profit test in rule 8.05(1), the market capitalisation/revenue/cash flow test in rule 8.05(2), or the market capitalization/revenue test in rule 8.05(3).

Issuers are encouraged to contact the Exchange if they envisage any difficulties in complying fully with the applicable requirements set out in this Chapter.

DEFINITIONS

18C.01 Unless otherwise stated or the context otherwise requires, the following terms have the meanings set out below:-

"Commercial Company"	a Specialist Technology Company that has met the revenue requirement of rule 18C.03(4) at the time of listing
"Cornerstone Investor"	has the meaning in rule 18A.01
"De-SPAC Target"	has the meaning in rule 18B.01
"De-SPAC Transaction"	has the meaning in rule 18B.01
"Institutional Professional Investors"	has the meaning in rule 18B.01
"Pre-Commercial Company"	a Specialist Technology Company that has not met the revenue requirement as set out in rule 18C.03(4) at the time of listing
"Specialist Technology"	science and/or technology applied to products and/or services within an acceptable sector of a Specialist Technology Industry

"Specialist Technology Company"	a company primarily engaged (whether directly or through its subsidiaries) in the research and development of, and the commercialisation and/or sales of, Specialist Technology Product(s) within an acceptable sector of a Specialist Technology Industry
"Specialist Technology Industry" or "an acceptable sector of a Specialist Technology Industry"	an industry or an acceptable sector (as the case may be) that is included in a list of Specialist Technology Industries set out in guidance published on the Exchange's website, as updated from time to time
"Specialist Technology Product"	a product and/or service (alone or together with other products or services) that applies Specialist Technology
"Successor Company"	has the meaning in rule 18B.01

CONDITIONS FOR LISTING

Basic Conditions

18C.02 An applicant that has applied for listing under this Chapter must, in addition to satisfying the requirements of this Chapter, also satisfy the requirements under Chapter 8 (other than rules 8.05, 8.05A and 8.05B).

18C.03 An applicant applying for listing under this Chapter must: —

(1) demonstrate that it meets the definition of a Specialist Technology Company, and is both eligible and suitable for listing as either a Commercial Company or a Pre-Commercial Company;

Notes:

1. *The Exchange will publish guidance on the Exchange's website, as amended from time to time, on any eligibility or suitability criteria.*

2. *The Exchange retains the discretion to reject an application for listing from an applicant within an acceptable sector of a Specialist Technology Industry if it displays attributes inconsistent with the following principles:*

   (1) it has high growth potential;

   (2) its success can be demonstrated to be attributable to the application, to its core business, of new technologies and/or the application of Specialist Technology to a new business model, which also serves to differentiate it from traditional market participants serving similar consumers or end users; and

(3) research and development significantly contributes to its expected value and constitutes a major activity and expense.

3. A Biotech Company relying on a Regulated Product (as defined in Chapter 18A) as the basis of its listing application must submit an application under Chapter 18A instead of this Chapter. A Biotech Company relying on a Regulated Product as the basis of its listing application that fails to satisfy the requirements under Chapter 18A (and relevant guidance) is not permitted to submit an application under this Chapter.

(2) have been in operation in its current line of business for at least three financial years prior to listing under substantially the same management;

Note: The Exchange may accept a shorter trading record period under this rule in exceptional circumstances where the issuer or its group has a trading record of at least two financial years if the Exchange is satisfied that the listing of the issuer is desirable in the interests of the issuer and investors and that investors have the necessary information available to arrive at an informed judgement concerning the issuer and the securities for which listing is sought. In such cases the Exchange should be consulted at an early stage and additional conditions will be imposed pursuant to rule 2.04.

(3) for a Commercial Company, have an initial market capitalisation, at the time of listing, of at least HK$8,000,000,000; or for a Pre-Commercial Company, have an initial market capitalisation, at the time of listing, of at least HK$15,000,000,000;

(4) for a Commercial Company, have revenue of at least HK$250,000,000 for its most recent audited financial year;

Note: For the purpose of this rule, only revenue arising from the applicant's Specialist Technology business segment(s) (excluding any inter-segmental revenue from other business segments of the applicant), and not items of revenue and gains that arise incidentally or from other businesses, will be recognised. Revenue arising from "book" transactions, such as banner barter transactions, the writing back of accounting provisions and other similar activities resulting from mere book entries, will be disregarded.

(5) Research and development

(a) have engaged in the research and development of its Specialist Technology Product(s) for at least three financial years prior to listing; and

(b) for each of the three financial years prior to listing, its investment on the research and development of its Specialist Technology Product(s) amounted to:

(i) for a Commercial Company, at least 15% of its total operating expenditure for that year; and

(ii) for a Pre-Commercial Company, at least 50% of its total operating expenditure for that year.

18C.04 An applicant that has applied for listing under this Chapter must have received meaningful investment from sophisticated independent investors.

Note: The Exchange will publish guidance on the Exchange's website, as amended from time to time, on the nature and extent of investment that would meet this rule.

Additional Conditions for Pre-Commercial Companies

18C.05 A Pre-Commercial Company must demonstrate to the Exchange and disclose in its listing document a credible path to the commercialisation of its Specialist Technology Product(s), appropriate to the relevant Specialist Technology Industry, that will result in it achieving the revenue requirement as set out in rule 18C.03(4).

Note: The Exchange will publish guidance on the Exchange's website, as amended from time to time, on what constitutes a "credible path" for the purpose of this rule.

18C.06 A Pre-Commercial Company must ensure that it has available sufficient working capital to cover at least 125% of its group's costs for at least 12 months from the date of publication of its listing document (after taking into account the proceeds of the new applicant's initial listing). These costs must substantially consist of the following:—

(1) general, administrative and operating costs (including any production costs); and

(2) research and development costs.

Note 1: The Exchange would expect that the issuer would use a substantive portion of the proceeds from its initial listing to cover these costs.

Note 2: Capital expenditures do not need to be included in the calculation of working capital requirements for the purpose of this rule. However, where capital expenditures are financed out of borrowings, relevant interest and loan repayments must be included in the calculation. A Pre-Commercial Company must include research and development costs, irrespective of whether they are capitalised, in the calculation of working capital requirements for the purpose of this rule.

INITIAL PUBLIC OFFERING OF A SPECIALIST TECHNOLOGY COMPANY

Allocation of Shares

18C.07 At least 50% of the total number of shares offered in the initial public offering (excluding any shares to be issued pursuant to the exercise of any over-allotment option) of a Specialist Technology Company must be taken up by independent Institutional Professional Investors in the placing tranche (whether as Cornerstone Investors or otherwise).

Note 1: For the purpose of this rule, an Institutional Professional Investor will not be considered independent if it is (a) an existing shareholder of the applicant, or a close associate of an existing shareholder; or (b) a core connected person of the applicant.

Note 2: In the case of a Specialist Technology Company listing by way of a De-SPAC Transaction, this rule also applies such that at least 50% of the total number of shares issued by the Successor Company as part of the De-SPAC Transaction (excluding any shares issued to the existing shareholders of the De-SPAC Target as consideration for acquiring the De-SPAC Target) must be taken up by independent Institutional Professional Investors.

Note 3: In the case of a Specialist Technology Company listing by introduction under Chapter 7, the Exchange will consider granting waivers, on a case by case basis, from the requirement under rule 18C.07 if the applicant is able to demonstrate that it is expected to meet the applicable minimum market capitalisation at the time of listing in rule 18C.03(3), having regard to its historical trading price (for at least a six-month period) on a Recognised Stock Exchange with sufficient liquidity and a large investor base (a substantial portion of which are independent Institutional Professional Investors).

18C.08 Paragraph 4.2 of Practice Note 18 is modified with respect to the allocation of shares in the initial public offering of a Specialist Technology Company, such that where an initial public offering of a Specialist Technology Company includes both a placing tranche and a public subscription tranche the minimum allocation of shares to the public subscription tranche shall be as follows:

(1) an initial allocation of 5% of the shares offered in the initial public offering;

(2) a clawback mechanism that increases the number of shares to 10% when the total demand for shares in the subscription tranche is 10 times or more but less than 50 times the initial allocation; and

(3) a clawback mechanism that increases the number of shares to 20% when the total demand for shares in the subscription tranche is 50 times or more than the initial allocation.

Shares may be transferred from the subscription tranche to the placing tranche where there is insufficient demand in the subscription tranche to take up the initial allocation.

Free Float and Public Float

18C.09 A Specialist Technology Company seeking an initial listing under this chapter must, in addition to meeting the requirements of rule 8.08(1), ensure that a portion of the total number of its issued shares with a market capitalisation of at least HK$600,000,000 are not subject to any disposal restrictions (whether under contract, the Listing Rules, applicable laws or otherwise) upon listing.

18C.10 The Exchange would expect the listing of a Specialist Technology Company to be accompanied by an offer (including both the placing tranche and the public subscription tranche) of a meaningful size and reserves the right not to approve the listing of a Specialist Technology Company if the offer size is not significant enough to facilitate post-listing liquidity, or may otherwise give rise to orderly market concerns.

CONTENTS OF LISTING DOCUMENTS FOR SPECIALIST TECHNOLOGY COMPANIES

18C.11 A Specialist Technology Company must disclose in its listing document any information required by the Exchange that is due to it being a Specialist Technology Company.

Note: The Exchange will publish guidance on the Exchange's website, as amended from time to time, on the information that a Specialist Technology Company must disclose in its listing document for the purpose of this rule.

RESTRICTIONS ON DISPOSAL OF SECURITIES FOLLOWING A NEW LISTING

18C.12 The controlling shareholder(s) of a Specialist Technology Company must comply with rule 10.07 modified as follows:

(1) the reference to "6 months" in rule 10.07(1)(a) is read as "12 months" for the controlling shareholder(s) of a Commercial Company and "24 months" for those of a Pre-Commercial Company; and

(2) rule 10.07(1)(b) does not apply to the controlling shareholder(s) of a Specialist Technology Company.

18C.13 The following persons and their close associates, as identified in the listing document of a Specialist Technology Company, must not, in the period commencing on the date by reference to which disclosure of their respective shareholdings are made in the listing document and ending on the applicable dates upon the expiry of the period as prescribed below (counting from the date on which dealings in the securities of the Specialist Technology Company commence on the Exchange), dispose of, nor enter into any agreement to dispose of or otherwise create any options, rights, interests or encumbrances in respect of, any of those securities of the company in respect of which they are shown by that listing document to be the beneficial owner(s):

	Person(s)	**The restrictions on disposal end upon the expiry of the following period**	
		Commercial Companies	**Pre-Commercial Companies**
(1)	The key persons of a Specialist Technology Company, comprising of the following persons: (a) founders (including the founding members of key operating subsidiaries of the Specialist Technology Company) (b) the beneficiaries of weighted voting rights (as defined in rule 8A.02) (if the Specialist Technology Company is listing with a WVR structure (as defined in rule 8A.02)) (c) executive directors and senior management (d) key personnel responsible for the Specialist Technology Company's technical operations and/or the research and development of its Specialist Technology Product(s)	12 months	24 months
(2)	Such existing investors in a Specialist Technology Company as identified by the Exchange in guidance published on the Exchange's website, as amended from time to time.	6 months	12 months

Note 1: Any offer for sale contained in a listing document is not subject to restrictions on disposal.

Note 2: Rules 10.07(2) and 10.07(3) including the Notes to Rule 10.07(2) apply mutatis mutandis, to the persons referred to in rule 18C.13(1) and (2) in this rule and their close associates, as if all references to "controlling shareholder(s)" were references to the relevant person(s) and their close associates.

Note 3: The restrictions on disposal under rule 18C.13(1) apply to a person identified as a key person of the Specialist Technology Company as at the time of its listing, and will continue to apply even if the person ceases to hold the relevant position (either because of a change in position or resignation or otherwise).

18C.14 Rules 18C.12 and 18C.13 do not prevent the disposal of any interest by the relevant person in the securities in the following circumstances:

(1) on the death of such person; or

(2) in any other exceptional circumstances to which the Exchange has given its prior approval.

18C.15 Any deemed disposal of securities resulting from the allotment, grant or issue of securities by a Specialist Technology Company in compliance with the Listing Rules will not be regarded as a breach of rule 18C.12 or 18C.13.

DISCLOSURE OF SHAREHOLDINGS

18C.16 A Specialist Technology Company must disclose in its listing document the total number of securities in the issuer held by the persons (as identified in the Listing Document) that are subject to the requirements of rule 18C.12 or 18C.13.

18C.17 A Specialist Technology Company must disclose in its interim (half-yearly) and annual reports the information referred to in rule 18C.16, as at the latest practicable date prior to the issue of the relevant report, for so long as the relevant person remain as a shareholder.

ADDITIONAL CONTINUING OBLIGATIONS FOR PRE-COMMERCIAL COMPANIES

Disclosure in Reports

18C.18 A Pre-Commercial Company listed under this Chapter must include in its interim (half-yearly) and annual reports details of its research and development and commercialisation activities during the period under review, including:

(1) details of the development progress of its Specialist Technology Product(s) under development;

(2) the timeframe for, and any progress made towards, achieving the revenue requirement as set out in rule 18C.03(4), including updates on the amount of contract value realised and/or realisable in respect of the agreements with customers, as previously disclosed to demonstrate the path to achieving such threshold in its Listing Document or any subsequent update as published by the Pre-Commercial Company;

(3) updates on any revenue, profit and other business and financial estimates as provided in the Listing Document and any subsequent updates to those estimates as published by the Pre-Commercial Company;

(4) a summary of investment on its research and development activities; and

(5) a prominently disclosed warning that it may not achieve the revenue requirement under rule 18C.03(4).

Note: Details to be disclosed under this rule should be consistent with those disclosed in the listing document of the Pre-Commercial Company pursuant to the relevant guidance referred to in rule 18C.11 to enable its shareholders and potential investors to assess how well the company is adhering to its intentions as previously disclosed.

Sufficient Operations

18C.19 Where the Exchange considers that a Pre-Commercial Company listed under this Chapter fails to comply with rule 13.24, the Exchange may suspend dealings or cancel the listing of its securities under rule 6.01. The Exchange may also under rule 6.10 give the relevant issuer a period of not more than 12 months to re-comply with rule 13.24. If the relevant issuer fails to re-comply with rule 13.24 within such period, the Exchange will cancel the listing.

Material Changes

18C.20 Without the prior consent of the Exchange, a Pre-Commercial Company listed under this Chapter must not effect any acquisition, disposal or other transaction or arrangement or a series of acquisitions, disposals or other transactions or arrangements, that would result in a fundamental change in the principal business activities of the relevant issuer as described in the listing document issued at the time of its application for listing.

Removal of Designation as a Pre-Commercial Company

18C.21 A Pre-Commercial Company that wishes to cease being regarded as a Pre-Commercial Company after listing must make an application to the Exchange for that purpose.

18C.22 A Pre-Commercial Company must provide the Exchange with published audited financial statements in support of an application made under rule 18C.21 demonstrating that:

(1) in its most recent audited financial year it has met the revenue requirement in rule 18C.03(4); or

(2) as a result of its operations as a whole, it has met at least one of the tests in rule 8.05.

Note: Upon the notification by the Exchange confirming that an issuer will no longer be regarded as a Pre-Commercial Company, rules 18C.18 to 18C.20 cease to apply to it. However, the restrictions on disposal of securities of the issuer as a Pre-Commercial Company as set out in rules 18C.12 to 18C.13 continue to apply to the relevant shareholders in accordance with the periods specified in those rules.

18C.23 A Specialist Technology Company must announce the removal of designation as a Pre-Commercial Company as soon as practicable after notification of such removal by the Exchange.

Appendix 1

Contents of Listing Documents

Part A

Equity Securities

…

36. A statement by the directors that in their opinion the working capital available to the group is sufficient for the group's requirements for at least 12 months from the date of publication of the listing document or, if not, how it is proposed to provide the additional working capital thought by the directors to be necessary. (Note 3)

Note 1: In the case of a Mineral Company, a statement by the directors that in their opinion the issuer has available sufficient working capital for 125% of the group's present requirements.

Note 2: In the case of a new applicant for listing under Chapter 18A, a statement by the directors that in their opinion the issuer has available sufficient working capital for at least 125% of the group's costs for at least 12 months from the date of publication of its listing document, taking into account the factors in rule 18A.03(4).

Note 3: A new applicant which is a banking company or an insurance company should refer to rule 8.21A(2)

Note 4: In the case of a new applicant for listing under Chapter 18C as a Pre-Commercial Company (as defined in Chapter 18C), a statement by the directors that in their opinion the issuer has available sufficient working capital for at least 125% of its group's costs for at least 12 months from the date of publication of its listing document, taking into account the factors in rule 18C.06.

APPENDIX V: DRAFT GUIDANCE LETTER

HKEX GUIDANCE LETTER

HKEX-GL[•]-22 ([•] 2022)

Subject	**Guidance on Specialist Technology Companies**
Listing Rules and Regulations	**Main Board Chapter 18C**

Important note: *This letter does not override the Listing Rules and is not a substitute for advice from qualified professional advisers. If there is any conflict or inconsistency between this letter and the Listing Rules, the Listing Rules prevail. You may consult the Listing Division on a confidential basis for an interpretation of the Listing Rules, or this letter. Unless otherwise specified, defined terms in the Listing Rules shall have the same meanings in this letter.*

Purpose

1. This letter provides guidance for Specialist Technology Companies with, or seeking, a listing on the Exchange pursuant to Chapter 18C of the Main Board Listing Rules ("**Rules**").

2. The definitions used in this guidance letter are the same as those set out in the Rules.

Guidance

A. Specialist Technology Industries

3. Rule 18C.01 states that Specialist Technology Industries considered to fall within the scope of listing applications under Chapter 18C are set out in the Exchange's guidance published on its website, as amended from time to time.

List of Specialist Technology Industries

4. The list of Specialist Technology Industries and the non-exhaustive[1] acceptable sectors that the Exchange considers to fall within each of these industries, are set out as follows:

[1] The list is non-exhaustive in nature given it may be updated from time to time (see paragraphs 5 and 6).

Acceptable sector	Description
1. Next-generation information technology	
Software, platform and infrastructure solutions powered by cloud computing and big data analytics	
Cloud-based services	The application of cloud computing in as-a-service business models through the access and use of servers, networks, storage capacity, development tools and applications via the internet, including: • Software as a service (SaaS): the delivery of software applications over cloud infrastructure enabling companies to conduct their operations using the application • Platform as a service (PaaS): the delivery of a platform for the creation of software in the form of virtualisation, middleware, and/or operating systems, which is then delivered over cloud infrastructure • Infrastructure as a service (IaaS): the delivery of cloud computing infrastructure (i.e. servers, storage, and networks) as an on-demand service
Artificial intelligence ("AI")	The development of AI technology, including: • Technology and infrastructure enabling AI: the development of open-source development platforms, computing, and data services • AI-empowered algorithm programming: natural language processing (NLP), machine learning, and deep learning • AI solutions: the design and provision of AI solutions used in different industry verticals
2. Advanced hardware	
The development of new hardware using advanced technology	
Robotics and automation	The development of robots, automated systems, and enabling technologies, including: • Robot technology: the engineering of robots, computer software and machines for the improved performance of tasks and/or automation processes • Internet of Things (IoT) technology: machine-to-machine communications designed to monitor events, process data and determine actions • Smart home applications: home automation designs involving human-robot interaction and/or human-appliance interaction • Smart product designs: design and manufacturing of sensor-driven, WiFi-enabled, self-learning, or programmable products

Acceptable sector	Description
Semiconductors	The development of technology for applications along the semiconductor value chain, including: • Production inputs: materials, manufacturing equipment, electronic design automation (EDA), and core intellectual property (IP) • Design: logic and physical design, and validation and verification • Fabrication: conversion of designs into chips and semiconductor devices • Advanced packaging: flip-chip packaging, 3D packaging, and wafer-level packaging
Advanced communication technology	The development of connectivity technologies used in the transfer of information and/or connection of devices, including: • Next-generation wireless communication systems: fifth-generation (5G) and beyond technology enabling high-speed and high-volume data transfers over wireless technology infrastructure and applications • Satellite communication: satellite-enabled telecommunications, broadcasting, and data communications
Electric and autonomous vehicles	The manufacturing and/or deployment of autonomous vehicles and electric vehicles, and development of enabling technologies, including: • Electric vehicles: the use of new energy solutions in all-electric or battery electric vehicles (BEVs) • Autonomous vehicles: vehicles and trucks equipped with self-driving solutions • Location technology: sensors and technology enabling the detection or calculation of the geographical position of a person, mobile device or vehicle
Advanced transportation technology	The development of transportation technology (excluding electric and autonomous vehicles), and deployment of smart mobility systems, including: • Transportation technology: new modes of transport (including electric aircraft), and drone technology • Intelligent transportation systems: the application of information and communication technology in road transport, traffic management and safety, and mobility systems (including ridesharing)
Aerospace technology	The development of technology used in the research, exploration and utilisation of space, including: • Spacecraft development: the development of space launch vehicles, satellites, space stations and related components • Space exploration: space imaging, earth imaging, robotic spacecraft • Utilisation of space in defence capabilities: space-based services and assets for security and defence purposes

Acceptable sector	Description
Advanced manufacturing	The development of technology in production activities that depend on automation, computation, software, sensing, and/or networking, including: • Additive manufacturing: 3D printing, and mass-scale customisation for industrial and manufacturing processes • Digitalised manufacturing: applications of sensors and 3D vision technology in manufacturing processes
Quantum computing	Software, hardware and services developed based on the principles of quantum physics, including • Quantum computing software: the development of software enabling organisations to use fully quantum tools • Quantum computer hardware: the manufacturing of error-corrected, fault-tolerant quantum computing hardware • Cloud-based quantum computing services: the provision of access to quantum computers via commercial cloud-based platforms
Metaverse technology	The development of technology (including hardware, software and infrastructure) that enables the following applications: • Virtual reality (VR): technology providing a lifelike simulation of reality synthetically or virtually • Augmented reality (AR): technology enhancing human experience through the combination of the physical and digital worlds • Brain-computer interfaces (BCIs): computer-based systems translating brain signals into commands that are relayed to an output device to carry out a desired action
3. Advanced materials	
The production or integration of new or significantly improved materials to enhance the performance of traditional materials	
Synthetic biological materials	The development of new materials that are genetically encoded and generated through the integration of synthetic biology and materials science. Examples include biopolymers, fibres, optical materials, adhesives, and other materials for specialist applications
Smart glass	The development of smart switchable glass technology, including smart windows and display
Nanomaterials	The development and application of technology to enable the manipulation of materials conducted at a nanoscale, including: • Manufacturing of end products using nanotechnology: nanostructured filters, coatings and additives • Development of nanotechnology: the manufacturing and testing of equipment for nanoscale measurement and/or manipulation of materials

Acceptable sector	Description
4. New energy and environmental protection	
The production of energy from natural sources and the networks and infrastructure to support such production and other processes for improving environmental sustainability and resource use efficiency.	
New energy generation	The development of technology enabling new, clean or renewable energy generation, including solar and wind power, hydropower, hydrogen energy, wave powered electricity generation, and biofuel
New energy storage and transmission technology	The development of energy transmission and distribution technology, and deployment of infrastructure dedicated to the generation and storage of new energy (including clean or renewable energy and hydrogen energy) including: • New energy storage systems: battery technologies and long duration energy storage • New energy transmission and distribution networks: power grid management and development, and smart grid developments
New green technology	The development of technology-driven solutions for environmental conservation or remediation, or technologies that enhance resource- and/or energy-efficiency including: • Environmental remediation: soil washing, soil vapour extraction and thermal desorption • Emissions reduction: hydrogen and carbon capture and storage
5. New food and agriculture technologies	
Food and agriculture technologies applied to agriculture, farming and food processing activities	
New food technology	The development of technology for food production and processing, including: • Artificial meat, sustainable protein technology, and synthetic biology in food technology: production of novel ingredients including cultured meat, plant-based meat and egg substitution, sustainable protein, genome engineering, livestock genetics and macronutrient products • Food waste reduction: new technology enabling food waste reduction, shelf-life enhancement and monitoring
New agriculture technology	The application of technology in the production of agricultural machinery, equipment and supplies, including: • Agricultural biotechnology and crop efficiency technology: genetic engineering of crops and crop nutrition diagnostics • Agricultural synthetic biology: the application of synthetic biology in crop production, fertilisers and pesticides and animal feedstock • Farming technology: hydroponic crop farming, vertical farming, insect farming, and microbe growing systems

Updating of guidance on Specialist Technology Industries and acceptable sectors

5. The Exchange will update its guidance on Specialist Technology Industries and acceptable sectors from time to time, as necessary, taking into account the principles set out in Note 2 to Rule 18C.03(1).

6. For the purpose of paragraph 5, the Exchange may add new industries or sectors to the list of Specialist Technology Industries and acceptable sectors after consultation with the SFC and with its approval. When doing so, the Exchange will take into account any pre-IPO enquiry from potential listing applicants from the relevant industry or sector.

Companies with multiple business segments

7. Where an applicant has multiple business segments, some of which do not fall within one or more Specialist Technology Industries, the Exchange will, for the purpose of determining whether the company is "primarily engaged" in the relevant business (as referred to in the definition of "Specialist Technology Company"), take into account the following:

   (a) whether a substantial portion of the total operating expenditure of the company and senior management resources (including their time; and the number of directors and senior management personnel with relevant expertise and experience) was spent on the research and development of, and the commercialisation and/or sales of, Specialist Technology Products in the company's Specialist Technology business segment(s)[2] for at least three financial years prior to listing;

   (b) whether the basis for investors' valuation and the expected market capitalisation of the company is based primarily on the company's Specialist Technology business segment(s), rather than its traditional business segments or assets unrelated to its Specialist Technology business segment(s); and

   (c) whether the proposed use of proceeds for listing would primarily be applied to its Specialist Technology business segment(s).

B. Other criteria for Specialist Technology Companies

8. An applicant applying for listing under Chapter 18C must satisfy the following criteria:

   (a) **Use of proceeds (Pre-Commercial Companies only):** a Pre-Commercial Company applicant must have as its primary reason for listing the raising of funds for the research and development of, and the manufacturing and/or sales and marketing of, its Specialist Technology Product(s) to bring them to commercialisation and achieving the revenue threshold as required under Rule 18C.03(4);

[2] For companies with multiple business segments, the business activities attributable to a Specialist Technology business segment is expected to constitute one or more operating and/or reporting segments under the applicable accounting and financial reporting standards (for example see IFRS 8).

(b) **Ownership continuity:** ownership continuity and control in the 12 months prior to the date of the listing application;

The Exchange may grant waivers on a case-by-case basis from the ownership continuity requirement with respect to a Specialist Technology Company that is listed by way of a De-SPAC Transaction; and

(c) **Revenue growth (Commercial Companies only):** a Commercial Company is normally expected to demonstrate a year-on-year growth of revenue throughout the track record period with allowance for temporary declines in revenue due to economic, market or industry-wide conditions. For this purpose, only revenue satisfying the requirement of the Note to Rule 18C.03(4) will be recognised. The reasons for, and remedial steps taken (or to be taken) to address, any downward trend in the Commercial Company's annual revenue must be explained to the Exchange's satisfaction and disclosed in its listing document.

9. Applicants should note that the criteria set out in paragraph 8 are neither exhaustive nor binding, and the Exchange will take into account all relevant circumstances in its assessment of the eligibility and suitability of an applicant for listing, including the attributes set out in Note 2 to Rule 18C.03(1).

C. R&D investment

10. Rule 18C.03(5)(b) sets out requirements as to the minimum amount of investment on the research and development of its Specialist Technology Product(s) that a Specialist Technology Company must make for each of the three financial years prior to listing.

11. Rule 18C.18 requires a Pre-Commercial Company to include in its interim (half-yearly) and annual reports details of its research and development and commercialisation activities during the period under review, including a summary of its investment on research and development activities.

12. For the purpose of calculating the amount of investment on the research and development ("R&D") under Rule 18C.03(5)(b) and Rule 18C.18:

(a) the amount of R&D investment for a period includes costs that are directly attributable to the Specialist Technology Company's R&D activities during the period, including development costs for the period that have been capitalised as intangible assets for accounting purposes, but excluding general, administrative or other costs that are not clearly related to R&D activities;

(b) the Exchange expects the amount of R&D investment to be primarily comprised of the following costs:

(i) the costs of personnel engaged in R&D activities;

(ii) the costs of R&D conducted by others on the company's behalf (including consulting or testing fees);

(iii) the depreciation, service fees or other directly attributable costs of equipment or facilities used in R&D activities (including data centre operating costs, cloud-based service fees, rentals, utilities and maintenance costs);

(iv) the amortisation of intangibles used in R&D activities; and

(v) the costs of materials consumed in R&D activities.

If any other type of costs apart from those listed above is included as qualifying R&D costs, the basis on which such costs are directly attributable to the company's R&D activities must be clearly explained; and

(c) the amount of R&D investment should exclude the initial recognition of any fixed assets relating to the company's R&D activities (e.g. capital expenditures for acquiring an R&D centre).

13. For the purpose of calculating the total operating expenditure under Rule 18C.03(5)(b), the total operating expenditure for a period is the sum of the total expenses of the company as reflected in the financial statements of the company during the period, excluding any expense of financial nature, and including any such costs that have not been recognised as expenses during the period but qualify as R&D investment as described in paragraph 12(b) above.

14. An applicant must include a detailed breakdown of its R&D investment in its listing document (see paragraph 32(h)).

D. Third party investment requirements

15. Rule 18C.04 stipulates that a Specialist Technology Company listing applicant must have received meaningful investment from sophisticated independent investors.

Independence requirement

16. A sophisticated investor will not be considered a sophisticated independent investor for the purpose of Rule 18C.04 if it is a core connected person of the applicant.

17. A sophisticated investor who is a substantial shareholder of the applicant can be considered a sophisticated independent investor if it is a core connected person only because of the size of its shareholding in the applicant (subject to paragraph 18 below).

18. A person who is a controlling shareholder (or within the group of persons who are considered as controlling shareholders) of the applicant would not be considered as independent for the purpose of this requirement.

Definition of "sophisticated investor"

19. The Exchange will assess whether an investor is a "sophisticated investor" for the purpose of Rule 18C.04 on a case-by-case basis by reference to its relevant investment experience, and knowledge and expertise in the relevant field, which could be demonstrated by its net assets, assets under management ("AUM"), size of its investment portfolio or track record of investments, where applicable.

20. For this purpose, the Exchange would generally consider the following as examples, for illustrative purpose only, of the types of "sophisticated investors":

    (a) an asset management firm with AUM of, or a fund with a fund size of, at least HK$15,000,000,000;

    (b) a company having a diverse investment portfolio size of at least HK$15,000,000,000;

    (c) an investor of any of the types above with an AUM, fund size or investment portfolio size (as applicable) of at least HK$5,000,000,000 where that value is derived primarily from Specialist Technology investments; and

    (d) a key participant in the relevant upstream or downstream industry with substantial market share and size, as supported by appropriate independent market or operational data.

21. We propose to define "investment portfolio" for the purpose of paragraph 20(b) and 20(c) as the aggregate value of investments in investee companies as determined under the prevailing accounting standards. We would not consider investee companies to include consolidated subsidiaries.

22. A fund managed by a fund manager that has AUM of an amount that meets the threshold set out in paragraph 20(a), or a wholly-owned subsidiary of an entity referred to in paragraph 20(b), would qualify as a sophisticated investor for the purpose of Rule 18C.04.

Minimum investment requirement

23. As an indicative benchmark, an applicant applying to list under Chapter 18C and meeting the following requirement will generally be considered as having met the requirement of having received meaningful investment for the purpose of Rule 18C.04:

    (a) third party investment from at least two sophisticated independent investors at least 12 months before the date of the listing application, each holding such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the listing applicant as at the date of its listing application and throughout the pre-application 12-month period; and

(b) the investment from all sophisticated independent investors result in them holding, in aggregate, such amount of shares or securities convertible into shares equivalent to at least the percentage of the issued share capital of the applicant at the time of listing set out in the table below:

Expected market capitalisation of the applicant at the time of listing	**Minimum total investment from all sophisticated independent investors as a percentage of the issued share capital of the applicant at the time of listing**	
	Commercial Companies	*Pre-Commercial Companies*
HK$8,000,000,000 or more but less than HK$20,000,000,000 *(Commercial Companies)* HK$15,000,000,000 or more but less than HK$20,000,000,000 *(Pre-Commercial Companies)*	20%	25%
HK$20,000,000,000 or more and less than HK$40,000,000,000	15%	20%
HK$40,000,000,000 or more	10%	15%

24. The Exchange will count investments by sophisticated independent investors made before listing and any offer shares issued to sophisticated independent investors in the IPO, towards the minimum aggregate investment requirement in paragraph 23(b).

E. Path to achieving the revenue requirement for a Commercial Company

25. Rule 18C.05 states that a Pre-Commercial Company must demonstrate to the Exchange and disclose in its listing document a credible path to the commercialisation of its Specialist Technology Product(s), as appropriate for the relevant Specialist Technology Industry, that will result in it achieving the revenue requirement as set out in Rule 18C.03(4).

26. The Exchange will retain the discretion to determine whether the evidence provided by an applicant satisfies the requirement of Rule 18C.05. For this purpose, a Pre-Commercial Company applicant must also:

(a) explain and disclose, in detail, the timeframe and impediments to achieving the revenue requirement as set out in Rule 18C.03(4); and

(b) to the extent that its working capital (after taking into account the listing proceeds) is insufficient to meet its needs before it achieves the revenue requirement in Rule 18C.03(4), describe the potential funding gap and how it plans to further finance its path to achieving such revenue requirement after listing.

27. Such a credible path could be demonstrated, for example, by:

    (a) binding contracts or non-binding framework agreements, with reasonably sufficient details on the timeframe and milestones for commercialisation, in respect of the Specialist Technology Product(s) that the applicant has in place; and

    (b) such binding contracts or non-binding framework agreements being arranged with a reasonable number of independent customers for the development, testing or sales of the Specialist Technology Product(s) for such customers, with a substantial potential aggregate contract value realisable within 24 months from the date of listing. The Exchange may, under exceptional circumstances, accept that a credible path is demonstrated by a binding contract or non-binding framework agreement with an expected timeframe of more than 24 months, in which case an independent customer engaged in such arrangement must also be a highly reputable customer.

28. For the purpose of paragraph 27(b):

    (a) a customer will not be considered independent if it is a core connected person of the applicant, except that a customer who is a substantial shareholder of the applicant would be considered as having met this independence requirement if it is a core connected person merely by reason of the size of its shareholding in the applicant. A customer who is the controlling shareholder (or within the group of persons who are considered as controlling shareholders) of the applicant would not be considered as having met this independence requirement; and

    (b) "a highly reputable customer" means:

        (i) a key market participant in the relevant upstream or downstream industry with substantial market share, as supported by appropriate independent market or operational data; or

        (ii) a State or State corporation as defined under Rule 1.01.

F. Disclosure requirements

29. Rule 18C.11 states that a Specialist Technology Company must disclose in its listing document any information required by the Exchange that is due to it being a Specialist Technology Company.

30. The following guidance supplements that which the Exchange has published relating to disclosure in listing documents applicable to all listing applicants. A listing document that does not follow this guidance may be considered not substantially complete as required under the Listing Rules and may be returned.

31. In view of the complexity and technicality involved in Specialist Technology Companies' businesses, applicants are encouraged to use diagrams or flowcharts to explain their business models, and Specialist Technology Products and key non-Specialist Technology Products. They are also reminded to present fair, balanced and accurate information to potential investors.

32. The following disclosure should be made in the listing documents which fall under Chapter 18C, where applicable:

	Key area	Disclosure recommendations
(a)	**Information on pre-IPO investments**	(i) In addition to the existing disclosure requirements on pre-IPO investments[3], an applicant should also disclose the implied pre-money and post-money valuations of each round of pre-IPO investment in a table (ii) reasons for material fluctuations in valuation (1) as compared to the immediate previous round of pre-IPO financing; and (2) between the proposed IPO valuation and the valuation in the latest round of pre-IPO financing, such as key development of the products and business milestones.
(b)	**Burn rate**	Disclose in the Summary and other relevant sections: (i) *Historical burn rate* The burn rate throughout the track record period, with the basis for determination and reasons for any substantial expenditure explained (ii) *Future burn rate* • a reasonable period of time, with basis, that the applicant can maintain its viability with existing cash balance with the IPO proceeds • when the applicant expects to raise its next round of financing based on the burn rate • assumptions in relation to the future burn rate, which should be reasonable taking into account specific facts and circumstances

[3] See Guidance Letter HKEX-GL43-12.

	Key area	Disclosure recommendations
(c)	**Cash operating cost**	(i) <u>*Historical cash operating cost*</u> Disclose an estimate of cash operating costs, including costs relating to research and development incurred in the development of the Specialist Technology Products and costs associated with: (1) workforce employment (2) direct production costs, including materials (if it has commenced production) (3) research and development (4) product marketing (if any) (5) non-income taxes, royalties and other governmental charges (if any) (6) contingency allowances (7) any other significant costs *Note: A Specialist Technology Company must:* • *set out the components of cash operating costs separately by category;* • *explain the reason for any departure from the list of items to be included under cash operating costs; and* • *discuss any material cost items that should be highlighted to investors.* (ii) <u>*Future cash operating cost*</u> A Specialist Technology Company must highlight in the Summary section any expected material increase in costs or expenses (such as research and development expenses and marketing expenses in connection with its products / services) during the period covered by the working capital forecast.

	Key area	Disclosure recommendations
(d)	**Products**	(i) Include in the Summary section a clear and accurate summary of its Specialist Technology Product(s) (ii) For each Specialist Technology Product (including those in the pipeline or not yet commercialised), disclose the existing stage and development timetable of the Specialist Technology Product (e.g. whether it is still in the prototype or testing stage, or it is conducting demonstrations in a controlled and real-world environment and close to delivering the final Specialist Technology Product), which should be presented in a fair and balanced manner and without favourable possibilities being presented as certain or as more probable than is likely to be the case (iii) The technical capabilities and commercial viability of the technology applied to the Specialist Technology Product(s) (iv) Specify the origins (i.e. in-licensing or internally developed) and the jurisdiction rights of the intellectual property pertaining to the Specialist Technology Product(s)
(e)	**Disclosure on commercialisation status and prospects**	With respect to each Specialist Technology Product, disclose: (i) information on the commercialisation status, impediments to commercialisation, and the future commercialisation plan (ii) to substantiate its commercialisation plan, details of contracts, orders and/or letters of intention (if any) to illustrate revenue visibility, or an appropriate negative statement if there is no contract, order or letter of intention

	Key area	Disclosure recommendations
(f)	**Addressable market, market share and Industry Overview**	(i) With respect to each Specialist Technology Product, clearly define their respective addressable markets (including the current addressable market and the expected addressable market for a reasonable future period), and the current and expected market shares, in each case, together with the basis for determination, to provide information on the applicant's market position within the relevant industry (ii) *Current and expected addressable markets* • Clearly define both the current and expected addressable markets (e.g. by reference to a limited pool of customers using the products / services rather than only the overall market), and disclose material information of such markets (e.g. size, value, assumed growth rates in prices and quantities, and comparable products / services in the target market and other markets) • Disclose competitive landscape of the Specialist Technology Product(s) and, to the extent applicable, include the following information of the competing or potentially competing commercialised or pipeline products / services: (1) the name and price (including similar products / services launched in other jurisdictions and factors that may affect pricing in the target market); (2) expiration dates of key IP rights; (3) technologies; and (4) addressable markets • Substantiate any statements that the applicant's products / services are likely to be more competitive or better (iii) *Current and expected market share* • Clearly disclose the basis for determination of the current and expected market shares • Disclose the expected market share for a reasonable future period • Disclose all assumptions (e.g. assumed demand and supply, and pricing strategies among the competitors)
(g)	**Business model based disclosures**	(i) Clearly disclose the business model(s) of the applicant in the Summary and Business sections. We expect the applicant to disclose key aspects of its business model(s), which can be one of the following, or a combination of them, and/or other business models: • subscription-based model • transaction-based model (ii) For each Specialist Technology Product from which the applicant has recorded sales during and after (if applicable) the track record period, the applicant must disclose key metrics relevant to its business model(s), with non-exhaustive examples as follows:

	Key area	Disclosure recommendations
		• *For subscription-based companies*: total number of subscribers, total number of paying subscribers, total number of new subscribers, total customer acquisition cost ("CAC"), annual recurring revenue [4], customer retention rate [5] and net dollar retention rate [6] and contribution margin[7] • *For transaction-based companies*: total number of customers, total number of new customers, total CAC, number of transactions, average transaction value, customer retention rate and net dollar retention rate (iii) Clearly present the key metrics disclosed by reference to regular intervals, with the basis for determination and reasons for material fluctuations (if any) explained

[4] For companies with monthly subscription revenue, annual recurring revenue (ARR) is determined by twelve times the subscription component of monthly recurring revenue (MRR). MRR is measured on the final day of each month the company's monthly subscription services fees.

[5] Customer retention rate refers to the percentage of customers for the immediately preceding year which remained to be the company's customers for the current year.

[6] Net dollar retention rate refers to the ratio of revenue contribution of a customer group in the immediately preceding year to the revenue contribution of the same group of customers for the current year.

[7] Contribution margin refers to the percentage of contribution bearing to revenue. Contribution is determined by revenue less variable costs (such as the variable components of cost of sales and selling and marketing expenses)

	Key area	Disclosure recommendations
(h)	**Research and development ("R&D") investment and experience and specific risks**	Disclose in the listing document: (i) a detailed breakdown of its R&D investment for each of the three financial years prior to listing (ii) the size, experience, qualifications and areas of specialisation of the R&D team, and how long they have been working on similar products / services (iii) the percentage of IPO proceeds to be spent on R&D (iv) the stage of R&D for key products / services in the pipeline or not yet commercialised (v) details of the Specialist Technology Company's R&D experience in the relevant Specialist Technology Industry and acceptable sector, including: (1) details of its operations in R&D (2) the collective expertise and experience of key management and technical staff (3) collaborative R&D arrangements, including the calibre and experience of collaborating parties, the material terms of the relevant arrangements, who will have ownership of IP rights (4) the relevant experience of the Specialist Technology Company's directors and senior management in the R&D, manufacturing and commercialisation of the relevant Specialist Technology Product(s) (5) the salient terms of any service agreements between the applicant and its key management and technical staff (6) measures (if any) that the applicant has in place to retain key management or technical staff (for example incentivisation arrangements and/or non-compete clauses), and the measures and arrangements that the applicant has in place, in the event of the departure of any of its key management or technical staff (7) statement of any legal claims or proceedings that may have an influence on its R&D for any Specialist Technology Product

	Key area	Disclosure recommendations
(i)	**Industry standards/ competent authority requirements**	(i) Disclose details of any applicable industry-specific standards, definitions or classifications (e.g. for autonomous vehicles, the level of automotive automation defined by the relevant industry association), and the basis for determination; and whether the applicant's Specialist Technology Product(s) have met such standards, definitions or classifications (ii) Disclose details of any relevant regulatory approval required and/or obtained for each Specialist Technology Product, and a statement that no material unexpected or adverse changes have occurred since the date of issue of the relevant regulatory approval for a Specialist Technology Product (if any). Where there are material changes, these must be prominently disclosed (iii) If applicable, disclose a summary of material communications with the relevant competent authority in relation to its Specialist Technology Product(s), and the results of such communications (iv) Disclose all material safety data relating to its Specialist Technology Product(s), including any serious adverse events

	Key area	Disclosure recommendations
(j)	**Intellectual property**	(i) Disclose details of any intellectual property right(s) granted and applied for in relation to the Specialist Technology Product(s), or an appropriate negative statement; (ii) With respect to material intellectual property rights: • include in the Summary section the material intellectual property rights • disclose the tenure and material payment obligations associated with such intellectual property rights and residual intellectual property rights, and whether such rights are in-licensed or self-owned • to the extent that any material intellectual property right is in-licensed, disclose a clear statement of the applicant's material rights and obligations under the applicable licensing agreement (iii) Clearly disclose the details and significance of material intellectual property rights in relation to the Specialist Technology Product, including: • the part of the Specialist Technology Product to which the material intellectual property right is attributing or protecting (for example, whether key technology or product packing); and • the extent and form to which such intellectual property is protected (e.g. whether patent is in the process of application, or patent has already been registered, procedures put in place to protect intellectual property rights not registered or not in the process of registration) (iv) Highlight any risk of intellectual property infringements in the Summary and Risk Factors sections, and disclose a positive statement by the directors (supported by the sponsor's due diligence) as to whether the applicant had any instances of infringement of third parties' intellectual property rights and, if so, the relevant details and potential impact on the applicant's operation
(k)	**Risks**	(i) Disclose specific risks, general risks and dependencies, including the extent to which the applicant's business is dependent on key individuals and the impact of the departure of key management or technical staff on the applicant's business and operations (ii) If relevant and material to the Specialist Technology Company's business operations, disclose information on project risks arising from environmental, social, and health and safety issues
(l)	**Warning statement on the cover of the Listing Document**	A warning statement that the company is a Specialist Technology Company and investment in its shares carries additional risks

	Key area	Disclosure recommendations
(m)	**Additional disclosures for Pre-Commercial Companies**	In addition to the disclosures required in paragraph 26 of this guidance letter, a Pre-Commercial Company is required to disclose, in the listing document: (i) the stage of research and development for each of its Specialist Technology Product(s) (ii) development details by key stages and milestones for its Specialist Technology Product(s) to meet the revenue requirement in Rule 18C.03(4) In defining the key stages and milestones, a Pre-Commercial Company should make reference to the industry-specific standards, definitions or classifications, and the relevant regulatory approval required, as disclosed by reference to Key area (i) - "Industry standards/ competent authority requirements" above. In the absence of such requirements, a Pre-Commercial Company should define its own stages and milestones that are appropriate for its relevant industry (iii) All relevant risks associated with the commercialisation of each of its Specialist Technology Product(s) (iv) A prominent warning on the cover of the Listing Document drawing investors' attention to the risk that it may not generate sufficient revenue to sustain its operations after listing and that it may fail due to a lack of available funds

G. Subscription of shares by existing shareholders

33. Given the likely significant funding needs of Specialist Technology Companies and the importance of existing shareholders in meeting the funding needs of these companies, existing shareholders may participate in the IPO of a Specialist Technology Company provided that the applicant complies with Listing Rules 8.08(1), 18C.07 and 18C.09. For the avoidance of doubt, the Existing Shareholders Conditions in GL85-16 do not apply to Specialist Technology Companies. Instead, the following applies:

    (a) an existing shareholder holding less than 10% of shares in the Specialist Technology Company may subscribe for shares in the IPO as either a cornerstone investor or as a placee. In the case of subscription as a placee, the applicant and its sponsor must confirm that no preference in allocation was given to the existing shareholder. In the case of subscription as a cornerstone investor, the applicant and its sponsor must confirm that no preference was given to the existing shareholder other than the preferential treatment of assured entitlement at the IPO price and the terms must be substantially the same as other cornerstone investors; and

    (b) an existing shareholder holding 10% or more of shares in the Specialist Technology Company may subscribe for shares in the IPO as a cornerstone investor.

34. An existing shareholder with a contractual anti-dilution right may exercise such right and subscribe for shares in the IPO in accordance with the existing requirements under paragraph 3.10 of GL43-12.

35. Where allocations will be made to core connected persons, the Specialist Technology Company must apply for, and the Exchange will ordinarily grant, a related Rule 9.09 waiver, if applicable.

H. Stock Marker

36. The listed securities of a Pre-Commercial Company will be assigned a special stock short name marker that ends with the marker "PC".

I. Lock-up periods

Key persons

37. It is stated in Rule 18C.13(1)(d) that "key personnel responsible for the Specialist Technology Company's technical operations and/or the research and development of its Specialist Technology Product(s)" should be subject to the restrictions on disposal in that Rule.

38. By way of example for illustration purposes only, the personnel referred to in Rule 18C.13(1)(d) includes the head and the key personnel of its research and development department whose expertise is primarily relied upon by the company for the development of the Specialist Technology Product(s), and the lead developer(s) of the core technologies in relation to the Specialist Technology Product(s).

39. Applicants should identify the key persons referred to in Rule 18C.13(1) above having regard to the specific facts and circumstances of each listing applicant, and disclose the basis for their determination.

40. The Exchange may request an applicant to provide supporting documentation to substantiate the basis on which such key persons have been identified.

41. The Exchange may deem any person to be a key person falling within the scope of Rule 18C.13(1) based on the facts and circumstances of an individual case.

Existing investors

42. Rule 18C.13(2) states that "such existing investors in a Specialist Technology Company as identified by the Exchange in guidance published on the Exchange's website, as amended from time to time", are subject to the restrictions on the disposal of securities of that Rule.

43. The lock-up restrictions of Rule 18C.13(2) apply to all sophisticated independent investors in a Specialist Technology Company that satisfy the criteria as set out in paragraph 23(a) above, being all sophisticated independent investors who: (a) have invested in that company at least 12 months before the date of its listing application; and (b) each hold such amount of shares or securities convertible into shares equivalent to 5% or more of the issued share capital of the listing applicant as at the date of its listing application and throughout the pre-application 12-month period. All such investors must be subject to the restrictions on disposal in Rule 18C.13(2).

J. Calculation of percentage ratios

44. Since Specialist Technology Companies listed under Chapter 18C are not required to meet any of the financial eligibility tests under Rules 8.05(1), 8.05(2) or 8.05(3) at the time of listing, they may not have recorded any profit (and in the case of Pre-Commercial Companies, they may not have recorded any revenue). Accordingly, the application of the revenue ratio and the profit ratio to any proposed transaction that these issuers propose to undertake may not be appropriate in some cases.

45. The Exchange may exercise its discretion under Rule 14.20 to disregard the revenue ratio and the profit ratio (where applicable) for any Specialist Technology Company listed under Chapter 18C and consider other relevant indicators of size, including industry specific tests suggested by the issuer, on a case-by-case basis. The listed issuer must provide alternative tests which it considers appropriate to the Exchange for consideration.

APPENDIX VI: PRIVACY STATEMENT AND DISCLAIMER

Privacy Policy Statement

Hong Kong Exchanges and Clearing Limited, and from time to time, its subsidiaries (together the "**Group**") (and each being "**HKEX**", "**we**", "**us**" or "**member of the Group**" for the purposes of this Privacy Policy Statement as appropriate) recognise their responsibilities in relation to the collection, holding, processing, use and/or transfer of personal data under the Personal Data (Privacy) Ordinance (Cap. 486) ("**PDPO**"). Personal data will be collected only for lawful and relevant purposes and all practicable steps will be taken to ensure that personal data held by us is accurate. We will use your personal data which we may from time to time collect in accordance with this Privacy Policy Statement.

We regularly review this Privacy Policy Statement and may from time to time revise it or add specific instructions, policies and terms. Where any changes to this Privacy Policy Statement are material, we will notify you using the contact details you have provided us with and, where required by the PDPO, give you the opportunity to opt out of these changes by means notified to you at that time. Otherwise, in relation to personal data supplied to us through the HKEX website or otherwise, continued use by you of the HKEX website or your continued relationship with us shall be deemed to be your acceptance of and consent to this Privacy Policy Statement, as amended from time to time.

If you have any questions about this Privacy Policy Statement or how we use your personal data, please contact us through one of the communication channels set out in the "Contact us" section below.

We will take all practicable steps to ensure the security of the personal data and to avoid unauthorised or accidental access, erasure or other use. This includes physical, technical and procedural security methods, where appropriate, to ensure that the personal data may only be accessed by authorised personnel.

Please note that if you do not provide us with your personal data (or relevant personal data relating to persons appointed by you to act on your behalf) we may not be able to provide the information, products or services you have asked for or process your requests, applications, subscriptions or registrations, and may not be able to perform or discharge the Regulatory Functions (defined below).

Purpose

From time to time we may collect your personal data including but not limited to your name, mailing address, telephone number, email address, date of birth and login name for the following purposes:

1. to process your applications, subscriptions and registration for our products and services;
2. to perform or discharge the functions of HKEX and any company of which HKEX is the recognised exchange controller (as defined in the Securities and Futures Ordinance (Cap. 571)) ("Regulatory Functions");

3. to provide you with our products and services and administer your account in relation to such products and services;
4. to conduct research and statistical analysis;
5. to process your application for employment or engagement within HKEX to assess your suitability as a candidate for such position and to conduct reference checks with your previous employers; and
6. other purposes directly relating to any of the above.

Direct marketing

Where you have given your consent and have not subsequently opted out, we may also use your name, mailing address, telephone number and email address to send promotional materials to you and conduct direct marketing activities in relation to HKEX financial services and information services, and financial services and information services offered by other members of the Group.

If you do not wish to receive any promotional and direct marketing materials from us or do not wish to receive particular types of promotional and direct marketing materials or do not wish to receive such materials through any particular means of communication, please contact us through one of the communication channels set out in the "Contact us" section below. To ensure that your request can be processed quickly please provide your full name, email address, log in name and details of the product and/or service you have subscribed.

Identity card number

We may also collect your identity card number and process this as required under applicable law or regulation, as required by any regulator having authority over us and, subject to the PDPO, for the purpose of identifying you where it is reasonable for your identity card number to be used for this purpose.

Transfers of personal data for direct marketing purposes

Except to the extent you have already opted out we may transfer your name, mailing address, telephone number and email address to other members of the Group for the purpose of enabling those members of the Group to send promotional materials to you and conduct direct marketing activities in relation to their financial services and information services.

Other transfers of personal data

For one or more of the purposes specified above, the personal data may be:

1. transferred to other members of the Group and made available to appropriate persons in the Group, in Hong Kong or elsewhere and in this regard you consent to the transfer of your data outside of Hong Kong;
2. supplied to any agent, contractor or third party who provides administrative, telecommunications, computer, payment, debt collection, data processing or other services to HKEX and/or any of other member of the Group in Hong Kong or elsewhere; and
3. other parties as notified to you at the time of collection.

How we use cookies

If you access our information or services through the HKEX website, you should be aware that cookies are used. Cookies are data files stored on your browser. The HKEX website automatically installs and uses cookies on your browser when you access it. Two kinds of cookies are used on the HKEX website:

Session Cookies: temporary cookies that only remain in your browser until the time you leave the HKEX website, which are used to obtain and store configuration information and administer the HKEX website, including carrying information from one page to another as you browse the site so as to, for example, avoid you having to re-enter information on each page that you visit. Session cookies are also used to compile anonymous statistics about the use of the HKEX website.

Persistent Cookies: cookies that remain in your browser for a longer period of time for the purpose of compiling anonymous statistics about the use of the HKEX website or to track and record user preferences.

The cookies used in connection with the HKEX website do not contain personal data. You may refuse to accept cookies on your browser by modifying the settings in your browser or internet security software. However, if you do so you may not be able to utilise or activate certain functions available on the HKEX website.

Compliance with laws and regulations

HKEX and other members of the Group may be required to retain, process and/or disclose your personal data in order to comply with applicable laws and regulations or in order to comply with a court order, subpoena or other legal process (whether in Hong Kong or elsewhere), or to comply with a request by a government authority, law enforcement agency or similar body (whether situated in Hong Kong or elsewhere) or to perform or discharge the Regulatory Functions. HKEX and other members of the Group may need to disclose your personal data in order to enforce any agreement with you, protect our rights, property or safety, or the rights, property or safety of our employees, or to perform or discharge the Regulatory Functions.

Corporate reorganisation

As we continue to develop our business, we may reorganise our group structure, undergo a change of control or business combination. In these circumstances it may be the case that your personal data is transferred to a third party who will continue to operate our business or a similar service under either this Privacy Policy Statement or a different privacy policy statement which will be notified to you. Such a third party may be located, and use of your personal data may be made, outside of Hong Kong in connection with such acquisition or reorganisation.

Access and correction of personal data

Under the PDPO, you have the right to ascertain whether we hold your personal data, to obtain a copy of the data, and to correct any data that is inaccurate. You may also request us to inform you of the type of personal data held by us. All data access requests shall be made using the form prescribed by the Privacy Commissioner for Personal Data ("**Privacy Commissioner**") which may be found on the official website of the Office of the Privacy Commissioner or via this link https://www.pcpd.org.hk/english/publications/files/Dforme.pdf.

Requests for access and correction of personal data or for information regarding policies and practices and kinds of data held by us should be addressed in writing and sent by post to us (see the "Contact Us" section below).

A reasonable fee may be charged to offset our administrative and actual costs incurred in complying with your data access requests.

Termination or cancellation

Should your account or relationship with us be cancelled or terminated at any time, we shall cease processing your personal data as soon as reasonably practicable following such cancellation or termination, provided that we may keep copies of your data as is reasonably required for archival purposes, for use in relation to any actual or potential dispute, for the purpose of compliance with applicable laws and regulations and for the purpose of enforcing any agreement we have with you, for protecting our rights, property or safety, or the rights, property or safety of our employees, and for performing or discharging our functions, obligations and responsibilities.

General

If there is any inconsistency or conflict between the English and Chinese versions of this Privacy Policy Statement, the English version shall prevail.

Contact us

By Post:

Personal Data Privacy Officer
Hong Kong Exchanges and Clearing Limited
8/F., Two Exchange Square
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