



OUR HONG KONG
FOUNDATION
團結香港基金

Healthcare and Ageing Policy Research Report:
**Building an Age-Friendly City—
Embedding Gerontechnology Into Everyday Life**



Table of Contents

	Executive Summary	2
	Introduction	12
1	Supply-side	32
2	Demand-side	48
3	Infrastructure	62
4	Investment	72
5	Education & Talent Development	76
	Conclusion	86

What is gerontech and why is it important?

According to the World Health Organization (WHO), creating an age-enabling city requires nine core ingredients, one of which includes “Technology and Innovation”, and by extension, gerontechnology (WHO, 2015). Gerontech is a fast-growing industry with significant potential to improve the lives of elderly and persons with disabilities (PWD). It is therefore an important tool to help the city to overcome challenges related to population ageing.

This is particularly significant for Hong Kong, as we not only have a rapidly growing ageing population, but also the longest average life expectancy in the world—**82.9 years for males** and **88.0 years for females** as of 2020 (C&SD, 2021, September 10). Some of the challenges that the city faces in relation to population ageing include the high institutionalisation rate of elderly and PwD, weak primary care in relation to chronic disease prevention and management, severe manpower shortages resulting in increased caregiver burden, and inadequate medical-social collaboration to meet the health and welfare needs of elders and PwD (OHKF, 2018).

All of these challenges represent areas where gerontech could positively contribute. Yet, whether a widespread adoption of gerontech can succeed depends on our commitment to build on the successes and momentum within the industry today, as well as to identify key areas where more can be done to further grow and mature the gerontech ecosystem. This is the focus of this report.

How has Hong Kong's gerontech ecosystem developed in the past few years?

In 2017, Our Hong Kong Foundation (OHKF) partnered with the Hong Kong Council of Social Service (HKCSS) to publish Hong Kong's **first ever gerontechnology report**, titled *Gerontechnology Landscape Report* (OHKF, 2017, June). The report identified 24 gaps representing areas of insufficiency and opportunities facing the ecosystem.

When we first published that report, many stakeholders were still exploring gerontech. But in the past years, **since the report's publication, Hong Kong's gerontech ecosystem has organically blossomed through the launching of many gerontech-related initiatives by both public and private parties**. Given the notable difference in circumstances from then to now, **it is therefore high time to reconsider and re-formulate our holistic analysis of Hong Kong's gerontech ecosystem**.

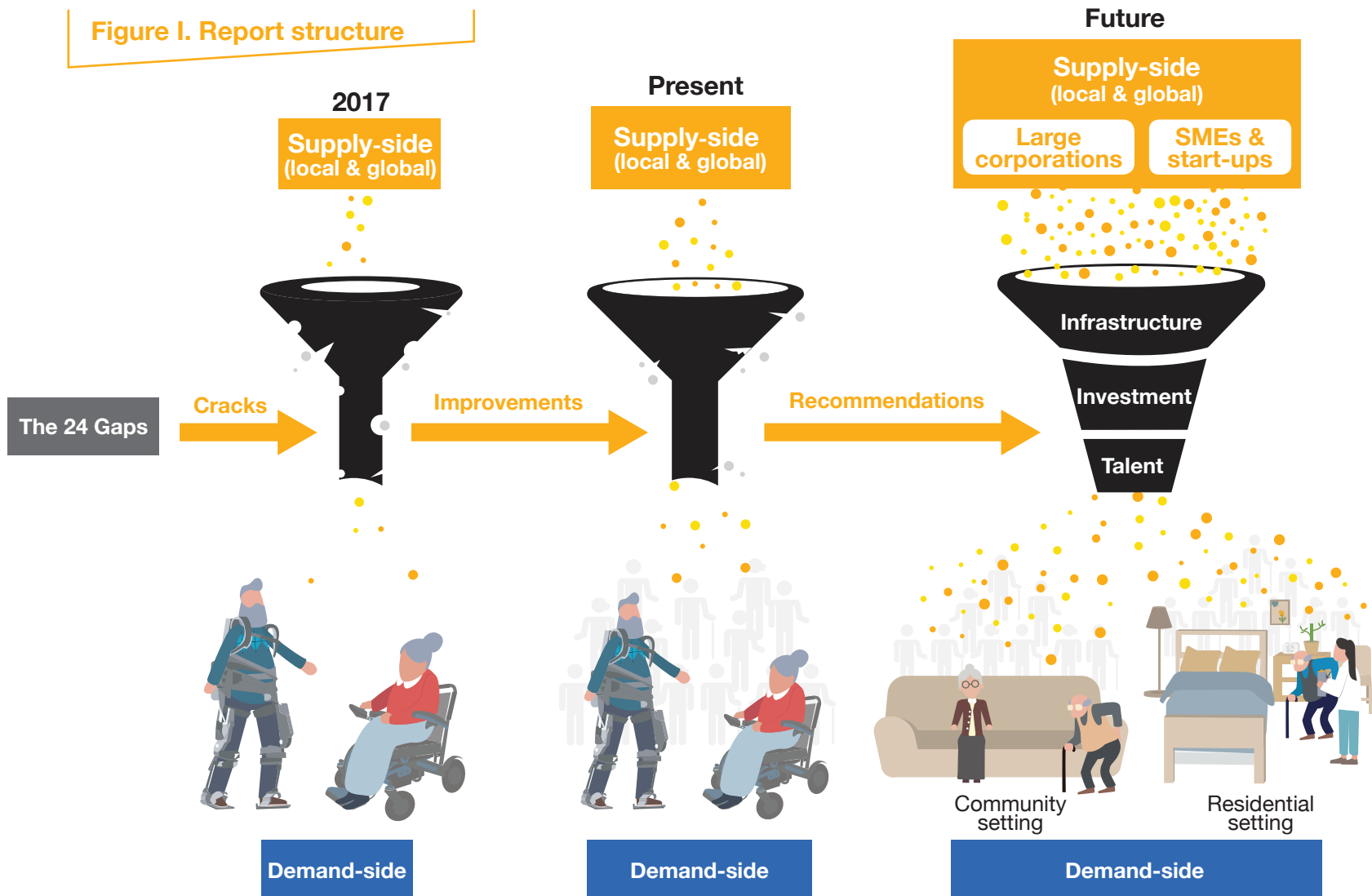
The first section of our report looks at the extent to which the 24 gaps have improved. To do this, we conducted a survey to gather data on the development of Hong Kong's gerontech ecosystem with relevant stakeholders. **The survey revealed that, on the whole, Hong Kong's gerontech ecosystem has improved** in the past years. Some of the most improved gaps include awareness, government risk aversion, and applied research funding, while many other gaps also saw some improvement.

However, there are three gaps that have worsened, including insufficient retirement protection, academics' lack of incentives to pursue gerontech research, and complicated medical device registration processes.

Put together, our survey findings suggest that there remain many areas within Hong Kong's gerontech ecosystem that need more support or attention. As such, the remaining chapters of the report considers how key levers can address and overcome these gaps, which we hope can enhance Hong Kong's gerontech ecosystem in the coming years.

Figure I illustrates the key levers identified, as well as the overall storyline and structure of this report. In 2017, Hong Kong's gerontech ecosystem was very fragmented, represented by the funnel with several cracks. Due to all the improvements in initiatives as well as an increase in the number of supply-side and demand-side players, we now have a solidified funnel under "Present" in the figure. While these are positive signs, we believe that more can be done to further grow the gerontech ecosystem. As such, we have proposed strategic key levers under "Future" in the figure, which we believe can facilitate the expansion of the city's local gerontech ecosystem and enable a smoother flow of gerontech products and services from supply-side to demand-side.

Figure I. Report structure



Each of the key levers identified form a chapter of this report. **Chapter 1** discusses supply-side support, namely relating to receiving user feedback, specific issues faced by start-ups, and issues concerning import and export. **Chapter 2** discusses demand-side needs, differentiated based on elderly living in residential setting compared to those living in a community setting. **Chapter 3** discusses how to improve the availability of gerontechnology-friendly infrastructure, both within public spaces and inside private homes. **Chapter 4** discusses how to leverage public-private investment partnerships for gerontechnology. **Chapter 5** discusses how to nurture the relevant talent to sustain the gerontechnology ecosystem, including the creation of gerontechnology consultants, facilitating knowledge transfer, and enhancing general education.

1. Enabling supply-side to produce more and better gerontechnology products and services

Within Hong Kong's gerontechnology ecosystem, the "supply-side" refers to organisations and individuals that create and supply gerontechnology products and services to consumers. The past years have seen an increase in the quantity and quality of gerontechnology suppliers, which has brought more gerontechnology products and services to the market. Yet, there remains a gap in actually bringing these products and services into the hands of users.

Connecting supply-side with demand-side stakeholders is one of the main focuses of the Gerontechnology Platform (GT Platform), an initiative funded by the Hong Kong SAR Government (the Government)'s Social Innovation and Entrepreneurship Development Fund (SIE Fund) and coordinated by HKCSS to lead collaborative efforts within the gerontechnology ecosystem (HKCSS, 2021). The GT Platform is therefore ideally positioned to implement several recommendations about connecting supply-side with demand-side, such as those related to user feedback. As another mandate of the GT Platform is capacity building, it is also well-positioned to implement recommendations related to increasing start-up specific support and providing additional mechanisms to enhance the import and export of gerontechnology products and services.

1.1 Increasing opportunities for suppliers to obtain user feedback

Many suppliers face difficulties in obtaining user feedback, which is especially important to gerontechnology because many elders and PwD have specific health or social needs. We therefore recommend the Government to create more opportunities for suppliers to obtain user feedback at every stage of the product development cycle. At the early stages, companies and financiers struggle to conduct gerontechnology market analysis due to limited data, such as the health and social needs of end-users or their gerontechnology consumption patterns. As such, **we recommend that the Census and Statistics Department collaborate with relevant government departments to conduct a thematic survey on the size and needs of the gerontechnology market.**

During the middle stages, suppliers need access to testing grounds for end-users to give them feedback for product enhancement; testing grounds can also test how effective products are in helping end-users. **In the future, we recommend that the GT Platform’s testing grounds allow for relevant parties to conduct both gerontech product evaluation and enhancement.** Also, to enable suppliers to further obtain post-procurement feedback on their products following their market release, **we recommend that the GT Platform add a comment function to their existing Product List.**

1.2 Specific support structures for start-ups

Generally, start-ups need more support than large corporations because of their comparatively limited access to financial and human resources. Many gerontech start-ups face the additional hurdle as they struggle to access end-users. To this end, **we recommend that the GT Platform set up an Elderly, PwD & Caregiver Advisory Panel, consisting of end-users who can readily provide feedback to start-ups.** Many gerontech start-ups also struggle to understand user needs and the regulatory requirements of the elderly and rehabilitation services sector. As such, **we recommend the GT Platform to provide a specific training course for start-ups** that explain user needs in relation to ageing, disability, and rehabilitation, as well as the operational context and regulatory requirements of the elderly and rehabilitation services sector.

1.3 Mechanisms to facilitate the import and export of gerontech products and services

Due to Hong Kong’s limited gerontech market size, many local suppliers desire to expand into the emerging Greater Bay Area (GBA) market. Yet, many struggle with learning how to do this. To this extent, **we recommend that the GT Platform help local start-ups to conduct site visits and product trials at service units in the GBA. We also recommend the Central Government to explore the option of having approved products from the Social Welfare Department’s Innovation and Technology Fund for Application in Elderly and Rehabilitation Care (\$1 billion I&T Fund) Reference List allowed for direct use in GBA service units.**

Our small market size also means that many foreign companies are reluctant to import and localise their products. To overcome this, **we recommend the GT Platform to collaborate with InvestHK to create strategic partnerships with international gerontech organisations and platforms.** Furthermore, **we recommend that GT Platform and InvestHK collaborate to create a gerontech “Regulation & Localisation Consultancy”,** which would help overseas companies understand gerontech-related standards and cultural practices in Hong Kong, as well as provide local gerontech companies with information on overseas gerontech standards and cultural practices.

2. Increasing demand-side's financial accessibility to gerontech products and services

Within the gerontech ecosystem, the “demand-side” refers to ends-users, including the elderly, PwD, and caregivers in either institutional or home settings. In recent years, we have seen a growth in the demand-side, with more end-users accessing and using gerontech as an organic response to the increase in supply.

Due to increasing levels of tech penetration and higher educational attainment among the young old (aged 45–64), we anticipate significant market potential for gerontech. However, at present, many existing demand-side users and organisations do not have enough purchasing power to acquire gerontech on their own. The Government must therefore play a key role in generating momentum to sustain the gerontech market's growth in the coming years. In particular, they must consider how to support both end-users living in institutional and community settings.

2.1 Elderly living in care homes

One of the most important financial drivers to Hong Kong's gerontech ecosystem is the Government's \$1 billion I&T Fund, which subsidises Government-subsented elderly and rehabilitation service units to purchase and rent gerontech products. The \$1 billion I&T Fund encompasses two schemes: i) procurement/rental of innovative technology products; and ii) trial use of newly developed products.

One significant issue is that 100% privately funded elderly and rehabilitation service units do not have access to the \$1 billion I&T Fund. As more than half of the residential care homes for the elderly are 100% privately funded, many elderly living in residential institutions do not benefit from the \$1 billion I&T Fund. **We therefore recommend the Government to renew the \$1 billion I&T Fund after its completion in the 2023/24 fiscal year and extend the renewed funding scheme to cover all care homes.** Specific measures should be in place to ensure that the service quality of 100% privately funded organisations is comparable to that of subsidised elderly care homes.

Another key issue is that the \$1 billion I&T Fund's trial use scheme has received little reception. For instance, applicant's lack of technical know-how has deterred them from making rightful applications. To improve this, **we recommend that the Social Welfare Department empower applicants by providing more information for the trial use scheme**, such as a detailed handbook to help applicants identify and select appropriate gerontech products for trial.

2.2 Elderly living in the community

One of the largest challenges currently facing Hong Kong's gerontech ecosystem is helping end-users in the community to access and use gerontech. Currently, the Government's primary gerontech-related spending—the aforementioned \$1 billion I&T Fund—mainly benefits institutions. However, less than 8.1% of Hong Kong's elderly live in residential settings, whereas most elderly (91.9%) live in domestic households within the community (C&SD, 2018). As such, the majority of end-users who live in the community lack the Government's support to procure gerontech.

But in the short to medium term, it is difficult to expect current end-users in the community to procure gerontech without some financial assistance, as Hong Kong's inadequate retirement protection system provides elderly with little incentive to spend money, especially on gerontech. However, elderly do have access to different voucher schemes that subsidise the cost of certain medical or welfare care services, and there is widespread support for vouchers to be expanded to cover the procurement of gerontech.

Therefore, **we recommend the Government to extend the scope and increase the amount of the Elderly Healthcare Voucher Scheme (EHCVS) and the Community Care Service Voucher (CCSV) to allow for the purchase or rental of gerontech products.** Such an extension is justifiable because the preventive and rehabilitative nature of gerontech products closely aligns with the EHCVS's objective to promote preventive care and the CCSV's objective to promote ageing-in-place.

We also recommend that the voucher extension be clear on what gerontech products are covered for whom. This should be done through a pre-approved list with two tiers, namely **Tier I** for basic, lower-valued products that encourage prevention and **Tier II** for more advanced, higher-valued products that can better support frail elderly. All end-users can purchase or rent Tier I products through the EHCVS voucher extension, while Tier II products are reserved for users with moderate or severe needs to purchase or rent via the CCSV voucher extension. Due to the Tier II products' more advanced nature, an additional referral from an occupational therapist or a physiotherapist should be required.

3. Enhancing city-wide gerontech infrastructural capacities

In Hong Kong, many end-users cannot easily view gerontech products and do not know where to procure these products within their local communities. In addition, many end-users who live in the community—particularly those living in private housing—have difficulty installing gerontech in their homes. These issues indicate the extent to which there are few “gerontech-friendly” public and private infrastructures in Hong Kong.

3.1 Increasing district-level accessibility to gerontech

There is currently no public space where end-users can easily access gerontech products in all 18 districts in Hong Kong. While there are a few privately-run gerontech showrooms, they are not present in all districts, and it is also often not possible to purchase or rent gerontech products on display in these showrooms. We therefore believe that the Government should take a leading role in increasing the physical accessibility of gerontech products to end-users living in the community.

As such, we recommend that the Government build a “Gerontech Corner” in District Health Centres. We envision this Gerontech Corner to perform three key functions. First, it can host gerontech-related public education and awareness-raising activities. Second, end-users should be able to directly purchase or rent products on display through the voucher scheme extensions. Third, the Gerontech Corner should also operate as a “product testing hub” enabling user feedback from visitors to be collected.

3.2 Home Modification Scheme

It is necessary to provide elderly and PwD with a safe and accessible home environment to facilitate their independent living and avoid institutionalisation. Currently, there are some initiatives that help end-users living in public housing to receive basic home modification, such as widening doorways, laying non-slip floor tiles, and installing handrails. Unfortunately, similar schemes do not exist for end-users living in private housing. **We therefore recommend the Buildings Department to create a similar Home Modification Scheme for elderly and PwD living in private housing.** Eligible households should be entitled to a one-time grant of maximum HKD \$10,000 for costs incurred.

4. Leveraging public-private partnership financing models for innovative gerontech service delivery

Accompanying the expansion of Hong Kong’s gerontech ecosystem in recent years is a growth in the number of financiers interested in investing into gerontech. However, despite both public and private financiers’ interests in funding gerontech projects, there are few gerontech public-private partnerships.

Pay-for-Success (PFS) is an innovative financing model for social services. In short, private investors fund a social project under the agreement that—only if the service provider meets pre-determined outcome-based Key Performance Indicators (KPIs) measured through social impact assessments—will the Government then repay the private investor with interest. PFS is particularly suitable for testing innovative and preventive services, which greatly suits the nature of gerontech products and services. **We therefore recommend using PFS as an innovative way to bring together public and private financiers within the gerontech industry.**

5. Training up the next generation of innovative gerontech industry professionals

Many of Hong Kong's efforts in education and training of gerontech-specific skills are either scattered or not formally recognised. If Hong Kong hopes to develop the gerontech industry to its fullest potential, it needs to align and nurture talent who are passionate and have the necessary skill sets to drive and meet the various needs of the industry.

5.1 Vocational training for gerontech-specific skills

The procurement of gerontech is not only limited to an individual product—it also refers to a lengthy process, one that generally requires the involvement of different professionals at different stages. To streamline this, **we recommend training up gerontech consultants as the primary contact person to assist elderly and PwD to purchase or rent gerontech.** To provide formal training and recognition in the care sector, **we recommend the Social Welfare Department to introduce a new vocational qualifications pathway under the Qualifications Framework to certify and register gerontech consultants in Hong Kong.**

5.2 Entrepreneurial support and training

To promote research-driven gerontech innovation in universities, flexible policies for researchers to translate their output into real-life impact is needed. The terms and conditions offered by universities in Hong Kong for researchers seeking commercialisation remain very unattractive. First, **we recommend that Hong Kong universities provide flexible policies on patent ownership and buyout.** Second, **we recommend that universities identify suitable licensing terms and revenue-distribution ratios.** Third, **we recommend universities to consider accepting a small share of equity as compensation for paying for the licensing fees of spin-off companies.**

In 2014, the Technology Start-up Support Scheme for Universities (TSSSU) was launched to encourage students and faculty members to establish technology start-ups or commercialise their research and development outcomes by forming spin-offs (Innovation and Technology Fund, 2021). To encourage collaboration with welfare services, **we recommend TSSSU to enhance the existing funding mechanism, as well as establish a second phase of funding. We also suggest that the prerequisite for accessing Phase II TSSSU funding to include industry collaboration with welfare service providers, such as elderly or rehabilitation service units.** To improve commercial prospects, TSSSU can recommend start-ups to create industry partnerships with service units that register to become gerontech testbeds under the GT Platform.

5.3 General awareness and education on gerontech

Despite efforts to raise awareness, there is a need for educational initiatives tailored towards younger people across the various stages of learning. At the primary and secondary levels,

we recommend hosting gerontech youth competitions on an annual basis, which we recommend to include a follow-up opportunity to commercialise innovative designs.

At the tertiary level, **we recommend that courses covering gerontech-related content be expanded across all universities and applied education institutes in Hong Kong.**

Looking forward towards a comprehensive gerontech ecosystem

Moving forward, while there are undeniably many positive signs of synergy and commitment within Hong Kong's gerontech ecosystem, there remain many areas that still do not receive adequate support. As such, the strengthening of key levers, namely supply-side, demand-side, infrastructure, investment and talent, will help enhance our gerontech ecosystem in the coming years. Our commitment to build on the successes and momentum within the industry today, as well as enhancing the gerontech ecosystem further, is a continued investment for the celebration of ageing.

From Gerontech Report 1.0 to 2.0

Gerontechnology and its importance¹

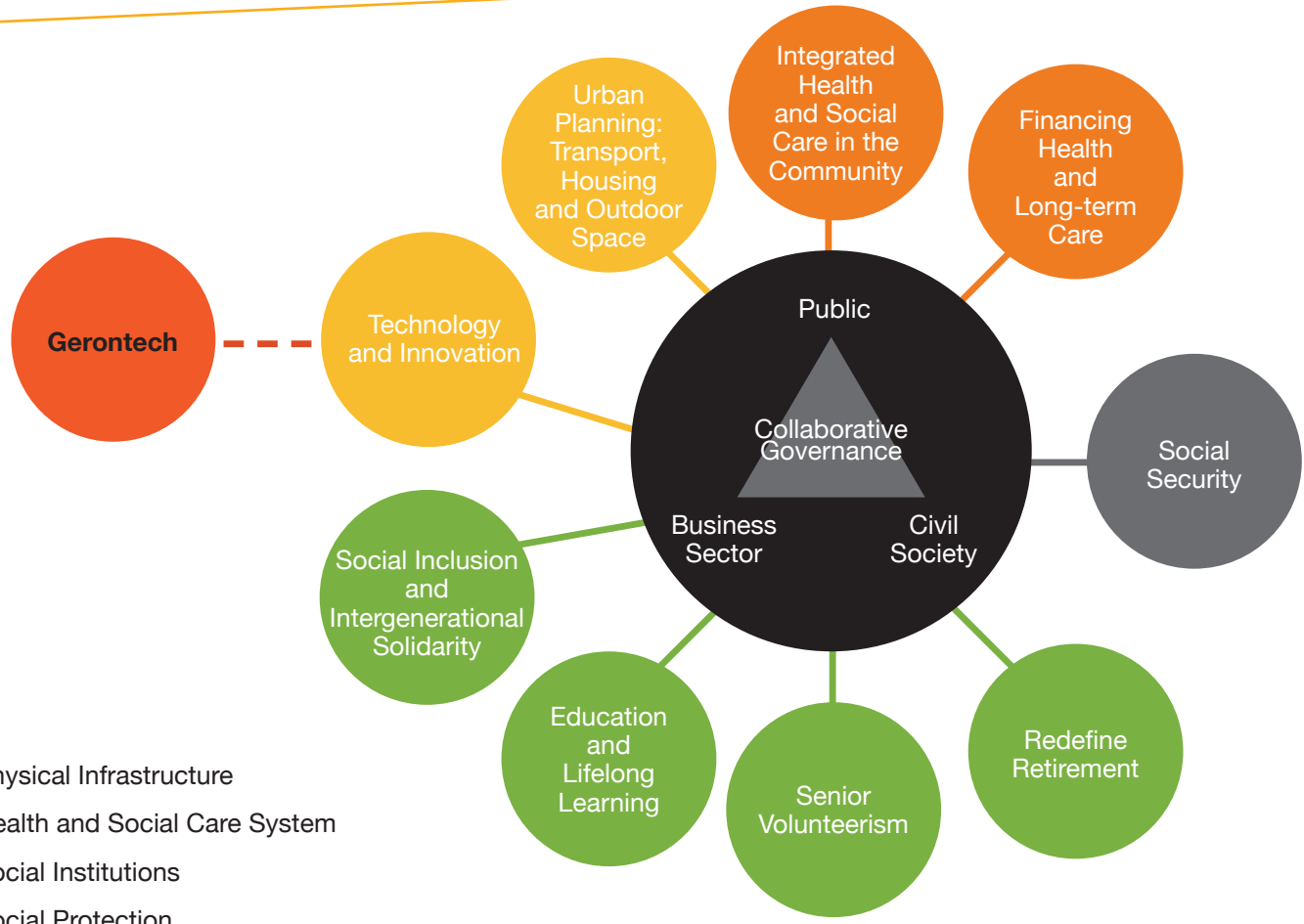
In 2017, Our Hong Kong Foundation (OHKF) partnered with the Hong Kong Council of Social Service (HKCSS) to publish Hong Kong's **first ever gerontechnology report** (hereinafter referred to as "Gerontech Landscape Report 1.0"), titled *Gerontechnology Landscape Report* (OHKF, 2017, June). The report was commissioned by the Government's Social Innovation and Entrepreneurship Development Fund (SIE Fund) with the purpose of exploring Hong Kong's existing gerontech ecosystem and landscape at the time.

In recent years, gerontech has become increasingly important to Hong Kong. In addition to our growing ageing population, we also have the longest average life expectancy in the world—**82.9 years for males** and **88.0 years for females** as of 2020 (Census and Statistics Department (C&SD), 2021, September 10). As such, there is an urgent need to think about how to transform Hong Kong into an age-enabling city that emphasises a culture of **healthy ageing**.² According to the World Health Organization (WHO), an age-enabling city includes nine elements, including "Technology and Innovation"—which is where gerontech fits in (**Figure 1**) (WHO, 2015).

¹ Gerontechnology is an interdisciplinary field that brings together gerontology, the scientific study of ageing, and technology, the development and distribution of technology (Fozard, Rietsema, Bouma, Graafsmans, 2000). The objective is to prevent, delay, or compensate for cognitive and physical decline that occurs during ageing and curate technological environments for older adults spanning across health, housing, mobility, communication, leisure, and work domains (García-Alonso & César Fonseca, 2019).

² According to the World Health Organization (2021), healthy ageing refers to "the process of developing and maintaining the functional ability that enables well-being in older age".

Figure 1. The WHO's elements of an age-enabling city



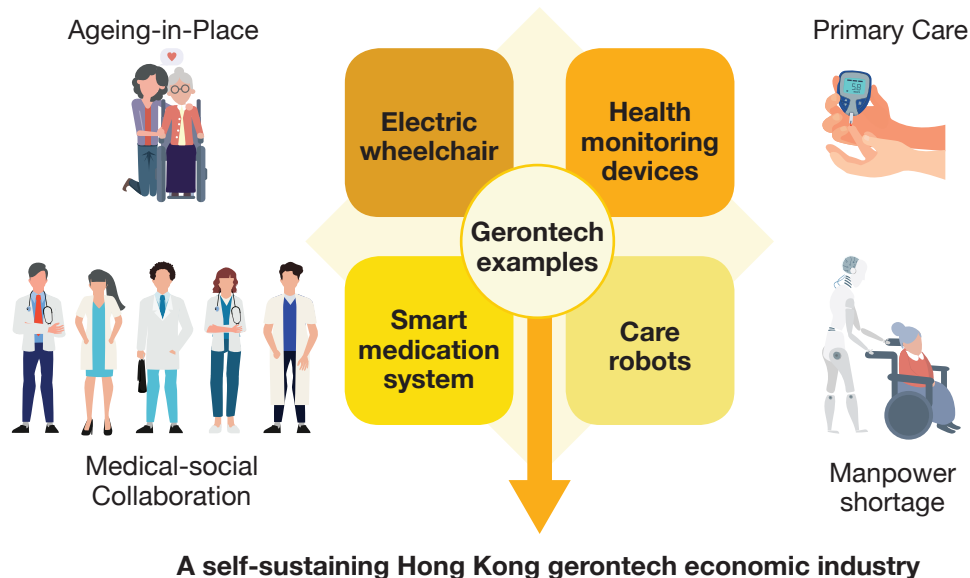
- Physical Infrastructure
- Health and Social Care System
- Social Institutions
- Social Protection

Source: OHKF, 2016

There are many problems associated with the city’s ageing population. In our report *Fit for Purpose: A Health System for the 21st Century*, some key challenges identified in relation to ageing include a **high institutionalisation rate** of elderly in residential homes, **weak primary care** when it comes to chronic disease prevention and management, **severe manpower shortages** resulting in **increased caregiver burden**, and **inadequate medical-social collaboration** for meeting the health and welfare needs of elders (OHKF, 2018). There are ways that gerontech can address each of these key challenges (**Figure 2**).

One of the key problems in Hong Kong is that, compared to other developed places, there is a much higher proportion of elders living in residential care institutions.³ This is due to a proliferation of residential care services (RCS) and limited and unaffordable community care services (CCS) (Chui, 2011). However, the Government’s vision for the elderly is “ageing in place as the core, institutional care as back-up” (Legislative Council (LegCo), 2016, February 16; Elderly Commission, 2017). Ageing-in-place means empowering elders to continue living independently in

Figure 2. Gerontech’s position in ageing-related policy directions



³ Hong Kong’s institutionalisation rate (8.10%) is among the highest compared to many developed places, such as Sweden (4.20%), South Korea (2.73%) and Japan (2.64%) (C&SD, 2018; Organization for Economic Cooperation & Development, 2021).

their existing neighbourhood. An example of how gerontech can help encourage ageing-in-place is through **intelligent sensor-equipped devices and smart wheelchairs**, which can improve the functional capacity and delay institutionalisation of elderly.

Another key challenge that elderly in Hong Kong face is chronic illness, with **78.1% of persons aged ≥ 65** suffering from a chronic health condition (C&SD, 2019).⁴ This high prevalence of chronic diseases among the elderly causes increasing strain on scarce medical resources. **Reorienting our healthcare system to emphasise primary care** can better accommodate the health needs of an ageing population. Primary care includes health promotion, supportive care, as well as disease prevention and management—including rehabilitation (Food and Health Bureau (FHB)—*What is Primary Healthcare*, 2021). Due to its preventive nature, primary care therefore represents a **more cost-effective way** to achieve better health outcomes for the elderly (FHB, 2010). Gerontech can help promote primary healthcare, as chronic conditions can be managed better with the use of **smart health monitoring devices**, thereby lowering demand on medical services.

Hong Kong also suffers from poor linkage between medical and social institutions. This is a problem because **many elders and persons with disabilities (PwD) require holistic long-term care (LTC) that involves both medical and welfare services and professionals**. The likelihood of requiring such care is high among elderly, as the chances of acquiring a disability or multiple impairments increases with age.⁵ For example, an elderly recovering from stroke may require outpatient treatment from a doctor, case management with a social worker, and regular training sessions with a physiotherapist (PT). Therefore, Hong Kong needs to promote an integrated care model which emphasises closer coordination between medical and social services (OHKF, 2018). Gerontech can help facilitate this, for example by implementing **an automatic tablet dispensing medication system** in residential care homes through the help of pharmacists and nursing care staff, which could be further facilitated by collaboration between Hospital Authority and the Social Welfare Department (SWD).

A final challenge resulting from Hong Kong's ageing population is **manpower shortage**, as the ballooning of Hong Kong's ageing population corresponds to a decline in the city's prime working population (aged 15–64). **Figure 3** reflects the drastic shifts in Hong Kong's population structure from 2020 to 2069 (C&SD, 2020; 2021, August 11).⁶

⁴ Among the most prevalent chronic diseases are hypertension (51.5%), high cholesterol (26.1%) and diabetes mellitus (23.4%) (C&SD, 2019).

⁵ According to the C&SD (2014), the overall prevalence of persons with disabilities increased from 5.2% in 2007 to 8.1% in 2013. The largest increases were observed in persons aged ≥ 70 with a prevalence rate of 42.6%, with restricted body movement being among the highest.

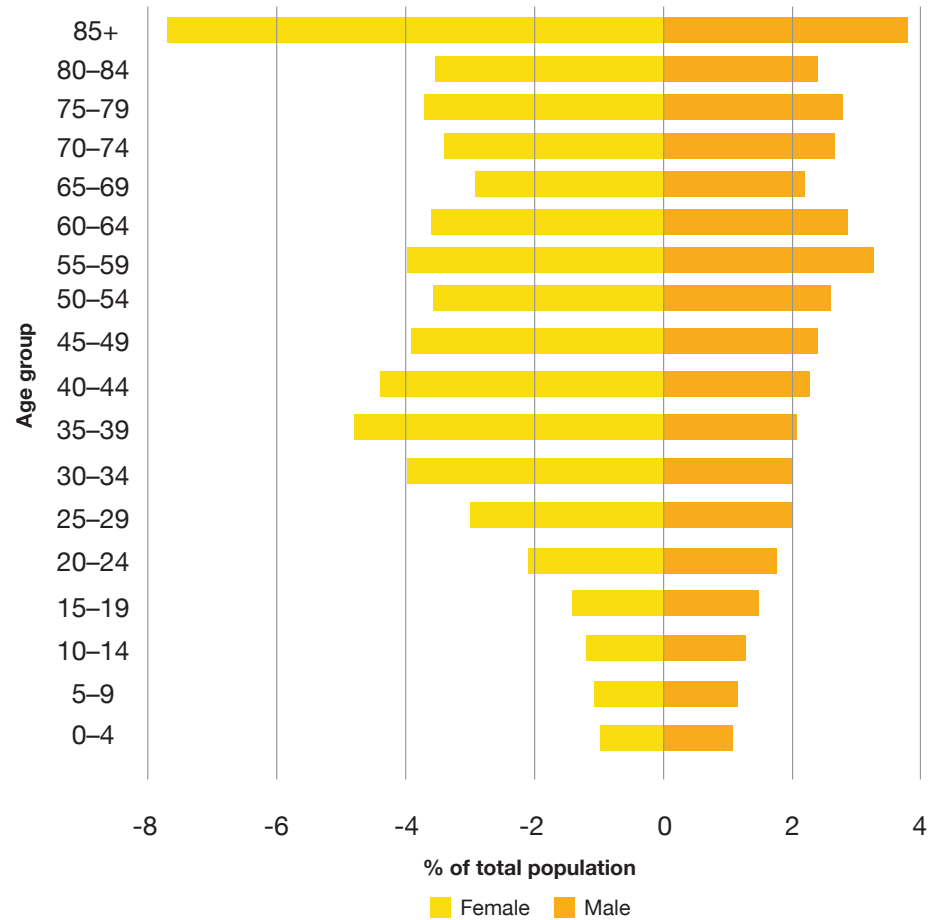
⁶ The ageing population (aged ≥ 65) is projected to grow from 19% of the total population in 2020 to 35% in 2069 representing an increase of approximately 1.8 million people with an alarming concentration of elderly aged ≥ 85 bracket ("old-olds") projected to rise in the next couple of decades.

Figure 3. Population by age group and sex, 2020–2069

Population by age group and sex, 2020



Population by age group and sex, 2069



Note: The population projection for 2069 uses the mid-2019 population estimate as the base.
Sources: C&SD, 2020; 2021, August 11

With the current ageing population trend, caregivers and institutions will struggle to cope with the large influx of elderly patients in the coming years. This will increase the number of individuals suffering from **caregiver burden**, which is the strain borne by a person who cares for a chronically ill, disabled, or elderly family member.⁷ Heavy amounts of caregiver burden result in decreased care provision, decrease in quality of life, and physical and psychological health deterioration (Liu, Heffernan & Tan, 2020). As gerontech promotes ageing-in-place, preventive health practices and medical-social collaboration, these **technologies may also increase efficiency and alleviate the pressure on and workload of both institutional and informal caregivers.**

In sum, while gerontech can by no means solve all the challenges of an ageing society, it has far-reaching impact with potential to empower our elders to age-in-place with dignity, within the comforts of the community, and reduce the overall burden on scarce public resources and manpower.

Gerontech Landscape Report 1.0

In the Gerontech Landscape Report 1.0, OHKF introduced 72 gerontech products and services, which were further classified into four categories: Healthcare (醫), Diet (食), Living (住), and Transport (行). This categorisation of gerontech products has remained influential within the development of Hong Kong's gerontech ecosystem in the past few years.⁸

Aside from introducing various types of gerontech products available in Hong Kong and overseas markets, the report further **identified 24 gaps** facing the ecosystem (**Table 1**). As Hong Kong's gerontech industry was still in preliminary stages of development in 2017, the 24 identified gaps represented areas of insufficiency and opportunities for development within Hong Kong's gerontech ecosystem.⁹ Among the 24 gaps identified, OHKF further identified five key gaps:

- (1) Lack of awareness of gerontechnology
- (2) Lack of collaboration between stakeholders
- (3) Start-ups fall victim to the “Valley of Death” funding gap
- (4) Cultural differences and difficulties in product localisation
- (5) Lack of testing ground for new products

⁷ Despite the increasing number of people suffering from caregiver burden, Hong Kong does not yet have a comprehensive carer policy. The Government is currently completing a study on how to support carers, following various instances when other organisations encouraged the Government to adopt such a policy (LegCo *The Chief Executive's Policy Address Supplement—Caring*, 2021; HKCSS, 2020, April; EOC, 2019). Other jurisdictions such as Taiwan, Australia, Sweden, and the United Kingdom have introduced legislation that recognise the statutory right of carers, enabling them to obtain various support services from their governments (LegCo, 2020, March 9). In Hong Kong, the SWD operates a Carer Support Service page, which includes a Pilot Scheme on Living Allowance for Carers of the Elderly Persons from Low Income Families (SWD *Carer Support Service*, 2021). The scheme aims to provide carers of elderly persons from low-income families with a living allowance to help elders age at home (SWD *Pilot Scheme*, 2021). There is not yet any scheme to help caregivers of PwDs.

⁸ For example, even newer gerontechnology showrooms such as Lingnan University's Gerontech-X Lab, which was established in late 2019, display and explain gerontechnology products based on the four dimensions of healthcare, diet, living, and transport (LingnanU *X-Lab*, 2021). Similarly, the Jockey Club 'age at home' Gerontech Education and Rental Service Centre provides public education on gerontech via guided tours that also explain gerontech products based on these four categories of products (Jockey Club *age at home*, 2021).

⁹ The identification of these gaps has assisted the industry and Government to introduce strategic gerontech initiatives to expedite Hong Kong's gerontech ecosystem development. For example, following the publication of OHKF's *Gerontechnology Landscape Report*, SIE Fund and HKCSS held gerontech stakeholder engagement activities that provided discussion opportunities on how to improve the 24 gaps identified (SIE Fund, 2017). As a result of feedback collected from these discussions, SIE Fund worked alongside HKCSS for many years to develop the city-wide Gerontechnology Platform, one of the most ambitious and wide-reaching gerontech initiatives in the city to date (SIE Fund, 2021).

Table 1. The 24 gaps identified in *Gerontechnology Landscape Report (2017)*

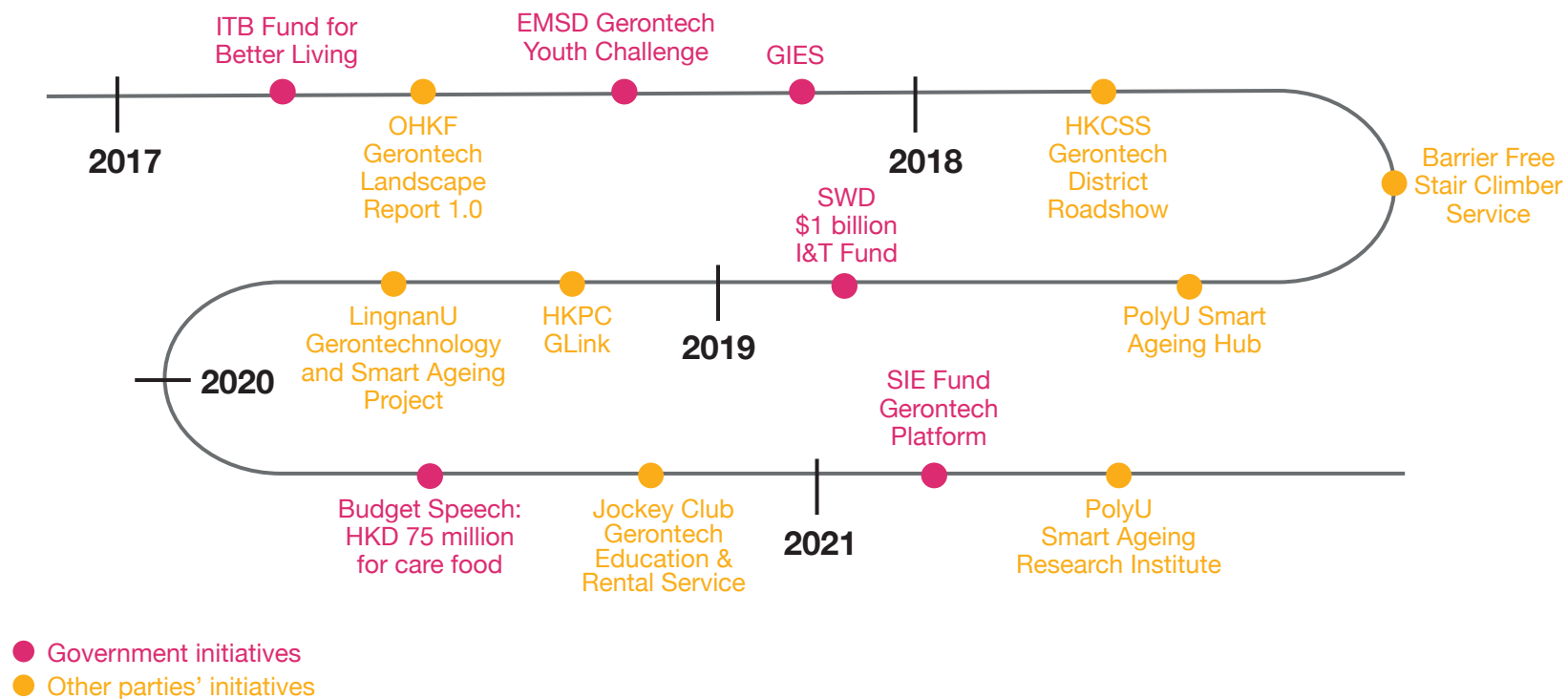
Stage	Gaps identified	
Government	Gap 1. Lack of awareness	
	Gap 2. Highly risk averse	
	Gap 3. Outdated regulatory systems	
	Gap 4. Insufficient retirement protection	
Applied research stage	Gap 5. Shortfall in applied research funding	
	Gap 6. Lack of human resources	
	Gap 7. Systemic issues in academia	
Prototype stage	Gap 8. Obstacles in spin-off and licensing procedures	
	Gap 9. Lack of support for start-ups	
	Gap 10. Risk of idea sharing	
Enhancement stage	Gap 11. Exhausting registration process for medical devices	
	Gap 12. Product design not catered to elderly consumers	
	Gap 13. Lack of a testing ground for new products for use in elderly homes	
	Gap 14. Cultural differences and difficulties in product localisation	
Gerontech market	Producer	Gap 15. Limited market size
		Gap 16. Poor segmentation
		Gap 17. Rental risks
	Consumer	Gap 18. Gerontech products are too expensive for the elderly
		Gap 19. Exhausting procurement procedures
		Gap 20. Refusal to accept products with new technology
Collaboration	Gap 21. Insufficient collaboration between universities and research institutions	
	Gap 22. Insufficient collaboration between research organisations and the private sector	
	Gap 23. Insufficient collaboration between the private sector and NGOs	
	Gap 24. Insufficient medical-social collaboration	

Source: OHKF, 2017, June

Key gerontech initiatives in Hong Kong since 2017

Since the publication of OHKF's report in 2017, Hong Kong's gerontech ecosystem has organically blossomed through a **significant number of Government and industry initiatives**. Some key initiatives are illustrated by **Figure 4**.

Figure 4. Key gerontech initiatives in Hong Kong since 2017



Government initiatives

One of the main areas of improvement have been **government-related gerontech initiatives across a wide variety of government bureaux and departments**. These initiatives, illustrated by **Table 2**, have significantly aided both supply-side and demand-side capacities of gerontech, as well as facilitated the interaction and collaboration between supply-side and demand-side.

Table 2. Government initiatives related to the promotion of gerontech

Government scheme	Relevant government body	Dates	Target beneficiaries	Description of the scheme	Impact of the scheme
Gerontech and Innovation Expo cum Summit	HKSAR Government	2017–Present	All gerontech stakeholders	An annual gerontech exhibition that raises users’ awareness of different gerontech products developed in Hong Kong and overseas	Surveys following the exhibition have showed the positive effect that it has on raising public awareness on gerontech
Innovation and Technology Fund for Better Living	Innovation and Technology Bureau	2017–Present	NGOs, R&D centres, companies, and start-ups	A fund dedicated to the R&D of I&T projects that seek to improve the convenience, comfort, and safety levels of products; and address the needs of specific vulnerable community groups	Out of a total of 35 successfully funded projects, 17 are gerontech-related, totalling to a funding of over HKD 61 million for gerontech R&D
Gerontech Youth Challenge	Electrical and Mechanical Services Department	2017–2019	Primary and secondary school students	A competition set to raise the younger generation’s awareness, interest, and technical skills in developing gerontech products	Over 160 teams participated and were engaged in the competition
Innovation and Technology Fund for Application in Elderly and Rehabilitation Care	Social Welfare Department	2019–2023	SWD-subvented elderly and rehabilitation service units	A fund that subsidises service units to purchase, rent, or trial products, as well as supports staff training and product maintenance	As of October 2021, a total of about HKD 380 million has been dispersed to about 1,300 service units for the procurement or rental of more than 9,600 gerontech products

Government scheme	Relevant government body	Dates	Target beneficiaries	Description of the scheme	Impact of the scheme
Care food subsidy	Social Welfare Department	2020–Present	Elderly with swallowing difficulties	A HKD 75 million subsidy that provides care food to elderly persons with swallowing difficulties, who receive services from SWD-subsvented elderly service units	Approximately 12,400 elderlies have been served, during the period between October 2020 and March 2021
Provision of wireless internet	Social Welfare Department	2020–2023	SWD-subsvented units	A four-year pilot project with a budget of HKD 205 million that provides wireless internet to about 1,350 service units operated by SWD-funded organisations	1,350 service units are expected to benefit from the scheme
Gerontechnology Platform ^[1]	SIE Fund	2021–2023	All gerontech stakeholders	An inclusive one-stop GT platform to promote the development of the gerontechnology ecosystem in Hong Kong	By way of engagement, cross-sector partnership and collaboration, the GT Platform would enhance the quality of life, independence and self-reliance of the elderly as well as provide support to their families, caregivers, healthcare staff and institutions.

Note: [1] The Gerontechnology Platform comprises four basic functionalities, namely (1) a knowledge hub; (2) network and capacity building; (3) consultancy, localisation and testing support; and (4) impact assessment. The knowledge hub is an online repository about all things gerontech-related, including a gerontech products and services library, portals linking up the demand and supply sides, and a user experience sharing platform. The network and capacity building functionality comprises of local and overseas study tours, annual summits, briefings, and trainings. The consultancy, localisation, and testing support functionality consist of a consultancy service to help the supply-side to develop and test products, while helping the demand-side to select gerontech products. It will also develop testing protocols that test the effectiveness of gerontech products in residential care and community settings. The impact assessment consists of this report, and an upcoming evaluation of the Platform's impact.

Sources: GIES, 2021; Innovation and Technology Fund for Better Living, 2021; EMSD, 2020; SWD, 2021; LegCo *Policy Address Supplement*, 2021, October 6; LegCo, 2021, May 31; LegCo, 2021, May 27; LegCo, 2020; HKCSS, 2021

Industry initiatives

Within the broader gerontech ecosystem, several stakeholders have also launched various **gerontech-related initiatives, many of which focus on the themes of awareness and collaboration**. For example, following the inaugural Gerontech and Innovation Expo cum Summit (GIES) in 2017, HKCSS collaborated with various non-governmental organisations (NGOs) to do a gerontech district roadshow across various districts in Hong Kong. The Hong Kong Productivity Council (HKPC) also launched a GeronTech Cluster in 2019 to bring different gerontech stakeholders together (HKPC, 2021).

In recent years, several organisations such as Lingnan University (LingnanU), The Hong Kong Polytechnic University (PolyU), and HKCSS have been funded by Jockey Club to create gerontech showrooms in different districts to raise public awareness about gerontech (LingnanU, 2021; PolyU, 2021; Jockey Club *age at home*, 2021). Of particular note is the Jockey Club Gerontech Education and Rental Service in Sha Tin and Fo Tan. These centres operate both as a location to raise public awareness about gerontech, as well as a one-stop service centre for gerontech rental services, inclusive of equipment assessment, cleaning, and maintenance service functions.

Gerontech Report 2.0

Overview

The colourful array of gerontech initiatives that have blossomed in recent years reveal the extent to which Hong Kong's gerontech ecosystem has changed and matured since we published our first landscape report in 2017. When we published the Gerontech Landscape Report 1.0, most relevant stakeholders were still exploring gerontech; in contrast, now virtually everyone within the elderly and rehabilitation services sector knows about and actively uses gerontech. Given the stark difference in circumstances from then to now, it is therefore **high time to reconsider and re-formulate our holistic analysis of Hong Kong's gerontech ecosystem**. This is what we aim to do through this report.

However, where the first landscape report both introduced gerontech products and conducted a gap analysis of the existing gerontech ecosystem, the **present report (Gerontech Report 2.0) will focus on providing an updated analysis of Hong Kong's current gerontech ecosystem**. To do this, the present study will first consider to what extent there has been an improvement in the 24 gaps identified in the first report. Following this analysis, the report will suggest key levers that will significantly help mobilise and develop the gerontech ecosystem. The report will also provide policy recommendations for the Government to consider on how to best maximise the opportunities presented by the key levers.

Survey on the 24 gaps

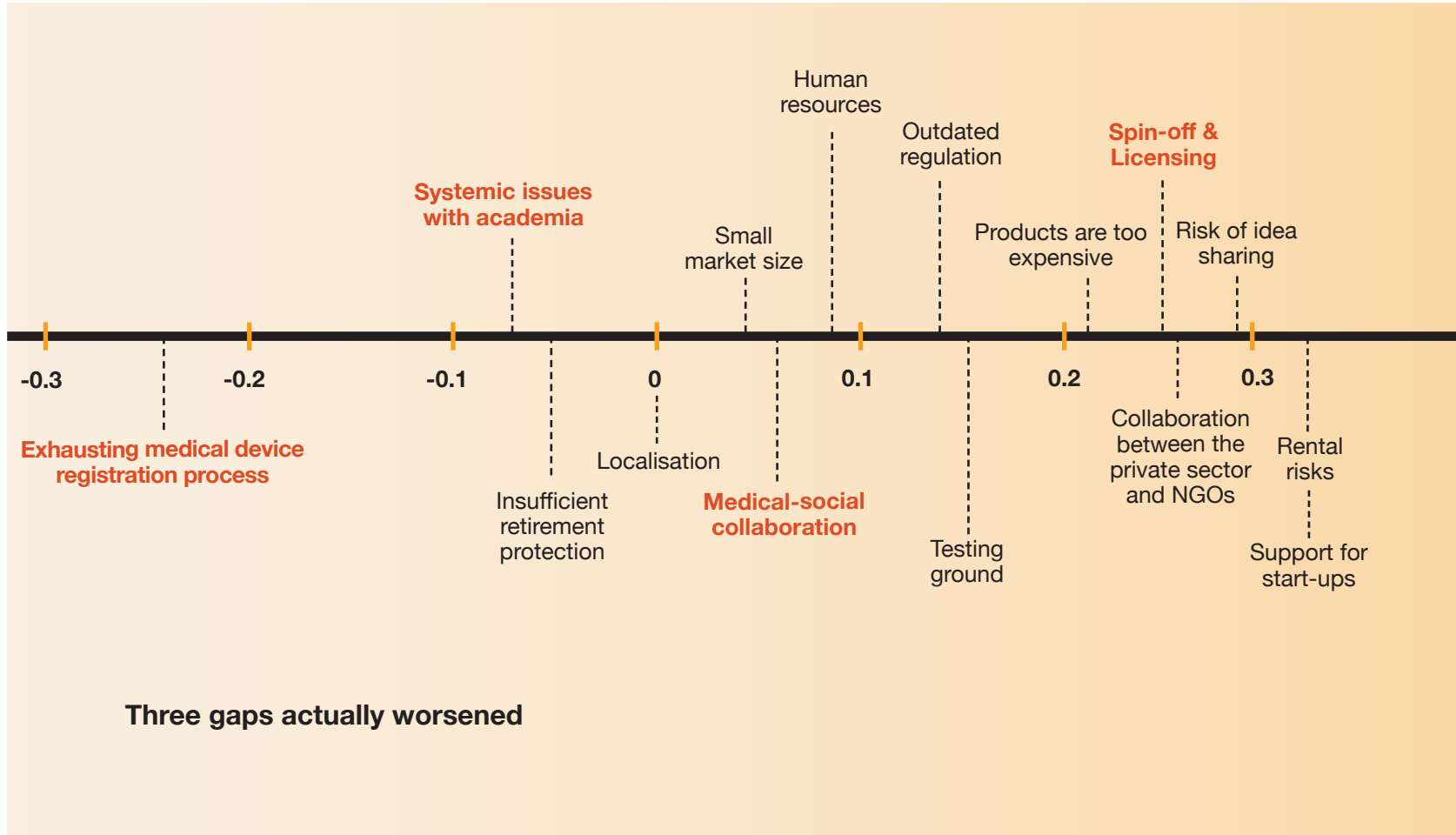
To determine the extent to which the 24 gaps improved, we conducted a **survey to gather data on the development of Hong Kong’s gerontech ecosystem** with previously engaged stakeholders.¹⁰ For each question—each representing one of the 24 gaps—respondents were given six response options:

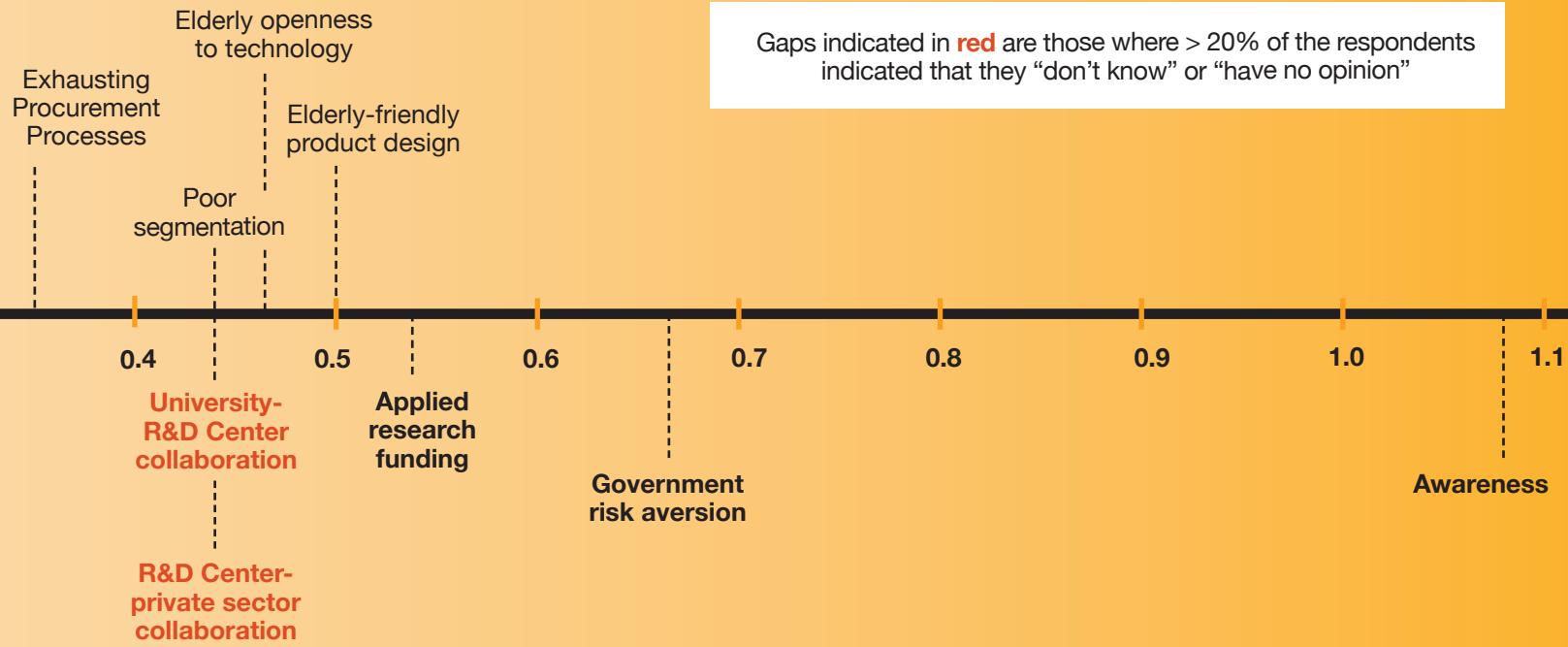
- (1) Significant deterioration
- (2) Some deterioration
- (3) No change
- (4) Some improvement
- (5) Significant improvement
- (6) Don’t know or have no opinion

Following the completion of the survey, we assigned a **numeral value amount for each gap’s degree of improvement**, which is illustrated in **Figure 5**. The numerical value was calculated by assigning a numerical value to each of the response options, **ranging from -2 for “significant deterioration” to +2 for “significant improvement”**. Throughout the report, we will continue to refer to the 24 gaps and their corresponding scores from our survey when discussing how to further improve the overall gerontech ecosystem. Full survey results can be found in **Annex I**.

¹⁰ In total, we received a total of 40 responses from stakeholders with whom we conducted in-depth interviews. The stakeholders come from a broad spectrum of backgrounds, including professionals working in start-ups, R&D centres, universities, foreign product distributors, healthcare services sector, elderly services sector, rehabilitation services sector, and philanthropic foundations.

Figure 5. Summary of findings from OHKF Gerontech Survey on the 24 gaps















Gaps indicated in **red** are those where > 20% of the respondents indicated that they “don’t know” or “have no opinion”

Three gaps obtained > 0.5 score

Survey analysis

The survey revealed that some of the **most improved gaps include awareness, government risk aversion, and applied research funding**. This is unsurprising as there indeed has been a significant improvement in initiatives relating to these areas (**Figure 6**).

Figure 6. Initiatives supporting most improved gaps

Awareness	Government risk aversion	Applied research funding
 <p>Exhibitions</p> <ul style="list-style-type: none"> • GIES • GAES 	 <ul style="list-style-type: none"> • SWD \$1 billion I&T Fund 	<ul style="list-style-type: none"> • Innovation and Technology Fund For Better Living <p>Examples:</p>
 <p>District events</p> <ul style="list-style-type: none"> • HKCSS • LingnanU • LSCM 	 <ul style="list-style-type: none"> • GIES 	 <p>Smart homes</p>  <p>VR systems</p>
 <p>Showrooms</p> <ul style="list-style-type: none"> • LingnanU • PolyU • Housing Society • Jockey Club “age at home” Centre • Project Futurus 	 <ul style="list-style-type: none"> • SIE Fund Gerontech Platform 	 <p>Intelligent care system</p>  <p>AI-based stroke rehabilitation</p>

Majority of survey respondents agreed that there has been an improvement in people's **awareness** of gerontech, given it is the only gap that scored above 1. When we wrote our first report, there was little discussion on how technology could alleviate population ageing issues. People usually thought about caregiver and doctor shortage, or bed shortages in nursing homes and hospitals (OHKF, 2017, June). Yet, many initiatives have since helped increase awareness. For example, GIES consistently attracts tens of thousands of participants and showcases hundreds of innovative products from local and international exhibitors (GIES, 2021). Many organisations also started hosting gerontech roadshow events, which have taken place in 10 of the 18 districts, as well as setting up gerontech showrooms, of which there are currently five. We will further discuss this topic in **Chapter 3**.

According to our survey, another gap with notable improvement is the **Government's risk-averse attitude**, which obtained a score of 0.66. Our first report indicated that Government facilities preferred to implement mature, foreign gerontech rather than new or local products, due to a lack of evidence on product effectiveness; yet the Government failed to provide product testing support, resulting in a vicious cycle (OHKF, 2017, June). However, several newer initiatives demonstrate that the Government is less risk averse with gerontech. The large sum associated with the \$1 billion I&T Fund shows the Government's desire for local service units to try different gerontech products. The Government's continuous support of GIES also shows their commitment to provide a large-scale platform for new products to gain traction among local consumers. Furthermore, the Gerontechnology Platform's (GT Platform) specific focus on

testing support indicates the Government's desire to elevate the local industry's know-how of conducting product testing.

Our survey also indicated improvement with gerontech-affiliated **applied research funding**, which received a score of 0.53. When we published our first report, the Innovation and Technology Bureau's (ITB) Fund for Better Living had just launched. As of September 2021, the Fund for Better Living had approved funding for a total of 35 projects, of which 17 are projects that benefit elderly or PwDs, totalling to about HKD 61 million of gerontech-affiliated applied research funding in four years. Examples of approved gerontech-related projects include smart homes, VR systems, intelligent health and care management systems, and Artificial Intelligence (AI)-based stroke rehabilitation (Innovation and Technology Fund for Better Living *Approved Projects*, 2021). In the 2021 Policy Address, the Chief Executive announced the Government's plan to leverage Hong Kong's strength in life and health sciences research to set up an InnoLife Healthtech Hub in the Hong Kong-Shenzhen Innovation and Technology Park in the Loop (LegCo *Policy Address*, 2021, October 6).¹¹ We hope this initiative can further help raise funds and technical know-how of gerontech-related research.

The survey also revealed that **three gaps actually worsened**. The first relates to **insufficient retirement protection**, which obtained a score of -0.05. This gap refers to how Hong Kong's existing retirement protection system—inclusive of social security allowances, voucher schemes, and pension initiatives—is insufficient for providing elderly with support for retirement living; we will discuss how to improve this issue in Section 2.2. The second relates to **systemic issues with academia**, which obtained a score of -0.06. This gap refers to how university

¹¹ AgeTech, a synonym for gerontech in US and European markets, is considered as an emerging subset of the HealthTech sector (Advanced Development Technology Center, 2021)

academics lack incentives to pursue research with social and economic impact; we will discuss how to improve this issue in Section 5.2. The third relates to the **exhausting medical device registration process**, which obtained a score of -0.23. This gap refers to how medical devices can require additional certification—involving time-consuming registration—that non-medical devices do not require (OHKF, 2017, June). We will discuss how to improve this issue in Section 1.3.

However, **majority of the gaps only saw little improvement**, with 18 of the 24 gaps scoring between 0–0.5. Moreover, there were **numerous gaps where $\geq 20\%$ of respondents indicated that they did not know or had no opinion** (highlighted in red colour in **Figure 5**), specifically those related to different forms of collaboration and technical support for supply-side organisations.

Put together, **our survey findings suggest that there remain many areas within Hong Kong’s gerontech ecosystem that still do not receive adequate support or attention**. These areas of insufficiency serve the basis of how we identified the key levers that will help mobilise and enhance Hong Kong’s gerontech ecosystem in the coming years.

Figure 7 represents the overall storyline and structure of our report. In 2017, when we first published our report, Hong Kong’s gerontech ecosystem was very fragmented, represented by the funnel with several cracks. In addition to there not being many supply-side players, there were few gerontech products and services—represented by the spheres—available on the market, and these products were not reaching target users due to lack of support connecting supply-side with demand-side.

Due to all the improvements in initiatives from the past few years, we have seen an increase in the number of supply-side players.

Hong Kong’s gerontech ecosystem has become more integrated, as represented by the more solidified funnel under “Present” in the figure. This has enabled more end-users to access and use gerontech, represented by the increase in spheres reaching the demand-side and the increase in number of users. The growth in supply has also organically increased the demand for gerontech, with more end-users being willing to try and purchase gerontech. **While these are positive signs, we believe more can be done to further grow the gerontech ecosystem**. We will describe these key levers and their corresponding recommendations.

One area of need is further **differentiation between different market players and their corresponding market needs**. For example, on the supply-side, companies of different sizes have different needs; also, local companies have different needs compared to international ones. On the demand-side, there is a need to distinguish between elderly and PwDs who live in the community versus those in residential settings.

Another area of need is more **strategic planning on how to increase and better facilitate the flow of gerontech products and services from supply-side to demand-side**. This is because we expect more suppliers and end-users within the local gerontech ecosystem in the coming years, which will result in a higher volume of gerontech products flowing from supply-side to demand-side, which in turn requires more strategic planning on how to facilitate and accommodate that increased flow. The increase in quantity and flow is represented by the enlarged supply side box, increased number of demand-side users, increased number of spheres flowing through the funnel, and expansion of the funnel’s mouth. The facets of strategic planning required for ecosystem facilitation and development are depicted by the three sub-categories of “Infrastructure”, “Investment”, and “Talent”.

Figure 7. Report structure

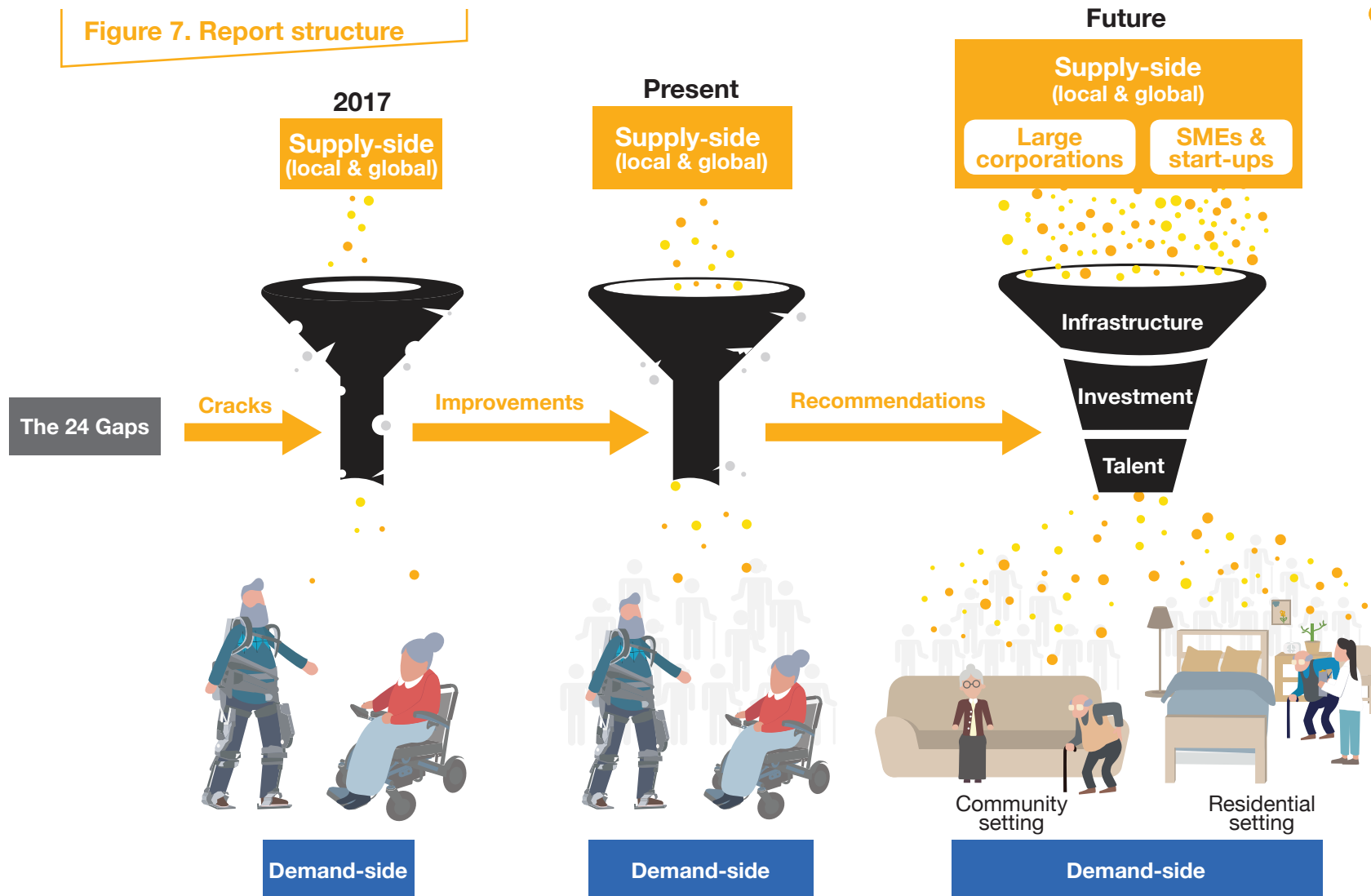
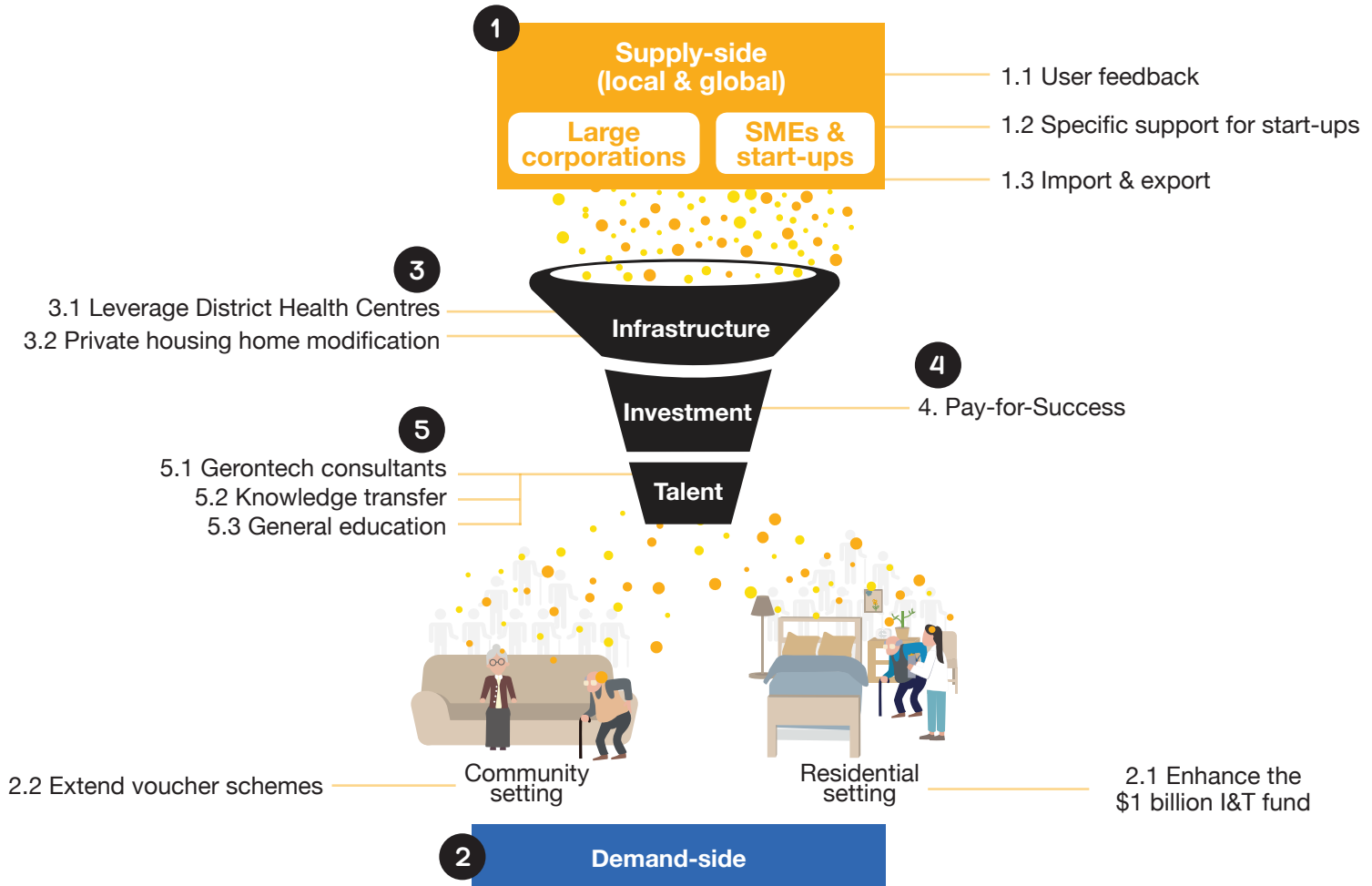
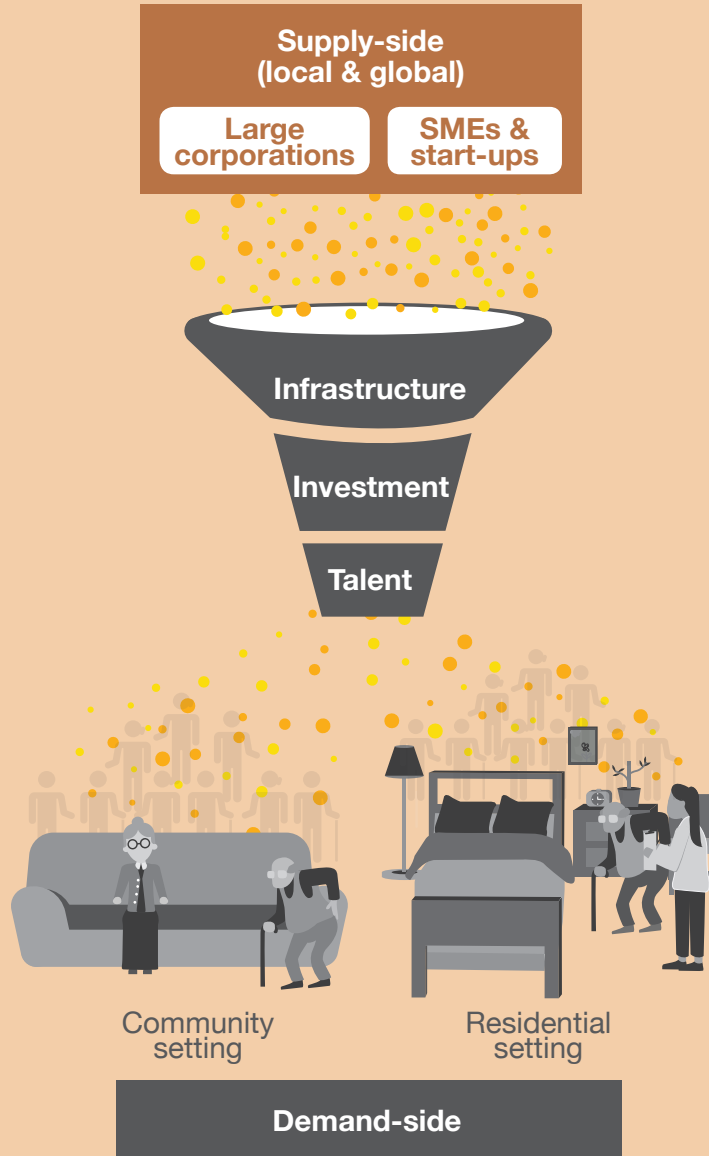


Figure 8. Summary of report recommendations



Our report will therefore provide recommendations in the hopes of realising this vision of a strategic and consolidated gerontech ecosystem. **Chapter 1** will discuss the challenges and opportunities faced by different types of supply-side stakeholders, namely related to receiving user feedback, specific issues faced by start-ups, and issues concerning import and export. **Chapter 2** will discuss the challenges and opportunities faced by different demand-side stakeholders, differentiated based on elderly living in residential setting compared to those living in community setting. **Chapter 3** will discuss how to improve the availability of gerontech-friendly infrastructure, both within public spaces and inside private homes. **Chapter 4** will discuss how to leverage public-private investment partnerships for gerontech. **Chapter 5** will discuss how to create the relevant talent to sustain the gerontech ecosystem, including the creation of gerontech consultants, facilitating knowledge transfer, and enhancing general education. Lastly, the conclusion will summarise our key report findings.

CHAPTER 1. SUPPLY-SIDE



Overview

The “supply-side” of the gerontech ecosystem refers to organisations and individuals that design, create, and supply gerontech products and services to consumers. As identified in our first report, suppliers face numerous challenges. For example, there is limited public funding for start-ups (Gap 9); Hong Kong’s gerontech market remains small (Gap 15); and there are no testing grounds or easy way to access user feedback (Gap 13). Yet, compared to 2017, our survey reveals that while stakeholders believe there have been some improvements related to supply-side challenges, there is still much that can be done to further improve the situation.

Given Hong Kong’s general gerontech ecosystem expansion in recent years, there has been a corresponding increase in the quantity and quality of gerontech suppliers. As a result of this market development, there is a need to further differentiate between different types of suppliers to better determine their corresponding challenges and opportunities. In particular, we need to differentiate between **global versus local organisations**, as well as between **companies of different size**. This is because these different types of organisations have varying types of support needs, which we will highlight throughout this chapter.

This chapter consists of three sub-sections:

- Section 1.1 will focus on how to provide all suppliers with more opportunities for **user feedback** to help with the enhancement of gerontech products throughout the product development cycle.

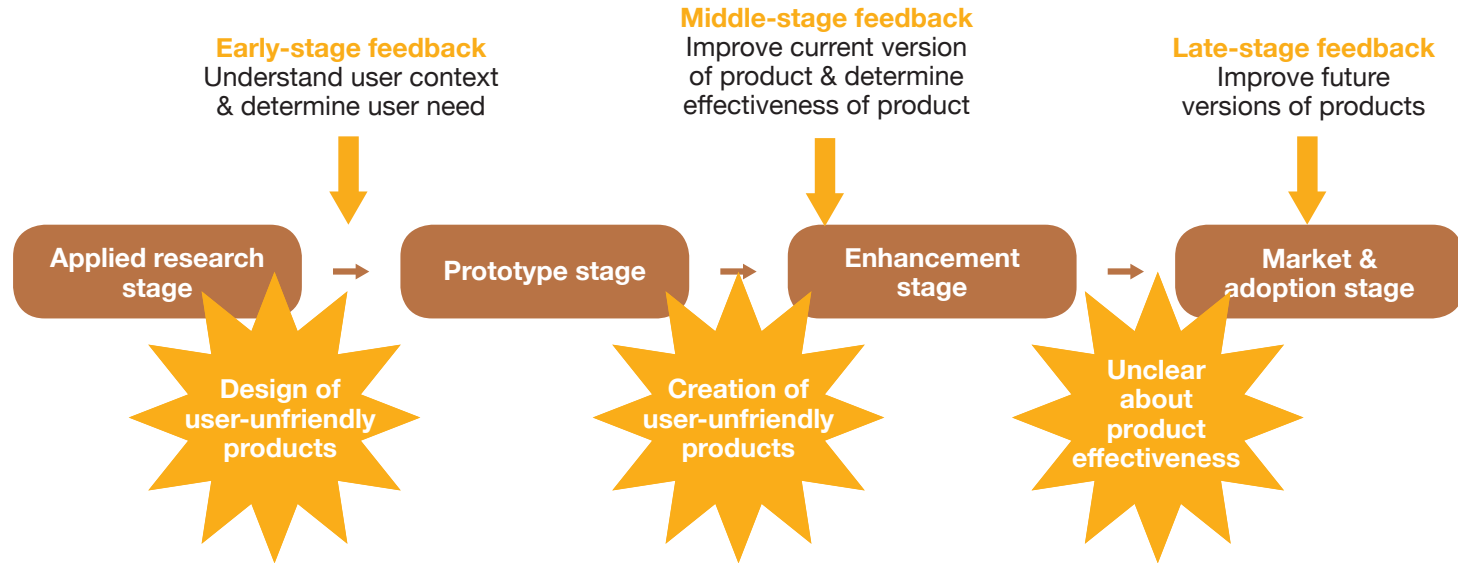
- Section 1.2 will focus on how to provide **specific support to gerontech start-ups**.
- Section 1.3 will focus on how to improve the **import and export** flow of gerontech products and services in and out of Hong Kong.

1.1 User Feedback

One of the key findings from our research is the **lack of possibilities for suppliers to get reliable access to user feedback**. As **Figure 9** illustrates, user feedback is critical to every stage of product development. User feedback is especially important to gerontech because many elders and persons with disabilities have specific health or social needs; as such, gerontech is an industry where products need to be particularly user-centric. This need is particularly exacerbated by the fact that most product developers will be younger people who will not have much first-hand understanding or experience of elders’ and PwDs’ user needs.

Therefore, the lack of opportunities to obtain user feedback in early stages will lead to the design of user-unfriendly products; lack of user feedback in the middle stages will lead to the manufacturing of user-unfriendly and ineffective products; lack of user feedback following the purchasing of products will lead to inability to create better future versions of the product. As such, our recommendations will discuss potential ways to provide user feedback across the different stages of product development.

Figure 9. User feedback across different stages of product development



Recommendation 1.1A: Conduct an overall market study on Hong Kong's gerontech industry

Our survey revealed that there has been huge increase in general awareness of gerontech among the general public (Gap 1; score 1.08). However, one of the key challenges that remain is the **lack of clear information on the overall gerontech market situation or market needs**. As a result, companies have a hard time assessing where there is the greatest market need and opportunity. Similarly, financiers—whether private foundations, venture capitalists, or Government bodies—have a hard time assessing what the greatest opportunity for social or economic benefit is.

The European Union (EU) has an initiative called Ambient Assisted Living (AAL) Programme that offers different initiatives relating to the theme of “ageing well in a digital world” (*AAL About Us*, 2021).¹² One of the initiatives under the AAL Programme is the Market Observatory, which commissioned studies on the “ICT for ageing well” market.¹³ The studies provide a consolidated view of the existing market and investment information in Europe within the ICT for ageing well market. It also includes information on the current status, trends, and perspectives on future market opportunities (*AAL Market Observatory*, 2021).

In Hong Kong, there is no study on the gerontech market situation or market need. The closest source of information that we have is a report published by the Consumer Council in 2018 entitled *Risk or Opportunity: A Study on Building an Age-friendly Consumption*

Environment (Consumer Council, October 2018). The report provides information on elderly's daily life consumption habits and advocates for consumer rights of the elderly. However, there is no specific information on elderly's gerontech consumption habits.

Based on the EU case, we recommend the Hong Kong Government's Census and Statistics Department to collaborate with relevant Government departments to conduct a thematic survey on the gerontech market size and needs. To start with, the study should quantify the current size of the gerontech market. For example, the study could include data on the health and social needs of elderly, PwDs, and caregivers to indicate where the greatest social need and potential market opportunity is. There could also be information on how much end-users are using gerontech, what kind of gerontech they find the most useful or desire the most, and how willing they are to spend money on it.

Furthermore, there could be information on the different behaviours and needs displayed by different institutional market players, such as residential versus community service units, private versus NGO service units, and elderly versus rehabilitation service units. Recorded data could include how digitised different service units are, whether they have used the \$1 billion I&T Fund, how comfortable staff are with learning and using gerontech, how willing they are to privately purchase gerontech, etc. Collection and dissemination of this data would hopefully attract more private investment into the industry to ensure the market's long-term sustainability, as well as enable further analysis that define and describe gerontech-related behaviour and needs of different market segments.

¹² The AAL Programme is funded by the European Commission and 19 member countries (European Innovation Partnership, 2021).

¹³ Two ICT for Ageing Well market reports were published, in 2014 and 2018 respectively.

Recommendation 1.1B: Create opportunities that concurrently provide product evaluation and enhancement capabilities

In our Gerontech Landscape Report 1.0, we identified “**lack of testing ground for new products**” (Gap 13) as one of the **five key gaps facing Hong Kong’s gerontech ecosystem**. Following the publication of our report, HKCSS and SIE Fund organised follow-up stakeholder engagement workshops with over 140 participants to brainstorm possible solutions (SIE Fund, 2021). One of the key areas that stakeholders agreed on is the need for testing support, which is reflected in the GT Platform’s prioritisation of creating testing protocols for various priority products within both residential and community settings (SIE Fund, 2017; 2018).

The current focus of testing support provided by the GT Platform is to test the product effectiveness of mature gerontech products that are already available on the market. This makes sense as there is a need within the current ecosystem, particularly from the Government’s perspective given their heavy investment into gerontech, to better understand the actual added social and economic value of gerontech products within the context of elderly and rehabilitation service delivery. Yet, there is a further

opportunity to provide testing support for product enhancement—especially for products in the prototype stage. An example of such support is exhibited in advanced rehabilitative assistive technologies service centres.

As depicted in **Figure 10**, the National Rehabilitation Centre (NRC) in South Korea runs a unique Rehabilitation Robot Gym.¹⁴ This gym not only offers innovative robotic treatment options to rehabilitation hospital patients; it also offers the simultaneous possibility for clinicians to conduct clinical trials on the rehabilitation robots’ treatment effectiveness and for engineers to receive user feedback for product enhancement on various rehabilitation robots. The clinicians and engineers are provided with government funding to conduct clinical trials and design product enhancements at the Rehabilitation Robot Gym, namely through the NRC’s Translational Research Program for Rehabilitation Robots and Business Support Program for Rehabilitation Robots (United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), 2021).

¹⁴ The NRC is a government-affiliated agency, consisting of a rehabilitation hospital and a rehabilitation research institute, that is run by the Ministry of Health and Welfare in South Korea (UNESCAP, 2021).

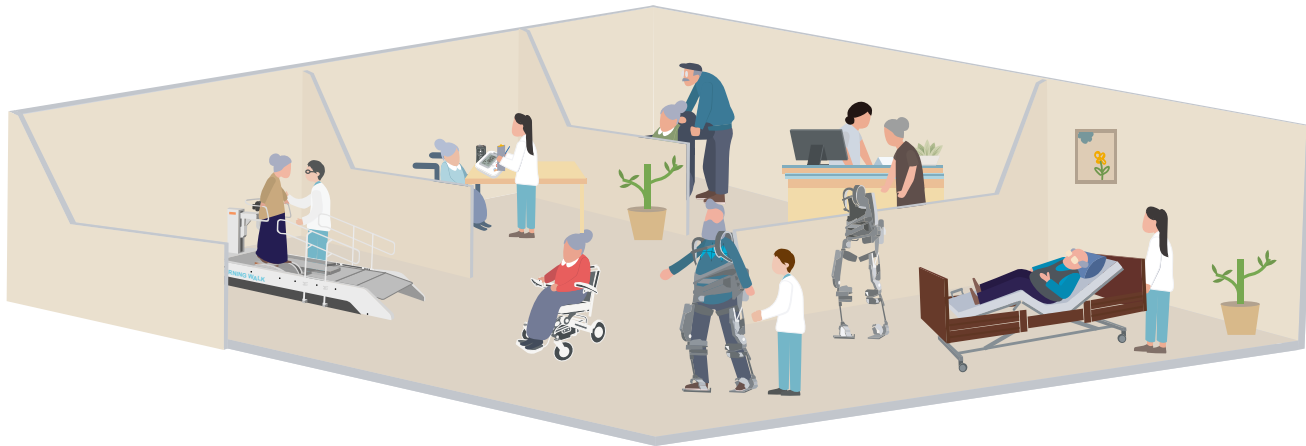
Figure 10. Rehabilitation Robot Gym



Case study:
Rehabilitation Robot Gym
(National Rehabilitation Center, South Korea)

Aside from patients receiving medical treatments,

- **Clinicians** use rehabilitation robot gym for **product evaluation**
- **Engineers** use rehabilitation robot gym for **product enhancement**



Source: UNESCAP, 2021

The Hospital Authority runs a similar initiative in Hong Kong—an Assistive Technology & Accessibility for Independent Living clinic at the Community Rehabilitation Service Support Centre (CRSSC) within Queen Elizabeth Hospital in Kowloon (Hospital Authority, 2021).¹⁵ CRSSC provides customised advanced technological solutions to rehabilitation patients requiring complex equipment, while also conducting clinical assessments on the effectiveness of advanced technologies on patients' rehabilitation, as well as product development and enhancement via in-house engineers (CRSSC, 2021). However, one of the challenges that CRSSC face is that users living further away, such as in Hong Kong Island or New Territories, can struggle with arriving to the centre.

Both the NRC and CRSSC demonstrate how advanced rehabilitation assistive technology centres successfully perform simultaneous clinical intervention, product assessment, and product enhancement in the same physical space for rehabilitation patients requiring advanced care. On the one hand, **we suggest that the Government consider constructing additional CRSSCs in Hong Kong Island and New Territories to help users living in those districts to gain more access to CRSSC services.**

On the other hand, following these centres' example, **we recommend that future gerontech testing platforms in Hong Kong allow relevant parties to conduct both product evaluation and enhancement for gerontech products in elderly and rehabilitation service units.** In practical terms, this could mean that after the GT Platform finishes creating the testing protocols for how to conduct product evaluation testing, when they move onto the next stage of actualising the creation of physical testbeds, the GT Platform can expand the purview of the testbed to include product enhancement functions in addition to product evaluation functions. The GT Platform can also consider allowing prototype versions of products, rather than just mature products, to be tested in these facilities.

¹⁵ An example of CRSSC clinical interventions is conducting advanced equipment assessment related to what kind of mobility aid is most appropriate for an advanced rehabilitation patient (Chan, 2021). CRSSC clinicians also conduct clinical research, such as research on breakthrough technology services for non-communicable patients (Shum & Chan, 2019). CRSSC in-house engineers also do individual product customisation based on patient needs, such as 3D printing of fingerprint moulds for finger-operated machines (Yu, 2021 & Chan, 2021).

Recommendation 1.1C: Provide opportunity for users to provide post-procurement product feedback

Following the release of any tech product or service, companies will regularly review what features need to be upgraded or removed to produce future versions of that product through collection of user feedback. For example, Apple will regularly review and update their iOS software to enhance users' experience.

Yet within Hong Kong's current gerontech ecosystem, there **are few opportunities for suppliers to obtain user feedback on products that are already in the market.** One of the gaps identified in our first report is that product design is not catered to elderly consumers (Gap 12), which stakeholders have indicated through our survey as having shown only some degree of improvement (0.50 score).

The GT Platform has a "Gerontech Application Experience Sharing" function under their Knowledge Hub. This will function as a user experience sharing platform of their individual experiences with different products. In addition to allowing other users to learn how to use products, there is potential to leverage such existing initiatives to also provide feedback to suppliers.

Another function of the GT Platform's Knowledge Hub is a "Product List" that consists of a product library of a wide

assortment of gerontech products. **We recommend that the GT Platform add a comment function to the Product List to enable users to have an accessible channel to provide their feedback to suppliers.** These comments should not be publicly viewable, but rather compiled by the website administrator and regularly sent back to corresponding suppliers.

1.2 Extra support for start-ups

Companies of different size may experience different challenges, with smaller companies facing unique challenges. One of the gaps that we had identified in the first report was a lack of support for start-ups (Gap 9), which stakeholders consider as having slight improvement (score 0.33). Yet, there is clearly room for further improvement.

This section will therefore focus on the specific types of additional support that gerontech start-ups could benefit from. Generally, start-ups need more support than large corporations because of their comparative limited access to financial and human resources. This disparity is further exacerbated within the gerontech industry because of the difficulty that start-ups have in accessing and understanding the unique needs and contexts surrounding individual elders and PwDs, as well as the broader elderly and rehabilitation services sector. Yet, if start-ups do not have access to end-users, they may end up creating products that are not user-friendly for elderly and PwDs, which further exacerbate the creation of user-unfriendly products (Gap 12).

Recommendation 1.2A: Create an Elderly, PwD & Caregiver Advisory Panel

One of the most heard challenges from stakeholders is the **difficulty that start-ups have in directly accessing end-users**, which is unsurprising as the elderly and disabled are not population groups that are particularly accessible. This contrasts with the efforts of large corporations, which can hold focus groups with end-users due to their larger scale. As such, more should be done to provide start-ups with more direct access to end-users.

In Canada, the Centre for Aging + Brain Health Innovation (CABHI) is a leading solution accelerator focused on driving innovation in the ageing and brain health sector (CABHI *About Us*, 2021).¹⁶ One of their key initiatives is the **Senior Advisory Panel, which is a group of 18 elderly and caregivers who provide end-user input to CABHI projects at all stages of development**. The Senior Advisory Panel provides start-ups with feedback through focus groups, input on how to make products user-friendly and accessible, and insight on how early-stage ideas could have real-world impact (CABHI *Senior Advisory Panel*, 2021).

The closest efforts within Hong Kong's gerontech ecosystem resembling such a panel are the **Gerontech Ambassadors programs hosted by various organisations**, including HKCSS and the GT Platform, the PolyU Jockey Club Smart Ageing Hub, and Lingnan University's Jockey Club Gerontechnology and Smart Ageing Project. The main function of Gerontech

Ambassadors is to raise awareness about gerontech as an elderly peer "Key Opinion Leader (KOL)". However, referencing CABHI's Senior Advisory Panel, **we would recommend the GT Platform to further expand the functions of the Gerontech Ambassador program to include a more structured Elderly, PwD & Caregiver Advisory Panel that can readily provide feedback to start-ups**. Such a panel would also have the effect of helping elderly, PwD, and caregivers become more familiar with various technology products (Gap 20).

Recommendation 1.2B: Provide gerontech training courses to start-ups

Another issue we have heard from stakeholders is the **difficulty for start-ups to understand the operational context and requirements of the elderly and rehabilitation services sector**. Again, this is unsurprising as there are complex regulations governing these sectors, as well as many different and complex types of professional medical and social services that interact with one another. For example, residential elderly and rehabilitation care homes are regulated by specific regulations (Cap. 459 and Cap. 613), which contain product-specific safety information such as the need for products to be fireproof. Start-ups therefore understandably struggle with trying to determine who performs what function within each different type of elderly or rehabilitation service unit, as well as understanding what kind of product requirements and restrictions the different service units have.

¹⁶ Established in 2015, CABHI had funded around 350 projects and engaged close to 80,000 elders and caregivers as of March 2021 (CABHI *Annual Report*, 2021).

Figure 11. AGE-WELL EPIC Programme

Early Professionals, Inspired Careers (EPIC)



Online modules,
workshops,
webinars



Mentorship
opportunities



Internships &
lab exchanges



Required for anyone receiving the AGE-WELL funding

The course covers:

- Physical, social, and psychological dimensions of ageing
- Ethical guidelines within the gerontech industry
- Key information about the Canadian healthcare system

Currently, the GT Platform is seeking to remedy this gap in understanding by having HKPC and the Hong Kong Science and Technology Parks Corporation (HKSTP) lead study tours through their Network & Capacity Building functionality. These study tours bring supply-side product developers to physically visit various elderly or rehabilitation service units, as well as bring demand-side social care professionals to visit tech-related exhibitions to better understand latest technological products and trends. These tours do indeed fill the understanding gap between supply- and demand-side; yet, because they are one-off events, there is little space for structured follow-up. As such, there is an opportunity to provide more systematic and holistic training to further minimise the communication and understanding gap between the two sides.

Canada's national technology and ageing network is called AGE-WELL, which is an initiative that gathers all relevant stakeholders together to develop technologies and services for healthy aging (AGE-WELL *About*, 2021). One of AGE-WELL's key goals includes training the next generation of innovators, which is primarily done through their Early Professionals, Inspired Careers (EPIC) training programme. As depicted in **Figure 11**, EPIC trains participants to understand the physical, social, and psychological dimensions of ageing; ethical guidelines within the gerontech industry; as well as key information about the Canadian healthcare system. The training is required for anyone who is receiving funding from AGE-WELL and free to all AGE-WELL members (AGE-WELL *EPIC*, 2021).

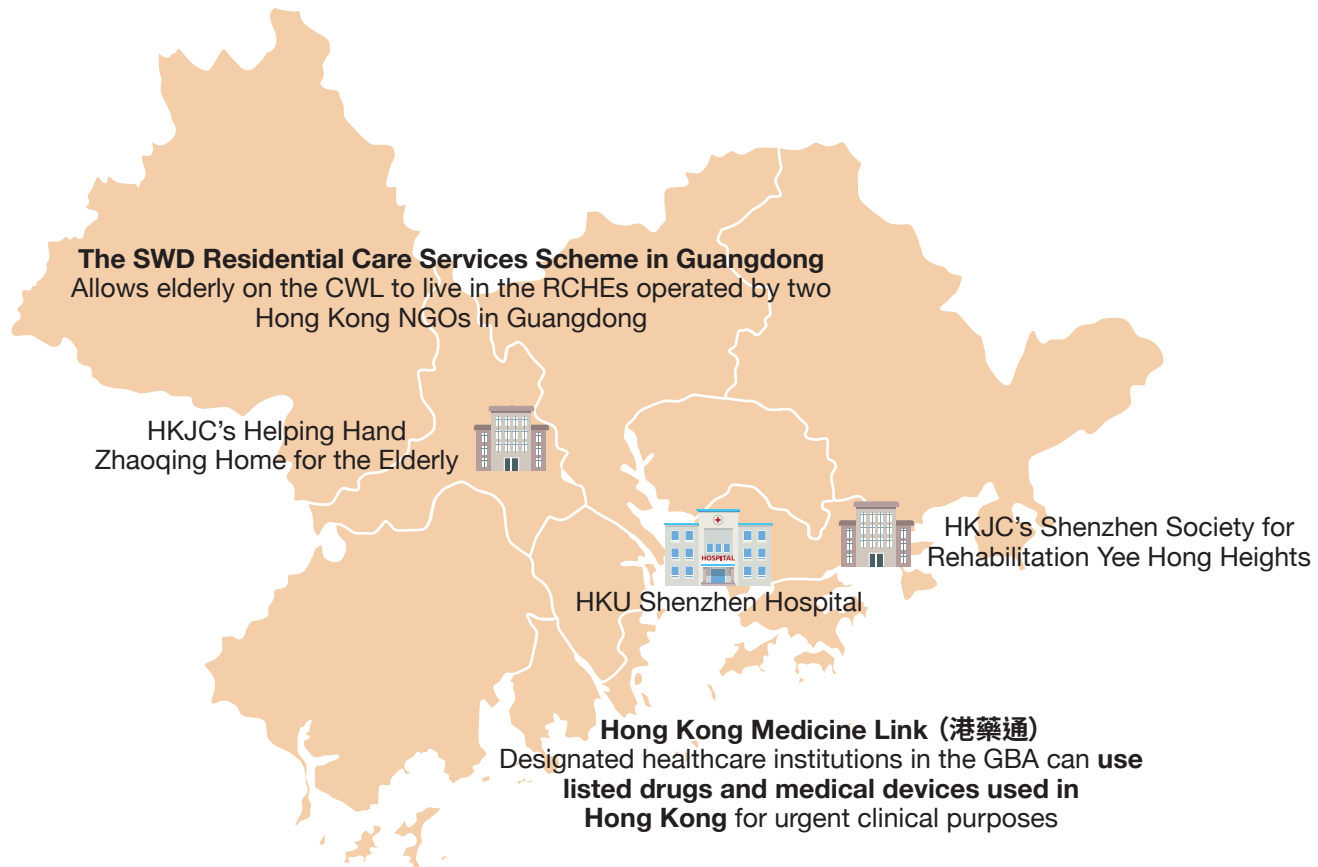
EPIC therefore provides trainees with a comprehensive understanding of the social and ethical dimensions of the gerontech industry. Referencing the AGE-WELL case, **we recommend the GT Platform to provide a specific training course for start-ups that covers the biopsychosocial contexts of ageing, disability, and rehabilitation,¹⁷ as well as the operational context and requirements of the elderly and rehabilitation services sector, such as different service units' regulatory requirements.**

1.3 Import & Export

One of the most persistent problems within Hong Kong's gerontechnology ecosystem is Hong Kong's limited market size (Gap 15). Stakeholders indicated in our survey that there is virtually no improvement in this area (score 0.05). Unfortunately, small market size causes the simultaneous problem of difficulty for local companies to sustain themselves by only relying on Hong Kong's domestic market, as well the lack of incentive for overseas companies to import and localise products into Hong Kong's market. We therefore need to consider how to help local gerontech companies with export opportunities, while also increasing the incentive and ease for overseas gerontech companies to import and localise their products. To tackle this problem, we will first distinguish between increasing the import and export flow within the Greater Bay Area (GBA), and then between Hong Kong and other international entities.

¹⁷ The biopsychosocial model posits that biological, psychological, and social factors all play a significant role in health and disease—not just biological factors (Borrell-Carrió et al., 2004).

Figure 12. Map of gerontech-affiliated Hong Kong initiatives in the GBA



Recommendation 1.3A: Build on existing initiatives to pioneer gerontech-specific collaboration within the GBA

Across the board, there is a consensus that **Hong Kong-based gerontech suppliers desire, but struggle with knowing how to expand into the emerging GBA market.** On the one hand, the GBA presents a huge market opportunity, contributing about USD 1.7 trillion to China's GDP in 2020, constituting 12% of China's GDP; the GBA is also home to 86 million citizens, of which 10 million are aged ≥ 65 (Constitutional and Mainland Affairs Bureau, 2021; HKTDC, 2020).¹⁸ On the other hand, there are many challenges resulting from cultural, operational, and technical differences between the GBA and Hong Kong. For example, there are different regulatory and product requirements. Elders and PwDs may also have different purchasing patterns and product preferences.

But the GBA is not only important to Hong Kong for economic purposes; the GBA also contains social value as a place where Hong Kong elderly can relocate and retire. To this extent, SWD has launched a Residential Care Services Scheme in

Guangdong that allows elderly on the Central Waiting List (CWL) to live in residential care homes operated by two Hong Kong NGOs in Guangdong (SWD *Residential Care Services Scheme in Guangdong*, 2021) (**Figure 12**).¹⁹

Yet, many Hong Kong people remain hesitant to relocate to the GBA. According to an OHKF-conducted survey, 62% of respondents cite access to Hong Kong or Hong Kong-like healthcare and welfare services as the major obstacle for moving to the GBA (OHKF, 2021).²⁰ Therefore, to support Hong Kong people who want to move to the GBA, we need to increase the amount of cross-border provision of Hong Kong-like healthcare and welfare services in the GBA.

An innovative initiative in this area is the “Hong Kong Medicine Link” (港藥通), which enables designated healthcare institutions in the GBA, such as the University of Hong Kong-Shenzhen Hospital, to use drugs listed and medical devices utilised in Hong Kong for urgent clinical purposes (**Figure 12**) (National Medical Products Administration, 2020). One of the gaps that our survey indicated has worsened is “exhausting medical device registration process” (Gap 11; score -0.23). This problem is further exacerbated because Hong Kong and mainland China have different medical device registration processes.

¹⁸ Percentage calculated based on China's national GDP, which is 14.7 trillion (World Bank, 2021).

¹⁹ The two existing residential homes are Hong Kong Jockey Club Helping Hand Zhaoqing Home for the Elderly and Hong Kong Jockey Club Shenzhen Society for Rehabilitation Yee Hong Heights (SWD *Residential Care Services Scheme in Guangdong*, 2021). The Government has also indicated that they will explore extending this scheme to cover other eligible RCHes in Mainland cities of the GBA (LegCo *Policy Address*, 2021, October 6).

²⁰ To better understand how Hongkongers perceive and evaluate opportunities in the GBA, OHKF commissioned the Public Governance Programme at Lingnan University to conduct a telephone survey. 1,012 Hong Kong permanent residents (aged ≥ 18) were interviewed by a randomised telephone survey in late April 2021. In addition, OHKF commissioned an external organisation to conduct 12 focus groups in May 2021, comprising of a total of 82 participants aged 18 to 40 (OHKF, 2021).

While the Hong Kong and GBA Governments are exploring possibilities for collaboration within the area of elderly services and biotechnology, there remains little collaboration within the area of gerontechnology. To this extent, **we recommend that the GT Platform create a program for Hong Kong gerontech start-ups to conduct site visits and product trials in the GBA elderly and rehabilitation service units**, as an extension of their network and capacity building and testing support programs. Based on the Hong Kong Medicine Link example, **we also recommend the Central Government to explore having approved products from the \$1 billion I&T Fund Reference List, which are already in active use in Hong Kong elderly homes, to be allowed for direct use in GBA elderly and rehabilitation service units without complying with mainland China's product regulations.** Such initiatives would greatly facilitate a greater flow of gerontech products in and out of Hong Kong and the GBA.

Recommendation 1.3B: Create gerontech-specific international import & export support structures

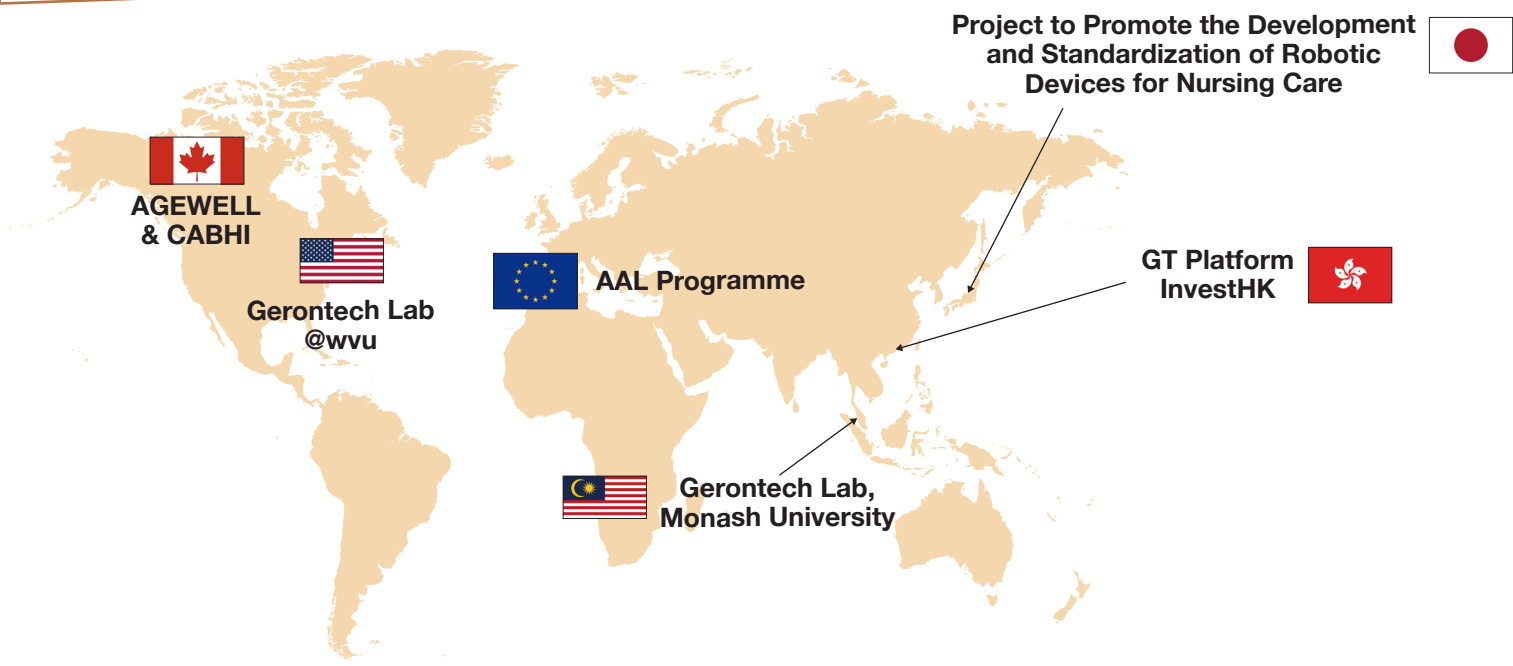
One of the most persistent challenges within Hong Kong’s gerontech ecosystem is related to overseas product localisation (Gap 14). Localisation is a challenge not only because of Hong Kong’s comparatively small market; it is also because of Hong Kong’s particular cultural needs, such as a Cantonese language setting and extremely small living spaces, which make it very costly for overseas companies to localise products for Hong Kong (OHKF, 2017). Despite the Government having invested significant resources to attract overseas gerontech suppliers through initiatives such as GIES, the care food subsidy, and \$1 billion I&T Fund, our survey indicated that there has been virtually no improvement on this front (score 0.00). More targeted efforts are therefore needed to further improve this area.

It is not that the Government does nothing to support foreign companies and start-ups. InvestHK is the Government Department of Foreign Direct Investment. Its aim is to attract and retain foreign direct investment to Hong Kong by providing free advice to support companies from planning stage to launch of business in Hong Kong (InvestHK *About*, 2021). An initiative within InvestHK is StartmeupHK, which specifically focuses on helping overseas start-ups to set up or expand in Hong Kong (StartmeupHK *About*, 2021). InvestHK and StartmeupHK both cover industries affiliated to gerontech, such as Innovation & Technology and Information & Communications Technology;

Health/Medical; and Social Innovation/Venture industries (InvestHK *Industries*, 2021; StartmeupHK *Hong Kong’s Startup Ecosystem*, 2021). However, there remain no dedicated efforts for gerontech. Similarly, while InvestHK and StartmeupHK have numerous global partnerships, there are not yet any gerontech-specific partners.

Yet, there are many gerontech-related international organisations, as illustrated in **Figure 13. We therefore recommend GT Platform to collaborate with InvestHK to create strategic partnerships with these international organisations. We further recommend that GT Platform and InvestHK collaborate to create a gerontech “Regulation & Localisation Consultancy”**. This consultancy could provide services that help overseas companies and start-ups understand gerontech-related standards, as well as ageing- and rehabilitation-related culture in Hong Kong. It could provide local gerontech companies and start-ups with referrals to relevant international partner organisations for gerontech standards, as well as ageing- and rehabilitation-related cultures in other countries.

Figure 13. International gerontech organisations and networks



International/regional organisations



International Society for Gerontechnology



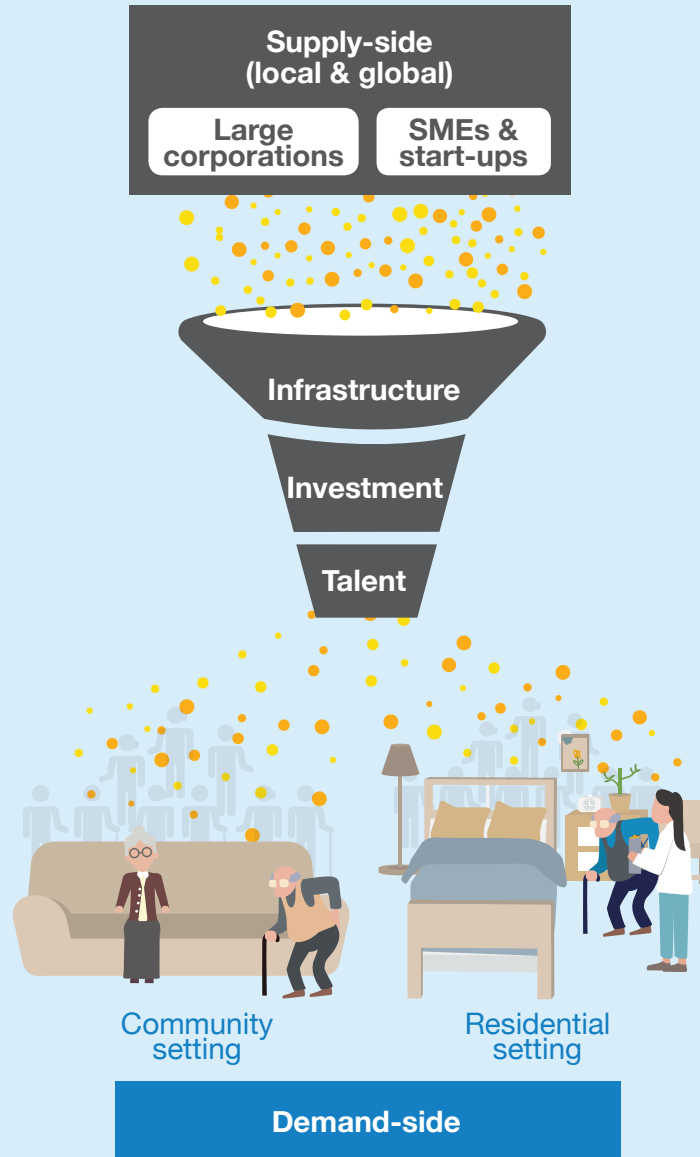
UNESCAP ARTNET on STI [1]



Asia Pacific Observatory on Health Systems and Policies

Note: [1] "STI" stands for science, technology, and innovation
Source: UNESCAP, 2021

CHAPTER 2. DEMAND-SIDE



Overview

The “demand-side” of the gerontech ecosystem refers to organisations and individuals that purchase and consume gerontech products and services. **End-users include the elderly, persons with disabilities, and caregivers, which is further differentiated by end-users living at home within a community setting, versus those who live in residential institutional settings.** Also, many professionals from the healthcare and welfare service sectors use gerontech to help end-users, such as nurses, occupational therapists (OT), physiotherapists, speech therapists, and social workers. It is important to recognise that the elderly and PwD are not mutually exclusive population groups, as many elders also suffer from disabilities. Every elderly and PwD have unique and diverse needs; therefore, any policy seeking to address their needs should remain flexible and accommodating. For this chapter, our research and analysis will primarily focus on the elderly for illustrative purposes.²¹

Hong Kong’s tech savvy culture is not limited to the younger generation. In recent years, the city has seen a significant rise in older people’s information technology use and penetration. As of 2020, more than 80 to 90% of persons aged 45 to 64 years (“young-olds”) have had experience in using a major form of information technology device (**Table 3**) (C&SD, 2013; 2021, April). These numbers signal stronger market potential in the next 10 to 20 years, when young olds will be willing to spend more money on using technology to improve their lives. **Hence, we anticipate significant market potential for gerontech.**

²¹ Many of our analyses and recommendations can also be extended to PwD as well.

Table 3. Information technology usage and penetration

Percentage of population who have used	Aged 45–64 (2020)	Aged ≥ 65 (2020)	PwD (2013)
Personal computer	82%	39%	26%
Smartphone	98%	68%	23%
Internet	98%	66%	78%

Note: Analysed by selected types of disability, the PwD who use technology the least are persons with restriction in body movement and those with seeing, hearing, or speech difficulties. Persons with autism, specific learning difficulties, and attention deficit/hyperactivity disorder are more likely to use technology.
Sources: C&SD, 2014; 2021, April

However, the young old’s high-tech penetration stands in contrast to the lower tech penetration among the elderly (aged ≥ 65) and PwD. This is an indicator of the disparity between current and future gerontech users. As previously mentioned, one of the biggest problems within Hong Kong’s gerontech ecosystem is its limited market size. We identified this as a gap in our first report (Gap 15), and our survey indicates that it has seen virtually no improvement (score 0.05). Through our stakeholder interviews,

it has become apparent that a reason for this limited market size is that existing demand-side users and organisations do not have enough purchasing power to acquire gerontech on their own. In other words, the **existing demand-side is unable to independently drive gerontech market growth in the short to medium term. Therefore, generating momentum that can help sustain the gerontech market’s growth in the coming years will be the focus of this chapter.**

Figure 14. Proportion of elderly residing in domestic and non-domestic households

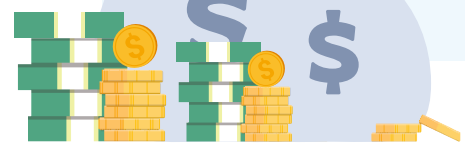
< 8.1%^[1]

2.1 Elderly living in care homes



91.9%

2.2 Elderly living in the community



\$1 billion I&T Fund



Inadequate funding support

Note: [1] 8.1% includes persons aged ≥65 who live in elderly homes, hospitals, penal institutions, etc.
Source: C&SD, 2018

At present, one of the most important financial drivers to Hong Kong's gerontech ecosystem is the Government's \$1 billion I&T Fund. As mentioned previously, the \$1 billion I&T Fund subsidises Government-subsented elderly and rehabilitation service units to purchase and rent gerontech products. One of the main beneficiaries of the fund are therefore end-users living in residential setting, as these end-users can directly use products purchased or rented by residential homes in their daily lives.²²

However, as illustrated by **Figure 14**, only less than 8.1% of Hong Kong's elderly live in residential settings, whereas the vast majority of elderly (91.9%) live in domestic households within the community (C&SD, 2018).²³ Even though the Government's official ageing policy is "ageing-in-place", the existing gerontech subsidy does not directly cover elderly living in the community who wish to acquire gerontech products or services. This creates a major limitation for the market to generate momentum and expand.

This chapter consists of two sub-sections:

- Section 2.1 will focus on how to enhance and expand funding opportunities through the \$1 billion I&T Fund for elderly **in residential settings**.
- Section 2.2 will focus on how to leverage existing pipelines such as the voucher schemes to empower the elderly **in community settings** to acquire gerontech products.

2.1 Elderly living in care homes

The \$1 billion I&T Fund has two schemes: **i) procurement/rental of innovative technology products**; and **ii) trial use of newly developed products** (SWD *I&T Fund Manual*, 2021). For the first scheme, the SWD collaborated with several stakeholders to draft a list of Recognised Technology Application Products (Reference list), which includes devices, equipment, tools, mobile applications and high-end hardware and software.²⁴ A brief overview of the Reference list with products ranging over 23 categories can be found in **Annex II** (SWD *I&T Fund Reference List*, 2021). For the second scheme on trial use of newly developed products, applicants are encouraged to use funding to trial products of their choice that are not included in the Reference list (SWD *I&T Fund Manual*, 2021).²⁵

Recommendation 2.1A: Regularise and extend the scope of \$1 billion I&T Fund to increase coverage among service units

The bold initiative to set up the \$1 billion I&T Fund has generated some momentum in the gerontech market. For example,

²² The \$1 billion I&T Fund also covers service units that deliver community care and home-based services, such as Day Care Centre/Unit for the Elderly, District Elderly Community Centres, Neighbourhood Elderly Centres. However, CCS are generally underutilised by the elderly (SWD *I&T Fund Manual*, 2021; Elderly Commission, 2017).

²³ Similarly, only 12.4% of PwD reside in institutions, while 87.6% of PwD reside in domestic households (C&SD, 2014).

²⁴ The list is reviewed periodically by the Expert Group of the \$1 billion I&T Fund under the HKCSS and updated through continuous dialogue between HKCSS, stakeholders, and the relevant panels of the I&T Fund. The applicant organisation can also use the funding to train respective staff to develop the technical know-how to use products, and cover costs for maintenance for a period of five years (SWD *I&T Fund Manual*, 2021).

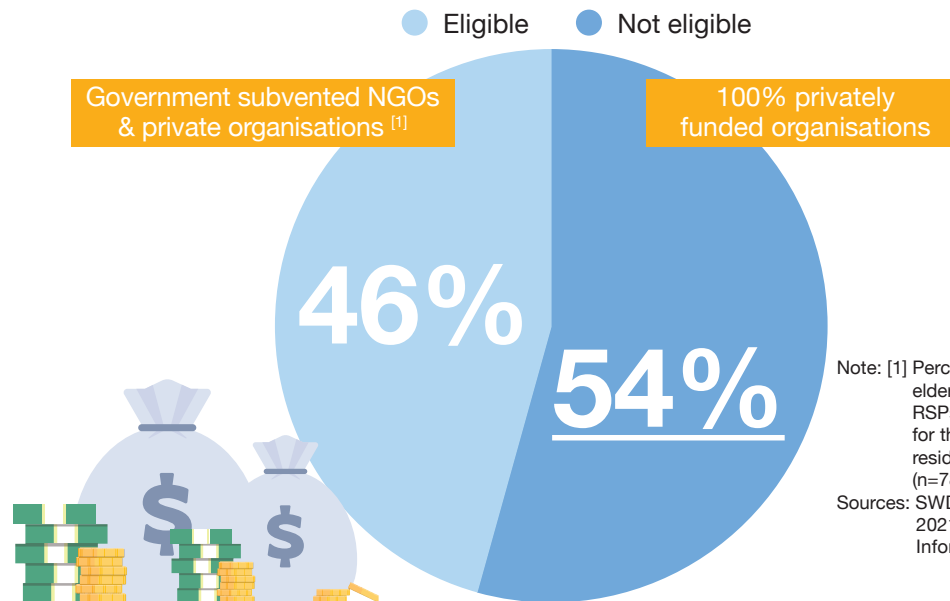
²⁵ Applicants may identify suitable technology research and development companies as working partners to try their newly developed technology products designed specifically for the nursing and rehabilitation needs of elderly persons or PwD (SWD *I&T Fund Manual*, 2021).

stakeholders have indicated that more overseas companies are now willing to set up agencies to distribute their products to Hong Kong consumers. All NGOs and private organisation that receive subsidies from the SWD or provide subsidised RCS or community care and support services for the elderly are eligible to apply to the \$1 billion I&T Fund.²⁶ However, **more than half of residential care services for the elderly are 100% privately funded and do not benefit from the \$1 billion I&T Fund** (SWD, 2021, October 4)

(Figure 15). This means that a significant number of elderly living in residential institutions have limited access to gerontech, since their homes are not eligible for the \$1 billion I&T Fund. At a critical period when the gerontech market is still developing, such funding restrictions further limits the size of an already small demand-side. Therefore, specific enhancement measures should be put in place to maximise the coverage of funding support.

Figure 15. Percentage of eligible residential care services for the elderly

Percentage of residential care services for the elderly eligible for \$1 billion I&T Fund



Note: [1] Percentage of eligible RCS for the elderly = Number of subsidised RCS + RSPs under the Pilot Scheme on RCSV for the elderly (n=357) / Total number of residential care homes for the elderly (n=782)

Sources: SWD, 2021, June 30; 2021, July 9; 2021, August 31; SWD Elderly Information Website, 2021

²⁶ Eligible private organisations only include organisations participating in the Enhanced Bought Place Scheme, self-financing nursing homes participating in the Nursing Home Place Purchase Scheme, and RSPs under the Pilot Scheme on RCSV for the elderly (SWD *I&T Fund Manual*, 2021).

First, **we recommend that the Government renews the funding for the \$1 billion I&T Fund after its completion in the 2023/24 fiscal year.** Second, **we believe that the renewed funding scheme of the \$1 billion I&T Fund should cover all elderly care homes.**²⁷ Specific measures can be put in place to ensure that the service quality of 100% privately funded organisations is comparable to that of subsidised elderly care homes. For example, an evaluation of staff's training and qualifications at private care homes should meet basic competence levels.²⁸ **We also recommend that the Government increase the funding amount of the \$1 billion I&T fund in the next proposed funding cycle to match the corresponding increase in coverage of eligible service providers.**

Recommendation 2.1B: Enhance trial use of newly developed technology products under \$1 billion I&T Fund

As for the \$1 billion I&T Fund trial use scheme, our stakeholders revealed that interested applicants **face roadblocks and lack incentive** to apply. In particular, the scheme has received little reception. As of April 2021, only four applications have ever been submitted (LegCo, 2021, May 27). Therefore, to improve the \$1 billion I&T Fund trial use scheme, specific support measures must be in place to encourage applications.

First, the target applicants **lack the technical know-how** to make judgements on whether the product for trial consideration is currently in the research and development (R&D) or market stage. Such a distinction is critical because the \$1 billion I&T Fund's trial scheme application only invites products that are well-tested in the market stage (SWD *I&T Fund Manual*, 2021). Applicants wanting to do R&D may incorrectly apply for the \$1 billion I&T Fund's trial scheme, resulting in inefficiencies and increases the time spent on processing and vetting applications.

We recommend that the Social Welfare Department empower applicants by providing more information for the trial use scheme. For example, a detailed handbook can be made available to help applicants identify and select appropriate gerontech products for trial. This can reduce overall time required to process applications. Also, the GT Platform offers consultation support to help both supply and demand-side organisations apply for the most relevant gerontech funding scheme (HKCSS, 2021). When SWD receives incorrect applications, they can consider collaborating with the GT Platform to refer applicants to more relevant schemes, such as the ITB's Fund for Better Living.

Second, the \$1 billion I&T Fund trial scheme only distributes grants in instalments, pending completion of progress reports and milestones/deliverables (SWD *I&T Fund Manual*, 2021).²⁹ More problematically, it requires successful applicants to submit a copy of the contract or service agreement with the working partner, which results in service providers needing to make

²⁷ Aside from extension to private elderly homes, the Government can consider further extension to other non-subsidised service providers such as rehabilitation homes, community care, and home-based service units.

²⁸ The I&T Fund requires service providers to have qualified professionals such as an OT or PT. Basic competence level means that the OT or PT should hold a relevant tertiary degree and register with the Supplementary Medical Professionals Council in Hong Kong (SMP-Council *OT Therapists Board*, 2021; *PT Board*, 2021).

²⁹ The SWD will retain 5% of the total approved grants for each trial use project of which will be released after completion of the trial use project (SWD *I&T Fund Manual*, 2021).

payments prior to receiving any grant. This can pose cash flow problems to service operators and even deter interested applicants from applying in the first place. Therefore, **we recommend that the Social Welfare Department modify the requirement of submitting a contract or agreement with the working partner prior to the dissemination of funding.** Specifically, the successful applicant should at least be allocated the first instalment of funding prior to the signing of any contract or agreement.³⁰

2.2 Elderly living in the community

Perhaps the largest challenge currently facing Hong Kong's gerontech ecosystem is helping end-users in the community to access and use gerontech. As mentioned in the overview of this section, around 90% of elderly live in domestic households, compared to the approximate 10% who live in institutions. Yet the Government's primary gerontech-related spending—the \$1 billion I&T Fund—mainly benefits institutions. This may be insufficient in helping the Government's goal of ageing-in-place.

To a certain extent, end-users living in the community do benefit from the \$1 billion I&T Fund, as elderly and rehabilitation service units providing CCS are also eligible to purchase and rent gerontech products (SWD *I&T Fund Manual*, 2021). But allowing CCS service units to procure gerontech is not the same thing as helping end-users in the community individually procure

gerontech products that can be directly used at home. **There remains a huge gap within the gerontech ecosystem, namely that end-users living in the community are provided with little incentive and support to procure gerontech.** This leads to three significant problems—one of social consequence, one of economic consequence, and one of policy consequence.

From a social perspective, individual end-users miss out on the potential benefits brought about by gerontech, as the preventive and rehabilitative nature of many products can help them stay healthier and more active in the community for longer.³¹ From an economic perspective, because these end-users effectively represent 90% of the market, their lack of active market participation significantly hinders the potential economic development of the local gerontech industry. From a policy perspective, while it is well-established that public investment into community care results in cost-saving from acute care,³² the Government's lack of financial assistance for end-users living at home to procure gerontech means missing out on another way to help them avoid institutionalisation.

³⁰ Approved applicants already provide at least one quotation during the application stage.

³¹ For example, elderly who use fall risk prevention devices not only minimises their risk of severe injury; it will also help caregivers have less psychological and emotional burden about the elderly's personal safety. A person with hearing impairment who has access to enhanced hearing devices may be more able to participate in daily activities within their community.

³² For every HKD 1 invested into community health, there is a HKD 8.4 saving on acute care costs (OHKF, 2018).

But in the short to medium term, it is difficult to expect current end-users in the community to procure gerontechnology without some financial assistance. Among the many challenges facing our elderly population, one that negatively predisposes them to financial vulnerability during old age is insufficient retirement protection (Gap 4).³³ In our survey findings, stakeholders have indicated that insufficient retirement protection is one of the three gaps that has worsened over time (score -0.05). **The weak state of Hong Kong's existing retirement protection system may have implications on the elderly's willingness to spend money**—especially on gerontechnology.³⁴ Not to mention, many elderly who reside in domestic households and do not access community and supports services will not benefit from the \$1 billion I&T Fund. Therefore, identifying appropriate funding support for elderly living at home is crucial for increasing their accessibility to the gerontechnology market.

Other governments subsidise the cost for end-users to directly procure gerontechnology products. One of the most successful programs is the **Welfare Equipment Rental Program (WERP)**

in Japan, which offers assistive device rentals to elderly (aged ≥ 65) living at home as part of their Long-term Care Insurance Program (International Longevity Centre (ILC)-Japan, 2018). As illustrated by **Figure 16**, Japanese elderly are required to pay mandatory insurance, which helps cover rental costs.³⁵ An elderly only needs to pay a monthly out-of-pocket payment of renting a device at either 10% or 20% of its commercial rental cost. Products are categorised into 13 categories based on functionality (e.g., wheelchairs, walkers, hospital beds) for easier choice and customisation. Elderly also have access to a case manager—referred to as “assistive device planners”—who can help them with all device-related queries (UNESCAP, 2021).

Outside Japan, mainland China is also exploring Government-subsidised rehabilitation assistive device rental services for the elderly (中国政府网, 2016).³⁶ Singapore also has an Assistive Technology Fund that provides subsidies for PwD to purchase, replace, upgrade, or repair assistive technology devices (Ministry of Social and Family Development, 2020).³⁷

³³ Existing retirement schemes include the Mandatory Provident Fund, Reverse Mortgage Programme, Life Annuity Plan, etc. (OHKF, 2017, June).

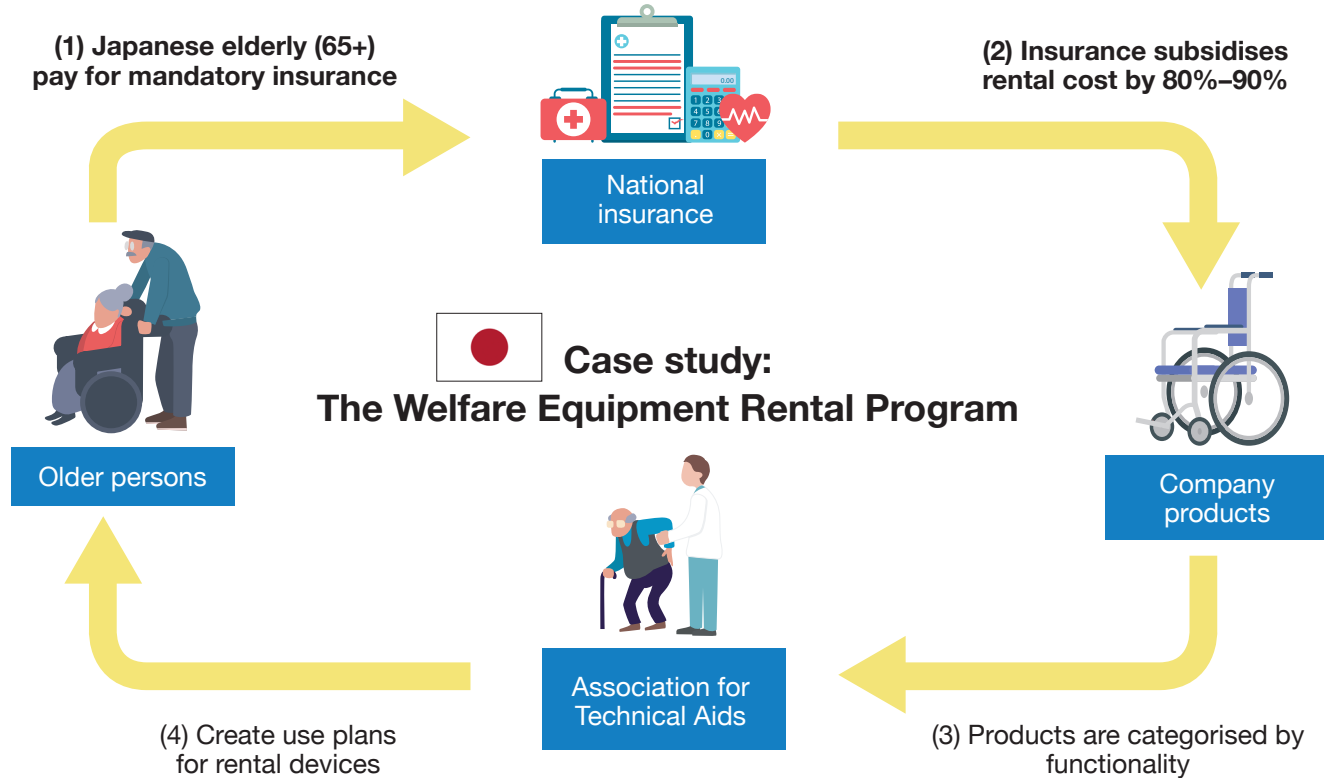
³⁴ PwD are also an economically marginalised population group. Discounting those who have retired, 24.3% of PwD aged ≥ 15 are economically inactive, significantly higher than the city's overall unemployment rate of 4.7% (EOC, 2019; C&SD *Labour Force*, 2021). Furthermore, among the 506,000 PwD residing in households, 40.2% of their caregivers must take care of the PwD's daily activities and are also likely economically inactive (EOC, 2019).

³⁵ The co-payment amount is adjusted based on an elderly person's income.

³⁶ Launched in 2019, the Shanghai Civil Affairs Bureau offers rental services of rehabilitation equipment and accessories in 70 pilot communities, expecting citywide coverage by 2021. Rental stations are mainly set up at elderly service centres in pilot communities. All Shanghai residents aged ≥ 75, as well as low-income elderly aged 60–74, can apply for subsidies worth 50% of rental price, with a maximum annual subsidy of RMB 3,000 (中国政府网, 2019).

³⁷ Successful applicants qualify for a means-tested subsidy of up to 90% of the cost of the device, subject to a lifetime cap of SGD 40,000 (approximately HKD 230,000) (Ministry of Social and Family Development, 2020).

Figure 16. Overview of the Welfare Equipment Rental Program in Japan



Source: Adapted from ILC-Japan, 2018

But Hong Kong neither has a long-term care insurance program for elderly or PwD, nor any Government-subsidised program empowering individual end-users to acquire gerontech.³⁸ Instead, elderly have access to voucher schemes that subsidise the cost of certain medical or welfare care services.³⁹ Also, while Hong Kong does have a gerontech rental program—namely the Jockey Club “age at home” Gerontech Education and Rental Service launched in April 2020—it is a non-governmental initiative coordinated by HKCSS and operated by three NGOs through charitable donations, without any support from the Government (Jockey Club *age at home*, 2021).⁴⁰

Yet, there is widespread support for the idea of expanding the scope of existing vouchers to include the procurement of gerontech. According to a survey conducted by Lingnan University, 87% of participants believed the Government should extend the scope of health care vouchers for gerontech products (LingnanU, 2020).⁴¹ The vast majority of stakeholders that we interviewed also share this view that vouchers are a well-established pipeline to encourage end-users to acquire gerontech. The question is therefore **which vouchers schemes should be extended to encourage end-users to purchase or rent gerontech products, and how should they be extended.**

Recommendation 2.2: Extend vouchers to purchase or rent gerontech products

At present, the Government offers various voucher schemes. Gerontech aligns well with the goals of the Elderly Health Care Voucher Scheme (EHCVS) and the Community Care Service Voucher (CCSV).⁴² For example, the objective of the EHCVS is to provide all elderly aged ≥ 65 with a financial incentive to consume **primary healthcare services**, including **preventive care** (Department of Health (DH) *Elderly Health Care Voucher Scheme Background*, 2021). And the objective of the CCSV is to provide moderately or severely impaired elderly to purchase community care services to support their **ageing-in-place** (SWD, 2021, September 30) (**Table 4**). A wireless health monitoring equipment, for example, can help with the management of chronic conditions. This is in line with the objective of the EHCVS since it encourages the **elderly to regularly engage in preventive practice at home** and helps the elderly prevent or better manage their chronic health conditions. As for ageing-in-place, an electric assisted rear wheel for wheelchairs can help the elderly to freely move and reduce caregiver burden. This not only encourages the **prospect of living at home** but also supports the objective of the CCSV to prevent or delay premature institutionalisation (SWD *I&T Fund Reference List*, 2021).

³⁸ Both elderly and PwD also have access to social security allowances that are not means-tested. The Old Age Allowance (HKD 1,475 per month) is offered to all elderly aged ≥ 70 . The Normal Old Age Living Allowance (HKD 2,845 per month) and Higher Old Age Living Allowances (HKD 3,815 per month) are offered to low-income elderly aged ≥ 65 . People with severe disabilities, as certified by the Director of Health or Hospital Authority Chief Executive, are offered with disability allowances (SWD, 2021 September 28). The Normal Disability Allowance (HKD 1,885 per month) is given to about 112,200 people with severe disabilities. The Higher Disability Allowance (HKD 3,770 per month) is given to about 20,300 severely disabled persons requiring constant attendance at home (LWB, 2016; 1823.gov.hk, 2021).

³⁹ However, it should be noted that equivalent vouchers do not exist for PwD.

⁴⁰ The three NGOs operating the education and rental service program are the Hong Kong Red Cross, St. James' Settlement, and the Evangelical Lutheran Church Social Service – Hong Kong (Jockey Club *age at home*, 2021).

⁴¹ Survey respondents are participants that attended the GIES in 2019.

⁴² The EHCVS was launched in 2009 and regularised by 2014. The CCSV is in the Third Phase of the Pilot Scheme as of October 2020.

Table 4. Overview of EHCVS and CCSV

	Elderly Healthcare Voucher Scheme (regularised)	Community Care Service Voucher (third phase of pilot scheme)
Eligibility	All elderly aged ≥ 65	Moderately or severely impaired elderly aged ≥ 65 ^[1]
Objective	Enhance accessibility to primary care services, including preventive care in the community	Promote ageing-in-place through purchase of community care services
Voucher value	HKD 2,000 per annum (accumulation limit HKD 8,000)	HKD 4,170–9,980 per month
Co-payment	Not applicable	Assessment based on family household income
Number of vouchers available (2020)	1,376,000	8,000

Note:[1] Elderly persons who have been assessed and recommended for RCS or CCS under the Standardised Care Need Assessment Mechanism for Elderly Services and are waitlisting for subsidised CCS and/or RCS on the CWL for Subsidised LTC Services without any kind of RCS or subsidised CCS being received.

Sources: SWD, 2021, September 30; DH, 2021; HKSARG, 2020

To provide the elderly with appropriate financial support, we believe that the Government should extend the scope of the EHCVS and the CCSV to allow for the purchase or rental of gerontech products.⁴³ The extension should come with an additional budget that has clear restrictions and guidance on its usage, which will be described below. Such an extension is justifiable because the preventive and rehabilitative nature of gerontech products closely aligns with the EHCVS's objective to promote preventive care and the CCSV's objective to promote ageing-in-place. The extension is made more advantageous by the fact that gerontech meets the vouchers' objectives without relying on scarce professional manpower within the medical and welfare services.

Particularly given the prevalence of abuse associated with the EHCVS, it is important to be cautious when thinking about how to implement the voucher schemes' gerontech extension.⁴⁴ During a focus group that we conducted with elders, they also shared that price transparency remains a major concern with the EHCVS. There must be **clear boundaries regarding the scope of the voucher schemes' gerontech extension,** which can be done through the clear differentiation of various gerontech products by purpose and by price. The set price range will help prevent end-users from being exploited.

First, it must be made clear that this **voucher extension can only be used exclusively for the purchase or rental of**

gerontech products; it cannot be used for any other purpose. This is to differentiate the voucher extension's purpose from the vouchers' existing scope of purchasing medical or welfare services. Elderly eligible for the CCSV should be entitled to a higher added value than general elderly who are eligible for the EHCVS, due to their more severe health needs.⁴⁵ As the CCSV has an existing co-payment mechanism in place, **we suggest that the Government consider extending the means-tested co-payment arrangement for the CCSV's gerontech extension as well** (SWD, 2021, April 1).⁴⁶

Second, **the voucher extension should be clear on what gerontech products are covered for whom.** Based on the \$1 billion I&T Fund Reference list, a pre-approved list of gerontech products should be made available. Similar to the \$1 billion I&T Fund's Reference list (**Appendix II**), this pre-approved product reference list for the voucher schemes' gerontech extension should have clearly defined categories and price ranges for specific types of gerontech products. The voucher extension list can be initially based on the products covered by the \$1 billion I&T Fund's Reference list; however, because applicants of the \$1 billion I&T Fund are institutions, the Reference list price range is relatively high and the size of products are quite large. The voucher extension's product reference list should **include more lower-priced products that are suitable for end-users' individual daily use at home,** such as smart medication boxes, fall prevention devices, etc.

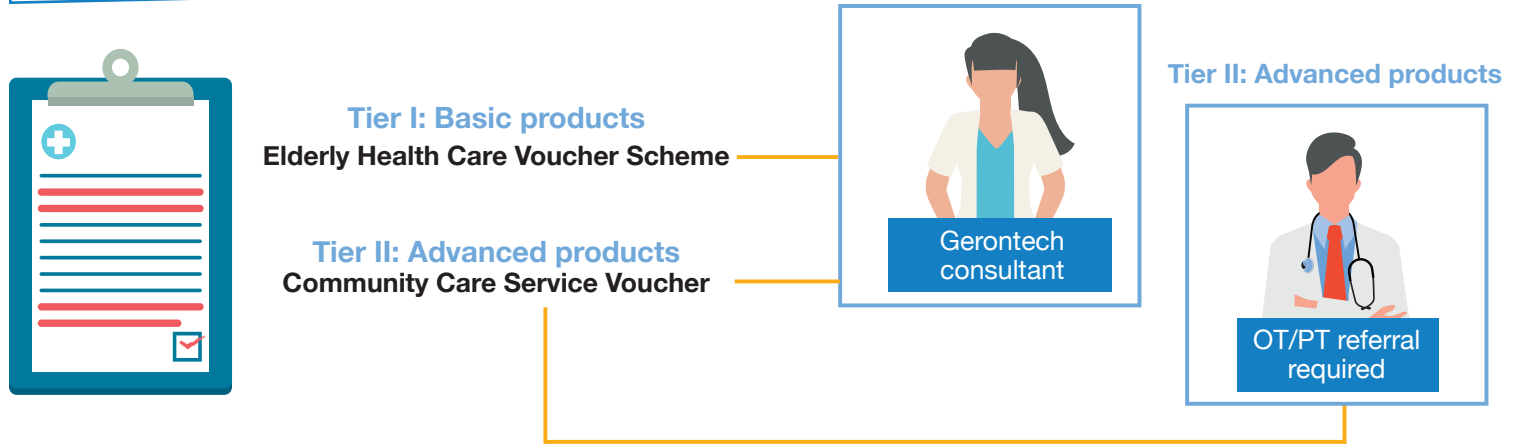
⁴³ In the longer term, given that PwD living at home also have a significant need for gerontech, we suggest that the Government further consider giving PwD access to something equivalent to the above-mentioned voucher extension for gerontech, even though PwD do not have access to either the EHCVS or the CCSV.

⁴⁴ The Consumer Council has documented several instances during which elderly using the EHCVS were tricked into paying higher costs than necessary or purchasing unnecessary products (Consumer Council, 2018, June). A survey conducted by the Society for Community Organisation (SoCO) found that 59% of respondents felt they had been unreasonably charged when paying with the EHCVS (SoCO, 2018).

⁴⁵ Similarly, if the voucher extension is also offered to PwD, then all privileges offered to elderly with CCSV extension should be also offered to PwD assessed to be severely disabled.

⁴⁶ The CCSV has an existing practice of co-payment which have six co-payment categories: 5%, 8%, 12%, 16%, 25%, and 40%. The co-payment amount is adjusted for household monthly income. The 5% category covers elderly receiving CSSA (SWD, 2021, April 1).

Figure 17. Proposed model for extending voucher schemes to purchase/rent gerontech products

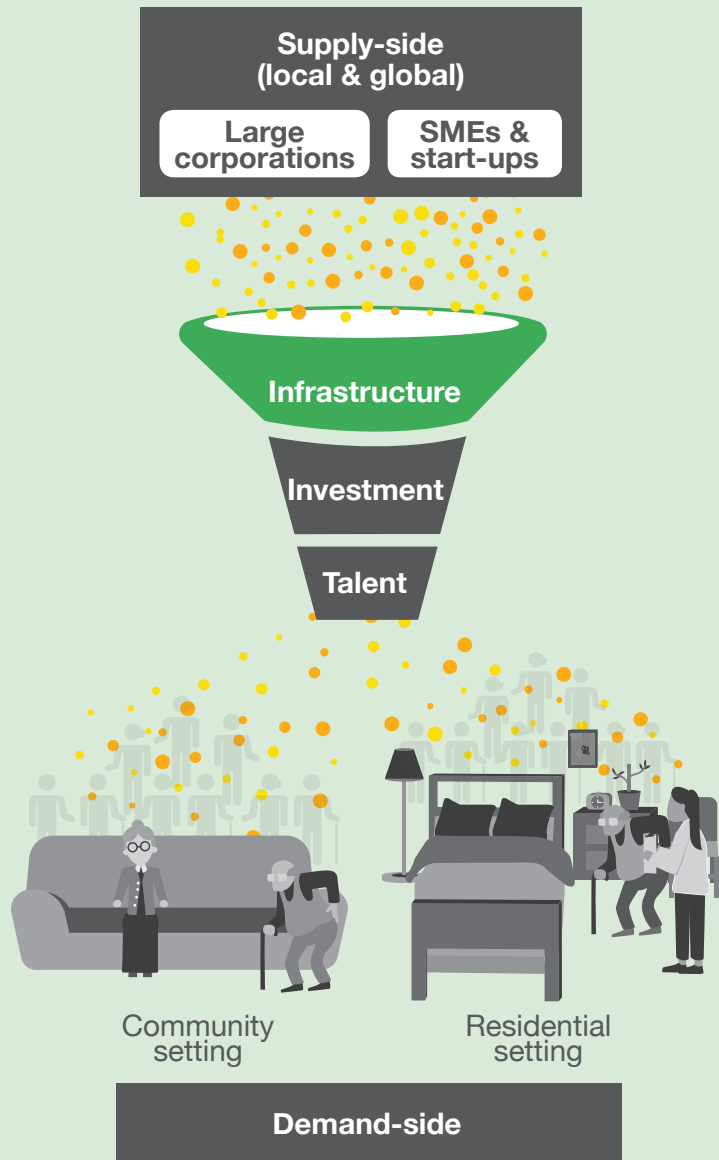


The pre-approved list should further be **differentiated between two tiers to be clear on who is entitled to what type and what price range of gerontech products**. As illustrated by **Figure 17**, namely **Tier I** for basic, lower-valued products that encourage prevention (including rehabilitation), and **Tier II** for more advanced, higher-valued products that can better support an elderly's experience of ageing-in-place. Referencing Japan's WERP case, a **gerontech consultant** can be made available to answer any questions that end-users have about any of the products. More details on the qualifications and functions of a gerontech consultant will be discussed in **Chapter 5**.

We envision that Tier I products can be available to all end-users, encouraging them to practice prevention and rehabilitation and to manage their conditions in the community. As such, the **general elderly should be able to pay for Tier I products through the**

extension of the EHCVS. In contrast, Tier II products can be purchased or rented with a CCSV for a smaller subset of elderly that have moderate or severe impairment and need more support to effectively age-in-place. This arrangement is also reasonable because these users should be allocated a higher added value for their voucher extension, which enables them to purchase or rent more advanced, higher-valued products. In particular, for Tier II products, assistance and professional input is not only necessary but also supports the elderly and their caregiver to make well-informed decisions when selecting a suitable product that can meet their living needs. Therefore, **one of the additional requirements of Tier II products should be an OT or PT referral**. If the elderly is not already in regular contact with an OT or PT, the gerontech consultant can help the elderly obtain an OT or PT, who can then assess the suitability of advanced products and issue a referral if appropriate.

CHAPTER 3. INFRASTRUCTURE



Overview

Following our analysis of the challenges and needs that supply-side and demand-side respectively face, this report will now consider how to better increase and facilitate the flow of gerontech products and services between supply-side and demand-side. As mentioned in Introduction, we believe that further development of Hong Kong's gerontech ecosystem requires more strategic planning on how to expand the width of funnel to enable smoother and larger quantity of flow from supply to demand side. The first aspect to consider is creating relevant **gerontech-friendly infrastructures**, of which there are currently few.

By gerontech-friendly infrastructures, we mean both public infrastructures that display and utilise gerontech, as well as private home infrastructures that can accommodate the installation of gerontech. These two types of gerontech-friendly infrastructures represent two infrastructural difficulties that Hong Kong is currently facing. Namely, many end-users cannot easily view gerontech products and do not know where to procure gerontech products within their local communities. Also, many end-users who live in the community—particularly those living in private housing—have difficulties in installing gerontech. These are the two primary problems that will be addressed in this chapter.

This chapter consists of two sub-sections:

- Section 3.1 will focus on how to **leverage District Health Centres (DHC)** to make gerontech accessible to Hong Kong residents in all 18 districts.

- Section 3.2 will focus on how to **provide elderly and PwD in private housing with home modification subsidies** to facilitate subsequent adoption of gerontech.

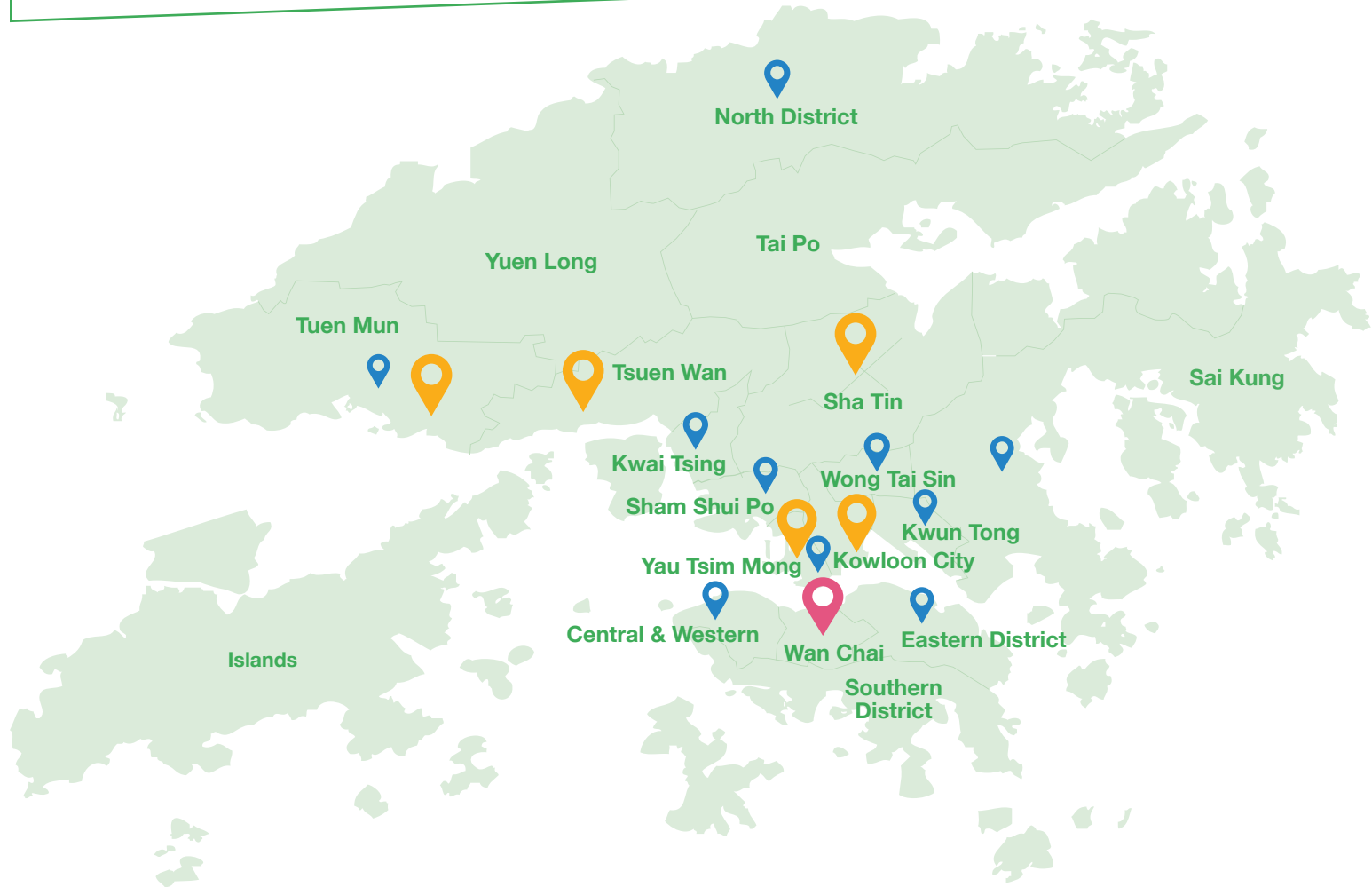
3.1 District-level accessibility to gerontech

It is undeniable that there has been an increase in awareness of gerontech in recent years. It was a key gap identified in our first report (Gap 1), and the gap that received the highest level of improvement in our survey (score 1.08). **However, we see that are still some areas for improvement, namely improving end-users' access to gerontech in their local neighbourhoods.**

Figure 18 illustrates the various types of awareness-raising gerontech initiatives that have taken place in recent years. In 2016, the Golden Age Foundation hosted the first annual Golden Age Expo & Summit (GAES) at the Exhibition Centre (red pin). Then, after the inaugural GIES was hosted at the Exhibition Centre in 2017 (red pin), different organisations followed up with one-off gerontech events in local districts (blue pins). More recently, organisations have set up physical gerontech showrooms (yellow pins) that seek to educate local residents about gerontech. The Government also announced their plan to create a gerontech showroom in Kwun Tong (Civil Service Bureau (CSB), 2021).⁴⁷

⁴⁷ In the 2017 and 2018 Policy Addresses, the Government announced that it would build a new civil service college in Kwun Tong. The building will consist of two high-rise and low-rise buildings, with the high-rises used for civil service college, and the low-rise blocks providing social welfare and district facilities, including the construction of a government-run gerontech exhibition centre (CSB, 2021). However, the construction of this civil service college and gerontech exhibition centre will likely take several years to complete (LWB, 2020).

Figure 18. Map of awareness-raising gerontech initiatives



Sources: Golden Age Foundation, 2016; GIES, 2021; HKCSS, 2018; LSCM, 2019; LingnanU, 2019; Jockey Club *age at home*, 2021; LingnanU *X Lab*, 2021; PolyU, 2021; Housing Society Elderly Resource Centre, 2021; Project Futurus, 2020

Different gerontech awareness raising initiatives



Annual
large-scale
exhibition

- Golden Age Expo & Summit
- Gerontech and Innovation Expo cum Summit



One-off
district events

- The Hong Kong Council of Social Service
- LingnanU Jockey Club Gerontechnology and Smart Ageing Project
- Logistics and Supply Chain MultiTech R&D Centre



Showroom

- LingnanU Jockey Club Gerontechnology and Smart Ageing Project
- PolyU Smart Ageing Hub
- Hong Kong Housing Society
- Project Futurus
- Jockey Club “age at home” Gerontech Education and Rental Service Centre

While these showrooms have helped mature Hong Kong’s gerontech ecosystem, we believe there is still room for enhancement and expansion. Firstly, as there are only a few showrooms, there is the possibility of scaling up to all 18 districts. Secondly, it is often not possible to procure the gerontech products on display in showrooms. In fact, in some showrooms, staff cannot provide visitors with information about product suppliers due to potential conflicts of interest. This leads to a slow-down in consumers’ purchasing process, as they cannot immediately procure a product after seeing, trying, and being educated about the product’s benefits. These are some areas that we hope to resolve through our recommendations.

Recommendation 3.1: Create a “Gerontech Corner” within DHCs

The first question is **where the physical gerontech presence in all 18 districts should be located**. Table 5 compares key figures of relevant community-based service units available to the elderly. The two figures that are particularly important when considering where to place a physical gerontech presence are the Net Operating Floor Area and Number of Paramedical Personnel. This is because there needs to be enough physical space to display the products, as well as relevant paramedical personnel to help assess end-users’ relevant healthcare and gerontech equipment-related needs.

Table 5. Table of community-based service units available to the elderly

Elderly social & healthcare centres	District Elderly Community Centre (DECC)	Neighborhood Elderly Centre (NEC)	Day Care Centre/ Unit for Elderly (DE/DCU)	Elderly Health Centre (EHC)	District Health Centre (DHC)
Relevant government bureau/ department	Social Welfare Department	Social Welfare Department	Social Welfare Department	Department of Health	Food and Health Bureau
Purpose	Provide community support services to elderly at district-level	Provide community support services to elderly at the neighborhood level	Provide community care services to frail elderly ^[1]	Provide integrated primary healthcare services to elderly	Provide district-based primary healthcare services
Number of centres	41 (in 18 districts)	170 (in 18 districts)	91 (in 18 districts)	18 (in 18 districts)	4 (plan for expansion to all 18 districts)
Number of persons served	Approximately 170,000 persons	15,000–20,000 persons	40–120 places	All elderly within a district	All persons within a district
Net operating floor area (in square meters)	424	303	267 to 754	Unavailable	1500
Total number of assigned personnel	24.5	10.25	22.507 (for 60 places)	Unavailable	70
Number of paramedical personnel^[2]	1.5	0	3.811 (for 60 places)	Unavailable	21

Notes: [1] Frail elderly are those who are assessed and recommended for Community Care Services or Residential Care Services under the Standardised Care Need Assessment Mechanism for Elderly Services.

[2] Paramedical personnel include registered nurses, care coordinators, occupational therapists, physiotherapists, pharmacist, and dietitian.

Sources: SWD, 2021, February 17; SWD, 2021, May 11; SWD, 2021, August 2; SWD *Schedule of Accommodation*, 2021; SWD, 2020; SWD, 2019; SWD, 2018; DH *Elderly Health Centres*, 2021; The Government of HKSAR Press Releases, 2019, September 24; Planning Department, 2021

As such, we believe that the **DHC is the most ideal location for district-level gerontech displays**, as there is a comparatively larger operating floor area and number of paramedical personnel assigned. The DHC also does not exclusively service the elderly and can therefore help PwDs. Of particular note is that each DHC is budgeted to include two in-house occupational therapists and three in-house physiotherapists. These professionals can provide end-users with advice and assessments on the appropriate gerontech equipment to procure and use (The Government of HKSAR Press Releases, 2021).

Furthermore, the DHC is one of the Government's leading initiatives in helping to push for medical-social collaboration, one of the gaps that we identified in our first report (Gap 24). As our survey revealed that there was only minor improvement on this area (score 0.06), we hope that leveraging DHC can help consolidate the collaborative efforts between social and medical professionals within the area of gerontech. Not to mention, we hope that higher usage of gerontech at DHCs can assist with

data flow between service providers. For example, if users use wearable health monitoring devices with extensive data on vital health indicators, the DHC can consolidate the data and make it meaningful to relevant social and medical professionals.⁴⁸

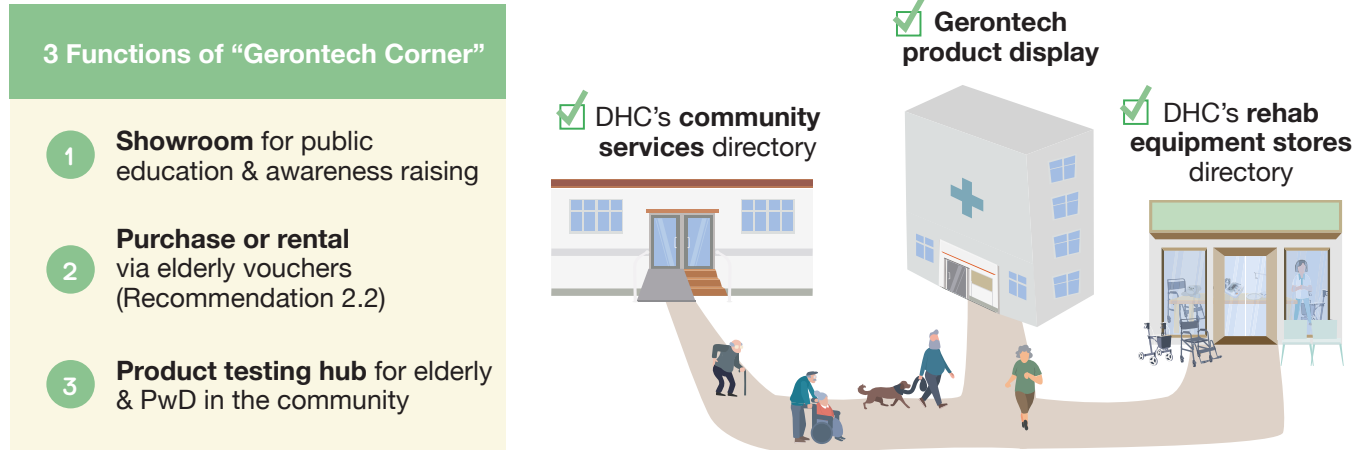
Currently, there are only four DHCs in operation, but the Government will construct DHCs in all 18 districts.⁴⁹ As illustrated in **Figure 19**, of the existing DHCs, several already include basic gerontech product displays, as well as reference lists to relevant community services and rehabilitation equipment stores. **We recommend building on these existing efforts within the DHC to build a “Gerontech Corner”**.

⁴⁸ From an operational perspective, there should be further consideration on obtaining the patient's consent and compliance with relevant laws.

⁴⁹ The DHCs currently in operation are in Kwai Tsing, Sham Shui Po, Wong Tai Sin, and Tuen Mun (FHB *District Health Centres*, 2021). The Government is also working to set up DHCs in Southern District and Yuen Long (LegCo *Policy Address*, 2021). In the districts where full-fledged DHCs will not yet be set up by the current Government administration, the Government will set up interim “DHC Express” stations. As of October 2021, there have been DHC Expresses set up in the Islands, Kowloon City, North, Sai Kung, Wan Chai, and Yau Tsim Mong Districts. Within the term of the current Government administration, there will also be DHC Expresses set up in Central & Western, Eastern, Kwun Tong, Sha Tin, and Tai Po Districts (FHB *DHC Express*, 2021).

Figure 19. Envisioning a “Gerontech Corner” in DHCs

Using existing DHCs as example:



Sources: Kwai Tsing DHC *Community Service*, 2021; Kwai Tsing DHC *Rehabilitation Equipment*, 2021; Sham Shui Po DHC *Community Service Provider*, 2021; Sham Shui Po DHC *Rehabilitation Equipment*, 2021

As indicated by **Figure 19**, we envision this DHC Gerontech Corner to have three key functions. First, like existing showrooms, we recommend the DHC Gerontech Corner to host gerontech-related public education and awareness-raising

activities. Second, building on Recommendation 2.2 to extend voucher schemes to allow for the purchase and rental of gerontech, we recommend that products on display in the DHC Gerontech Corner to be available for direct purchase or rental.⁵⁰

⁵⁰ Section 88 NGOs have trading restrictions and are only allowed to conduct trade/business which contributes directly to an expressed object of the charity (Inland Revenue Department (IRD) *Tax Guide*, 2021). However, it is possible for NGOs to have social enterprise spin-offs that perform more general trading functions. For example, the Hong Kong Federation of Youth Groups is both a section 88 NGO (IRD *List of Charitable Institutions*, 2021) and operator of social enterprises (The Hong Kong Federation of Youth Groups, 2021). Yet it is important to note that Hong Kong, unlike the United Kingdom, lacks a proper definition for social enterprise. This has caused some difficulties in building up the local social enterprise ecosystem (LegCo, 2016).

Third, due to difficulties that suppliers have in obtaining user feedback as indicated in Section 1.1—particularly from end-users in the community—we recommend that the DHC Gerontech Corner to also operate as a “product testing hub” to obtain user feedback from visitors.

3.2 Gerontech-friendly home modification

It is necessary to provide elderly and PwD with a safe and accessible living environment to prevent risk of fall and facilitate independent living. There are currently **several initiatives that help elderly and PwD living in public housing to receive basic home modification**. For example, the Housing Authority provides home modification works for elderly and disabled tenants (Housing Authority, 2018; 2021); the Housing Department funds and completes the requisite renovation works within two to five weeks (The Government of Hong Kong SAR Press Releases, 2019, May 15). The Hong Kong Housing Society (HKHS) also has an Ageing-in-Place scheme, which enables elderly tenants in all 20 HKHS rental estates to receive free home environment assessment and modification (HKHS *Ageing-in-Place Scheme*, 2021).⁵¹

Unfortunately, **similar schemes do not exist for elderly and PwD living in private housing**. Existing renovation schemes for private housing, primarily implemented by the Urban Renewal Authority (URA), focus on the building safety of older buildings rather than home safety of older persons. For example, the Mandatory Building Inspection Subsidy Scheme subsidises the cost of a Registered Inspector to determine whether a private or residential building is

in statutory compliance with the Mandatory Building Inspection Scheme and Mandatory Window Inspection Scheme (HK Building Rehabilitation Facilitation Services Ltd.⁵² *Building Maintenance Grant Scheme*, 2021). Similarly, the Building Maintenance Grant Scheme for Needy Owners offers individuals a maximum grant of HKD 80,000 for the costs of inspections, repairs, and maintenance of their self-occupied properties to enhance building safety and alleviate building dilapidation (HK Building Rehabilitation Facilitation Services Ltd. *Mandatory Building Inspection Subsidy Scheme*, 2021).⁵³ In June 2020, the Development Bureau injected HKD 2 billion into the Building Maintenance Grant Scheme for Needy Owners (URA, 2020).

In Macao and mainland China, home modification schemes for elderly are not differentiated based on whether they live in public versus private housing. The Social Welfare Bureau of the Macao SAR Government runs a scheme that enhances bathroom safety by providing a free bath chair, bathmat, and handrail to all residents above age 60 (Social Welfare Bureau, 2017). In mainland China, the Government runs a scheme to subsidise the cost of elderly-friendly home renovation, which includes a recommended list of seven basic renovation packages and 23 advanced options for more frail elderly, as illustrated in **Table 6** (中国政府网, 2020). Different cities offer different maximum renovation budgets: Shenzhen’s maximum is RMB 10,000, Hangzhou’s maximum is RMB 6,000, Beijing’s maximum is RMB 5,000, and Shanghai’s maximum is RMB 3,000 (动脉网-未来医疗服务平台, 2020; China News, 2021).

⁵¹ From April 2018 to March 2019, the scheme carried out 820 home modification assessments (HKHS *Ageing-in-Place Scheme*, 2021).

⁵² Hong Kong Building Rehabilitation Facilitation Services Limited is a wholly owned subsidiary company of URA.

⁵³ In the 2008–09 Budget, the Financial Secretary earmarked HKD 1 billion to launch the “Building Maintenance Grant Scheme for Elderly Owners” to provide financial assistance for elderly owner-occupiers to repair and maintain buildings and improve building safety (HKHS, 2014). In July 2020, the “Building Maintenance Grant Scheme for Elderly Owners” administered by HKHS was replaced with the “Building Maintenance Grant Scheme for Needy Owners”, currently implemented by the URA (HKHS, n.d.).

Table 6. Renovation list of Mainland China Home Modification Scheme

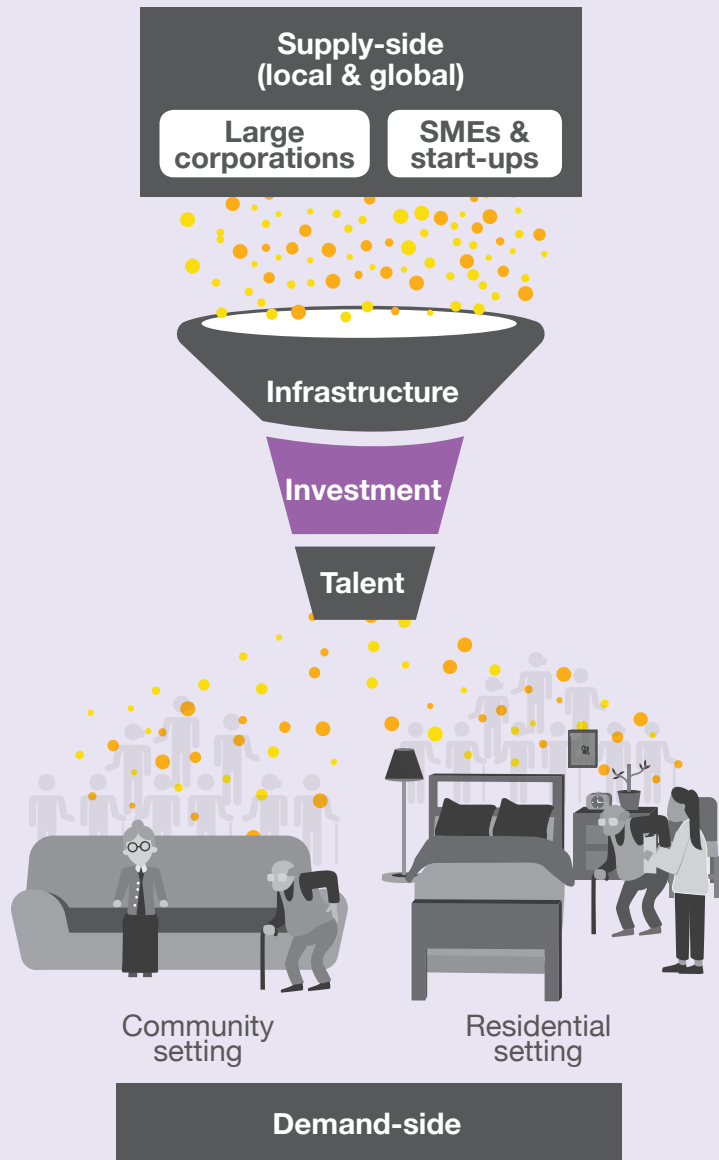
Type	Basic	Advanced
Floor renovation	Anti-slip treatment	Leveling and hardening
	Height difference treatment	Handrail installation
Door renovation		Lowering of door threshold
		Replacement of swing door with sliding door
		Widening of door
		Installation of push bar door handle
		Installation of flashing, vibrating doorbell
Bedroom renovation	Bedside rail installation	Nursing bed installation
		Configuration of anti-pressure mattress pad
Toilet and bathing equipment renovation	Handrail installation	Replacement of squatting toilet with seated toilet
	Bath chair installation	Faucet renovation
		Renovation of bath/shower room
		Counter renovation
Kitchen renovation		Installation of middle cabinet
		Leveling and hardening
Physical environment renovation		Automatic light sensor installation
		Power outlet renovation
		Anti-collision corners/strips and reminder signs installation
		Configuration of furniture to suit elderly
		Handrail installation
Individual products for the elderly's usage	Walking cane	Wheelchair/walker
	Location tracking device	Magnifying device
	Safety monitoring device	Hearing aid
		Eating aid

Source: 动脉网-未来医疗服务平台, 2020

Recommendation 3.2: Create a Home Modification Scheme for elderly and PwD in private housing

We therefore recommend the Buildings Department to create a Home Modification Scheme for elderly and PwD living in private housing, with implementation carried out by URA and HKHS. Similar to the Home Modification Schemes available to elderly in public housing, the scheme should provide elderly and PwD in private housing with occupational therapist home assessments, installation of basic home safety gerontech equipment, and basic home renovations. Referencing the mainland China case, to facilitate the implementation and reduce the likelihood of abuse of the scheme, there should be a standardised list of available basic home renovation plans and home safety equipment installation options. Eligible households should be entitled to **a one-time grant of maximum HKD 10,000 for the costs incurred.**

CHAPTER 4. INVESTMENT



Overview

Accompanying the expansion of Hong Kong's gerontech ecosystem in recent years is a **growth in the number of financiers who have invested into local gerontech services and projects**. On the one hand, as indicated in Introduction, the Government has allocated significant public resources into gerontech. On the other hand, while private sector venture capitalists and angel investors remain hesitant to invest heavily into the local gerontech industry, many philanthropic foundations have expressed interest in funding gerontech-related projects.

For example, the Keswick Foundation and Lee Hysan Foundation jointly funded a stair climbing service, which allowed wheelchair-bound elderly living in homes without elevators to hire a stair climbing device that enabled safe descent and ascent of their building's staircase (HKCSS, 2020, February). Several foundations also funded an operation that enabled elderly service units to rent and use an automatic tablet machine, which facilitated staff to distribute medication to elderly more quickly and accurately (Hong Kong Pharmaceutical Care Foundation, 2021). The HSBC 150th Anniversary Charity Programme further funded a smart home for elderly pilot programme (Senior Citizen Home Safety Association, 2019). More recently, the Jockey Club Charities Trust and China Merchant Foundation are co-funding the Gerontech Education & Rental Service, which allows people to learn about and rent gerontech equipment, inclusive of cleaning and disinfection service (Jockey Club *age at home*, 2021).

However, despite both public and private financiers' interests in funding gerontech projects, there are **few gerontech public-private partnerships (PPP)**. Our first report identified the lack of collaboration between private sector and NGOs as a gap (Gap 23), which our survey indicates has only received slight improvement (score 0.26). This gap leads to issues concerning the market sustainability of gerontech-related services. The lack of PPP within the gerontech ecosystem is therefore a missed opportunity to consider **innovative gerontech service delivery models**.

Currently, many government programmes related to gerontech remain product-oriented (in contrast to service-oriented), whether it is R&D funding for developing new products, such as ITB's Fund for Better Living, or demand-side subsidies for procuring or trialling products, such as the \$1 billion I&T Fund. However, many new devices employing advanced technologies, such as Internet of Things or Artificial Intelligence, require completely new service delivery models. The Government may be reluctant to fund such innovative service delivery models, as they require time to develop and trial and carry inherent uncertainties about their potential effectiveness. Given the private sector's higher risk appetite, it makes sense to consider PPP models where the private sector carries the risk for the Government. This is exactly what the Pay-for-Success model proposes.

Recommendation 4: Apply the Pay-for-Success (PFS) model to gerontech

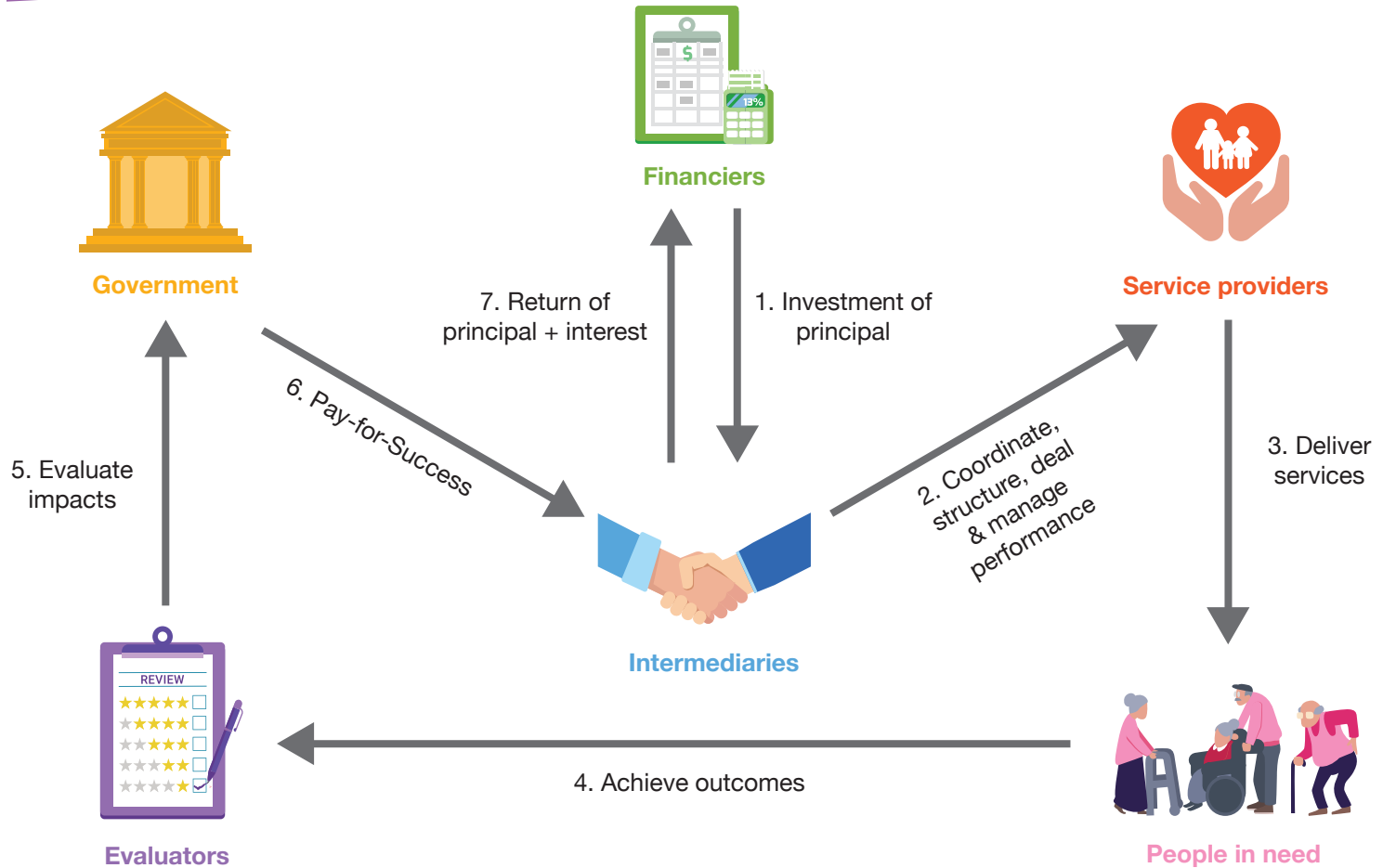
PFS is an innovative financing model for social services, which we introduced in our report *Financial Innovation for Social Impacts: An advocacy report on Pay-for-Success*, as illustrated in **Figure 20** (OHKF, 2017, November). In short, private investors fund a social project under the agreement that—only if the service provider meets pre-determined outcome-based Key Performance Indicators (KPIs) measured through social impact assessments—will the Government then repay the private investor with interest. The main benefit of PFS for the Government is risk-sharing. Because investors carry the initial risk, there is more possibility to fund innovative or preventive programmes that are not yet covered by the Government (OHKF, 2017, November). In Hong Kong, SIE Fund commissioned the city’s first PFS project in

September 2020 on a project that helps non-Chinese speaking kindergarten students improve their Chinese proficiency (SIE Fund *Piloting Pay-for-Success*, 2021).

PFS is a model particularly suitable for testing innovative and preventive services, which greatly suits the nature of gerontech products and services.⁵⁴ In Hong Kong, there is also a great need to move beyond thinking about gerontech at an individual product level towards considering the possibilities that gerontech provides in terms of innovative service delivery models. **We therefore recommend using PFS as an innovative way to bring together public and private financiers within the gerontech industry.**

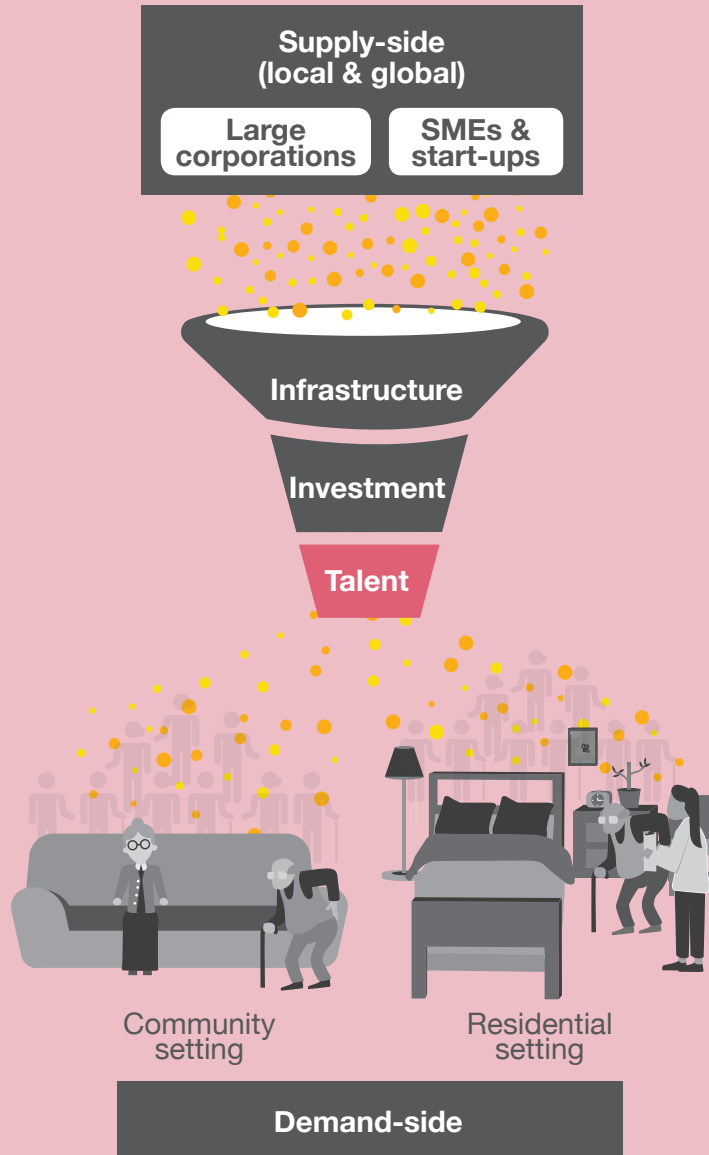
⁵⁴ One of the most important aspects of PFS is for contractual parties to agree on clearly identifiable and measurable social outcomes. The gerontech industry is itself still determining what types of social outcomes are clearly identifiable and measurable. They are also developing testing mechanisms to evaluate these outcomes, for example via the GT Platform’s Testing Support initiative. Indeed, there is already some exploration of using PFS in relation to gerontech. For example, in Israel, a combined online-offline service delivery model will seek to alleviate the loneliness of 200 elders in Tel Aviv (Tel Aviv Foundation, 2021).

Figure 20. How does Pay-for-Success work



Source: OHKF, 2017, November

CHAPTER 5. EDUCATION & TALENT DEVELOPMENT



Overview

One of the most critical yet overlooked components of gerontech's ecosystem is its skilled workforce, whether it be professionals who perform welfare or medical services, product developers, or start-up entrepreneurs. However, many of Hong Kong's efforts in education and training of gerontech-specific skills are either scattered or not formally recognised. If Hong Kong wants to develop the gerontech industry to its fullest potential, it needs to align and nurture talent who are passionate and have the necessary skill sets to drive and meet the various needs of the industry. **To achieve this, we need to provide formal training and recognition in the care sector, support entrepreneurship and training, and introduce exposure and awareness of gerontech throughout our educational curriculum.** Therefore, the focus of this chapter will cover a spectrum of measures to promote gerontech education and talent development in Hong Kong.

This chapter consists of three sub-sections:

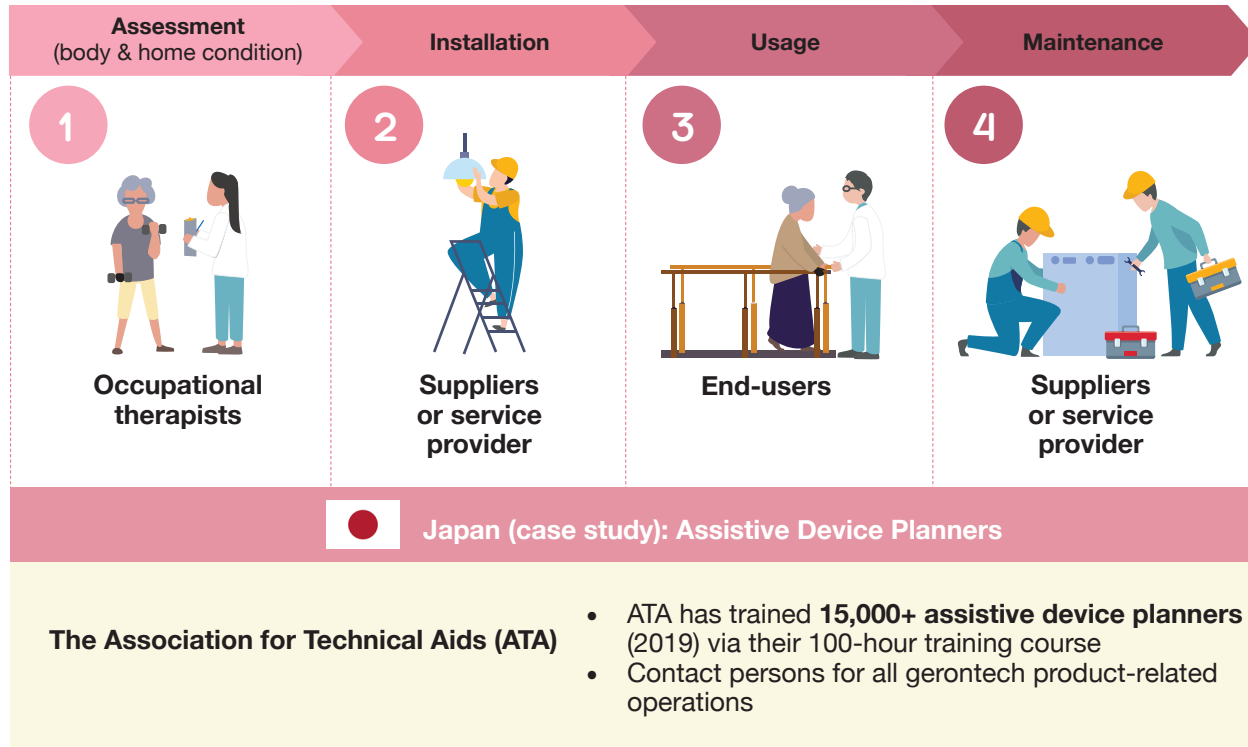
- Section 5.1 will focus on how to provide **vocational training** to gain gerontech-specific skills.
- Section 5.2 will focus on how to provide **entrepreneurial support and training** in universities to drive innovation for social impact.
- Section 5.3 will focus on how to increase **general awareness and education of gerontech** among the younger population.

5.1 Vocational training for gerontech-specific skills

Usually, when we talk about gerontech, it is in terms of individual products and how they can help a person. But the actual usage of gerontech is not only limited to an individual product—it also refers to a process, one that generally requires the involvement of different professionals at different stages. **Figure 21** illustrates this, with an occupational therapist required at the assessment stage, a supplier or technician at the installation stage, end-users at the usage stage, and a technician at the maintenance stage. Navigating this lengthy process can become problematic for an end-user interested in purchasing or renting a product without any assistance. Also, most service providers that acquire gerontech products need to train their existing staff to use the purchased or rented technology. However, **no official vocational training on gerontech-specific skill is currently offered in Hong Kong.**⁵⁵

⁵⁵ Some examples of non-official training for gerontech-specific skills exist in Hong Kong. For example, the Jockey Club “age at home” Gerontech Education and Rental Service provides a Care Equipment Counsellor (CECs) Training Programme for gerontech-specific skills for their education, rental, cleaning and maintenance services at the Gerontech Education and Rental Service Centre (Jockey Club *Service Overview*, 2021).

Figure 21. Overview of general process for purchase or rental of gerontech products



Sources: Techno-aids, 2014; ILC-Japan, 2018

Recommendation 5.1: Train gerontech consultants to assist the elderly

The first question is who can assist end-users in the process of acquiring or renting a gerontech product. We recommend training up gerontech consultants as the primary contact point to assist the elderly and PwD in procuring or renting gerontech products. In line with Recommendation 2.2, we recommend that any person who wants to use a voucher to procure gerontech products should be able to connect with gerontech consultants to enquire about any product-related questions. Should the need arise, the consultant can also handle any maintenance-related enquires.

As mentioned previously, referencing Japan, the Association for Technical Aids (ATA) trains “assistive device planners” who play the role of case managers for the elderly in acquiring gerontech under the Welfare Equipment Rental Program (Techno-aids, 2014; ILC-Japan, 2018).⁵⁶ Hong Kong can follow suit and consider adopting a case management model to streamline the process for end-users with higher health needs.

We therefore further recommend assigning gerontech consultants as case managers to the elderly that are eligible for CCSV.⁵⁷ The consultants can help manage the process of OT referral, as well

as assist the elderly in using the CCSV to select an advanced gerontech product under the Tier II category. More importantly, the case management can be more focused during the initial stages of assignment, for example, during the post-discharge stage to strengthen support for the elderly.

The next question is **how to provide formal professional training for individuals to acquire gerontech-specific skills.** At present, various organisations provide vocational training and certification for various posts in the social welfare sector under the Qualifications Framework (QF).⁵⁸ **We therefore recommend the Social Welfare Department to introduce a new vocational qualifications pathway under the QF to certify and register gerontech consultants in Hong Kong.** The SWD already provides a structured pathway for young talent interested in developing their career in the elderly and rehabilitation care services in the form of the Navigation Scheme for Young Persons in Care Services (Navigation Scheme) (SWD, 2021, August 16).⁵⁹ Building on top of this, **we recommend the Social Welfare Department to expand and scale up the Navigation Scheme to train and certify gerontech consultants.**

5.2 Entrepreneurial support and training

Having talked about how to scale up gerontech-specific care professionals, this section will turn to discuss how to increase the amount of gerontech product developers and start-up

⁵⁶ As of 2019, the ATA has trained over 15,000 assistive device planners as part of their 100-hour training program (Techno-aids, 2014).

⁵⁷ Applicable to elderly person assessed to have moderate or severe impairment under the Standardised Care Need Assessment Mechanism for Elderly Services (SWD *Standardised Care Need Assessment Mechanism for Elderly Services*, 2021).

⁵⁸ Training and certificate under the QF are offered for health worker, caregiver, and residential staff posts by Hong Kong Association of Gerontology (HKAG), Hong Kong Red Cross (HKRC), Employees Retraining Board (ERB) (HKAG, 2021; HKRC, 2017; ERB, 2016).

⁵⁹ In 2015, the SWD launched the Navigation Scheme. Starting from 2020/21, it will provide a total of 1,200 additional training places within 5 years. At the end of the two-year training period, trainees are registered as Health Workers and receive a QF of either Level 3 or 4 (SWD, 2021, August 16).

entrepreneurs. To have research-driven gerontech innovation, skilled human capital needs to go into gerontech. But this human capital is currently stifled by institutional rules in academia. As previously pointed out, our survey results found that systemic issues with academia, particularly a **lack of incentive among researchers** to pursue research with social and economic impact, is a gap that has worsened overtime (score -0.05).

As detailed in OHKF's report *Building the Technology Bridge for Scientific Breakthroughs: Developing an Innovation Hub of the Future*, knowledge transfer remains largely absent among our universities due to a **lack of transforming basic research in universities into innovative products in society** (OHKF, 2020).⁶⁰ Therefore, this section will focus on reviewing policies related to the commercialisation of university-based research and innovation. Solving such incentive problems is important to gerontech innovation as flexible policies for researchers encourages all forms of technology innovation.

Recommendation 5.2A: Provide better terms and conditions for researchers seeking commercialisation

In the commercialisation process, owning a patent is a form of intellectual property (IP) protection that gives its owner the right to exclude others from making, using, selling, or importing the invention or know-how in a particular jurisdiction.⁶¹ The patent must then be licensed or sold to an existing company or a spin-off company for the patented knowledge to generate an impact in society.⁶² As creating a spin-off company requires the researchers to possess entrepreneurial skills, it can serve as a proxy for a university's ability to promote and nurture entrepreneurial talents (OHKF, 2020). In general, Hong Kong trails behind in providing entrepreneurial support. In particular, **the terms and conditions offered by universities in Hong Kong for researchers seeking commercialisation remains very unattractive, therefore deterring researchers from translating their research into real-life impact.**

⁶⁰ Knowledge transfer is defined as “the systems and processes by which knowledge, including technology, know-how, expertise and skills are transferred between higher education institutions and society, leading to innovative, profitable or economic or social improvements” and has been recognised as the third mission of universities, after teaching and research (University Grants Committee (UGC), 2021).

⁶¹ Owning a patent also allows the inventor to further modify the technology when market conditions change.

⁶² Licensing is any payment made to an IP holder for the right to use the IP. The distribution of revenue can depend on whether the university or the inventor pays the cost for the patent filing. Spin-offs are companies that utilise technologies discovered in the university.

First, Hong Kong universities, with their **conservative patent ownership policies**, trail behind international counterparts. For example, in Hong Kong, patents are owned by the university unless the inventor buys out the patent and absorbs all costs including research, filing, and legal fees.⁶³ In contrast, global peers allow inventors to assume full ownership if the invention is

independently commercialised (**Table 7**). **We recommend that Hong Kong universities provide flexible policies on patent ownership and buyout, detailing how the patent buyout price is determined to both inventors and investors and give them the first right to buy out patents.**

Table 7. Patent ownership policies among selected universities

University	Patent ownership (Creation stage)	Patent ownership (Filing stage)
Hong Kong universities	Owned by university	Owned by university, unless inventors buy out the patent at a price with recovery of research costs, patent filing, attorney fees, etc. ^[1]
University of Cambridge (UK)	Owned by university	Owned by inventors if commercialised via their own efforts
University of Toronto (Canada)	Owned jointly by university and inventors	Owned by inventors if commercialised via their own efforts
University of Waterloo (Canada)	Owned by inventors	Owned by inventor
Karolinska Institutet (Karolinska Institute, Sweden)	Owned by inventors	Owned by inventor

Note: [1] Some local universities provide further flexibility. For instance, the Hong Kong University of Science and Technology (HKUST) offers flexible terms under the HKUST Entrepreneurship Program, which will be discussed in Recommendation 5.2C.

Source: OHKF, 2020

⁶³ One of the key issues related to patent buyout is lack of transparency. At present, determining the exact cost of each patent varies on a case-by-case basis, as the cost of research may include infrastructure, laboratory, manpower costs.

Second, the licensing revenue-sharing policies in Hong Kong universities do not provide enough incentives to researchers to commercialise their research. **Table 8** illustrates this, with Hong Kong universities distributing only **25% to 50%** of revenues to inventors under university-led commercialisation processes, while overseas institutions adopt more generous revenue-sharing terms.

Therefore, **we recommend that all Hong Kong universities encourage researchers to commercialise their research output by increasing the share of licensing revenue received by inventors and identify suitable licensing terms and revenue-distribution ratios.**

Table 8. Revenue sharing policies of Hong Kong and overseas universities

University	Patenting through universities [Percentage inventor(s) receives]	Patenting through inventors [Percentage inventor(s) receives]
Hong Kong universities	25%–50%	20%–80%
Overseas universities	60%–90%	75%–100%

Note: The numbers in the table are as of 31 August 2020. Hong Kong universities include HKU, CUHK, HKUST. Overseas universities include University of Toronto, University of Waterloo, and University of Cambridge.

Source: Adapted from OHKF, 2020

Third, most companies do not have the necessary cash-flow to pay for hefty licensing or patent fees at early-stages of developing a start-up. Spin-off companies, which are a subset of start-ups, often face the same problem. However, in the case of spin-off companies, universities can offer support through flexible financial terms to encourage entrepreneurship. For example,

under the HKUST Entrepreneurship Program, HKUST accepts 3% of the spin-off company’s shares as part of its licensing agreement (HKUST, n.d.).⁶⁴ Taking note, **we recommend all Hong Kong universities to consider accepting a small share of equity as compensation for paying for the licensing fees of spin-off companies.**

⁶⁴ In an overseas example, Stanford University accepts equity, which is typically less than 5% ownership (Stanford, 2016).

Recommendation 5.2B: Establish two phases of TSSSU funding to ensure commercial viability and industry collaboration with welfare services

In 2014, the Technology Start-up Support Scheme for Universities (TSSSU) was launched under the Innovation and Technology Fund (ITF). TSSSU encourages students and faculty members to establish technology start-ups or commercialise their R&D outcomes by forming spin-offs (ITF, 2021). At present, TSSSU funding has been critical in supporting early-stage start-ups from local universities (ITF, 2020).⁶⁵ Yet, there is room for improvement, as many start-ups require strategic support to succeed in the market in the long-run. Therefore, **we recommend TSSSU to enhance the existing funding mechanism, as well as establish a second phase of funding that encourages collaboration with welfare services (Figure 22).**

In terms of enhancing the existing TSSSU funding mechanism—what we consider as “Phase I”—we recommend that all participating universities provide a **condition-free grant to start-ups instead of the existing reimbursement model.**⁶⁶

More importantly, we recommend adding a second phase under TSSSU, through which TSSSU provides start-ups with additional funding.⁶⁷ In our previous report, we indicated that the prerequisite for start-ups wishing to access the second phase of TSSSU funding should be the acquisition of private funding or the securing of collaboration with industry partners, as this prerequisite demonstrates the start up’s commercial viability (OHKF, 2020).

Within the gerontech context, **we recommend that the prerequisite for accessing Phase II TSSSU funding can also include industry collaboration with welfare service providers, such as elderly or rehabilitation service units.** As mentioned in **Chapter 1**, there are few initiatives that actively encourage start-ups to interact with or provide solutions for welfare service providers.⁶⁸ To further encourage such collaboration, TSSSU can recommend start-ups to create industry partnerships with service units that register to become gerontech testbeds under the GT Platform. The service unit’s willingness to collaborate with the start-up demonstrates the usefulness of their gerontech product or service. TSSSU’s investment in gerontech start-ups through Phase II funding will therefore better guarantee that gerontech R&D results are translated into real-world social impacts.

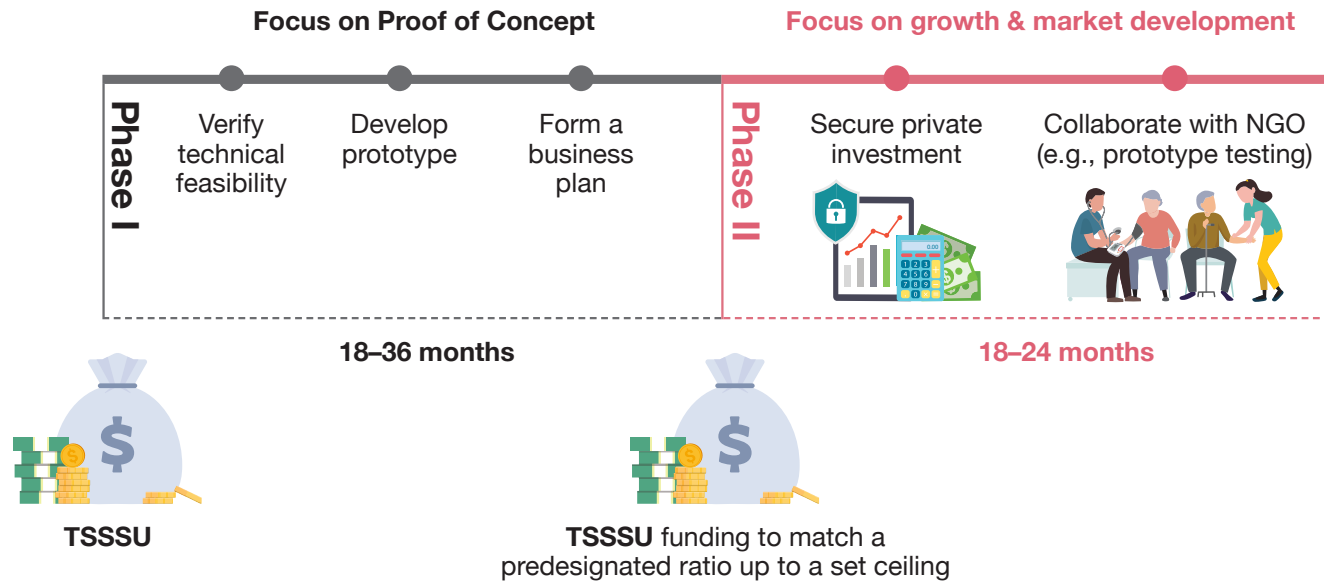
⁶⁵ An annual funding of up to HKD 8 million is provided to each of the six UGC-funded universities, and each funded start-up may receive up to HKD 1.5 million each year for up to three years. The six universities are The University of Hong Kong, The Chinese University of Hong Kong, City University of Hong Kong, The Hong Kong University of Science and Technology, Hong Kong Baptist University and The Hong Kong Polytechnic University. A technology start-up should consist of any mix of students, including alumni, and faculty members. In 2020/21, 44 start-ups were supported.

⁶⁶ Start-ups often face a severe cash-flow problem so awarding funding by reimbursement is counterproductive to support tech start-ups from universities. The timeframe of the first phase (18 to 36 months) should be subject to the nature and sector of the start-up.

⁶⁷ In the second phase, the TSSSU funding will match at a predesignated ratio up to a set ceiling. The funding for the second phase should last for around 18 to 24 months, by which point the start-up should be capable of raising funds by themselves in the private market.

⁶⁸ One notable exception is the LingnanU Jockey Club Gerontechnology and Smart Ageing Project, which hosts a 54-hour start-up competition and workshops to help entrepreneurs obtain related education, launch businesses, build networks, learn skills, etc., on innovation for smart ageing (LingnanU *techstars_Startup Weekend*, 2021). LingnanU also collaborates with HKSTP to host focus group discussions between start-ups and end-users (LingnanU, 2021, March 1).

Figure 22. Proposed model for TSSSU funding



5.3 General awareness and education on gerontech

As previously noted, our survey results found that people's awareness of gerontech has seen the most significant improvement, receiving the highest score from our respondents (score 1.08). This comes as no surprise with widespread gerontech initiatives surfacing in recent years. However, despite efforts to raise awareness, there is a **lack of initiatives tailored towards younger people**. Increasing general awareness and education of gerontech among our younger population is important since many young people have some form of relationship to the elderly, whether through familial ties, as informal caregivers, or even as potential talent that may want to work in the gerontech industry. This section therefore hopes to bridge the **intergenerational gap in awareness** through targeted efforts.

Recommendation 5.3: Promote a gerontech educational curriculum and related competitions

To initiate this, different educational methods can be employed at various stages of learning. For example, at the primary and secondary levels, students' interest can be sparked through school

competitions. In 2017, the HKCSS and EMSD co-organised the Gerontech Youth Challenge, an annual competition to encourage youth to design innovative products for older persons (HKCSS, 2019). We **recommend the continuation of youth competitions like the Gerontech Youth Challenge on an annual basis**. Also, to transform students' innovative ideas into reality, **we recommend that youth competitions incorporate a follow-up prototype stage to commercialise innovative designs**.

At the tertiary level, students should be offered courses on gerontech-related content. At present, only a few courses are offered by PolyU and LingnanU (PolyU, 2020; LingnanU *Bachelor of Social Sciences (Honours)*, 2021; LingnanU *Master of Social Sciences in Health and Social Service Management*, 2021).⁶⁹ Apart from the two universities, most higher institutions do not offer gerontech-related content. This is especially concerning as students interested in solving elderly problems with technology may be disincentivised to pursue gerontech as an official field of study. For example, tertiary students under the Vocational Training Council (VTC) Group successfully developed gerontech products at the HKHS's Gerontech Competition this year (HKHS, 2021).⁷⁰ Despite this, no gerontech courses are being offered to students in applied education. We therefore recommend that **tertiary courses covering gerontech-related content be expanded across all universities and applied education institutes in Hong Kong**.

⁶⁹ For example, the Department of Biomedical Engineering at the Polytechnic University offers a course on Rehabilitation Engineering and Assistive Technology (PolyU, 2020). At the Lingnan University, Master of Social Sciences in Health and Social Service Management students are offered gerontech-related content in a course on Modern Technology in Health and Social Services course (LingnanU *Master of Social Sciences in Health and Social Service Management*, 2021).

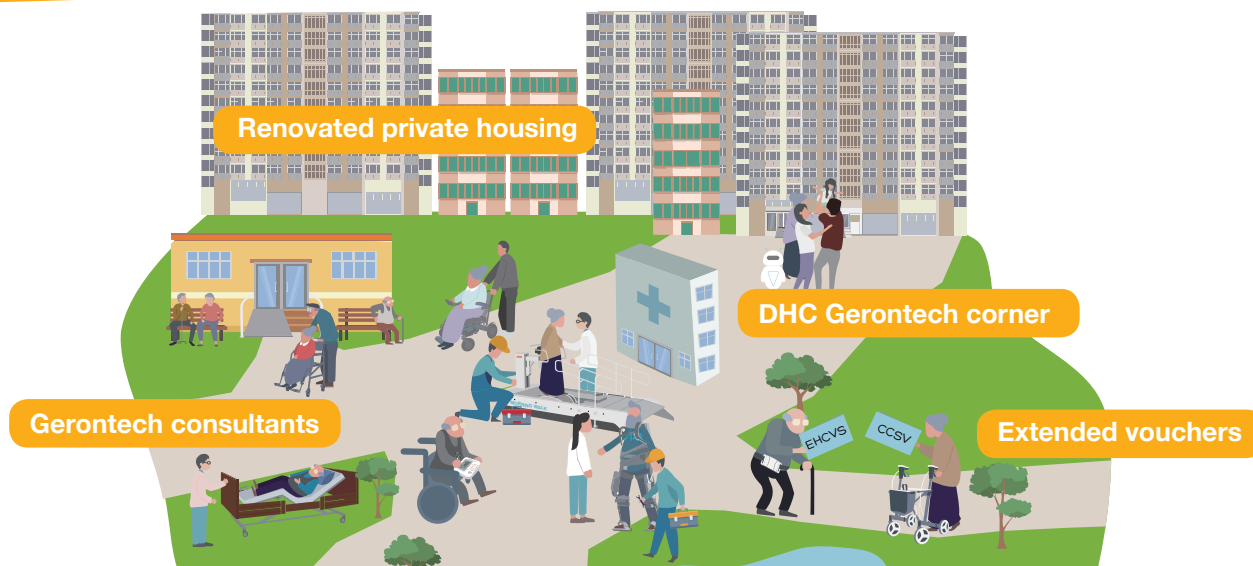
⁷⁰ The HKHS organised the Gerontech Competition to support science, technology, engineering, and mathematics (STEM) education and gerontechnology in the community. More than 750 students from nearly 150 teams participated (HKHS *Press Release*, 2021).

Since the publication of the Gerontech Landscape Report 1.0, Hong Kong's gerontech ecosystem has blossomed, presenting the city with fresh opportunities and challenges. In the first report that we published on gerontech, we identified the 24 gaps in the city's then gerontech ecosystem and landscape. Through in-depth stakeholder interviews and survey results, this report set out to provide an updated analysis on whether these gaps have been improved upon.

We are **encouraged to see a significant increase in gerontech-related initiatives** from the Government and industry. For example, the GT Platform has fostered collaboration between different stakeholders, which we suggest can be further enhanced through more comprehensive channels enabling suppliers to receive user feedback and gain more assistance relating to import or export of products. The SWD's \$1 billion I&T Fund has also become one of the most significant financial drivers for gerontech, which we believe can be further improved if it is regularised and extended to private elderly homes.

Yet, our research revealed that **one of the greatest challenges currently facing Hong Kong's gerontech ecosystem is the lack of opportunity and incentive for end-users living in the community to procure gerontech**. In this report, many of our key recommendations holistically work together to enable end-users to leverage on gerontech, while embracing gerontech in their everyday life within their community (**Figure 23**). To provide financial incentive for end-users, we recommend the Government extend the scope of elderly voucher schemes to include the purchase or rental of gerontech products. To improve end-users' physical access to gerontech, we recommend the creation of

Figure 23. Using gerontech to enable end-users to age-in-place in the community



“Gerontech Corners” at District Health Centres, as well as the extension of existing Home Modification Schemes to elderly and PwD living in private housing. To further assist end-users who have questions about products, we recommend training up gerontech consultants to address their queries.

We further hope that the Government will **attract more parties to grow the gerontech ecosystem**. For instance, the Government should seek to include more private investors by offering opportunities for public-private partnerships. They should also seek to attract more talent into the industry through QF-recognised gerontech professional skill training and robust knowledge transfer-related university policies.

Gerontech provides opportune solutions for Hong Kong to address its multi-faceted problems associated with its population of elders and PwD. It can empower these end-users to live more independently, alleviate manpower shortages, and curb both healthcare and long-term care costs in the future. From the publication of Gerontech Landscape Report 1.0 until today, the gerontech ecosystem has blossomed with growing numbers of suppliers and consumers. We hope this study will inspire greater strategic planning on how gerontech products and services can flow from supply to demand, help develop a consolidated gerontech ecosystem, and ultimately create the conditions for the elderly and PwD to continue living in the comfort of their community and with dignity.

APPENDICES

Annex I. Result findings from OHKF's Gerontech survey on the 24 gaps

Gaps		Significantly worsened	Slightly worsened	No change	Slightly improved	Significantly improved	"Don't know" or "no opinion"	Final score
(1) Government and overall situation								
1	The public lacks social awareness on the importance of gerontech; most perceive gerontech as a supplementary and/or luxury product to the elderly healthcare industry.	0 (0%)	0 (0%)	5 (12.5%)	27 (67.5%)	8 (20%)	0 (0%)	1.08
2	The Government's risk aversion leads it to procuring mature foreign technologies rather than new local products, thus hindering innovation in the local gerontech industry.	3 (7.5%)	0 (0%)	9 (22.5%)	21 (52.5%)	5 (12.5%)	2 (5%)	0.66
3	Government regulatory systems are outdated and fail to account for the application of gerontech. For instance, there exists a lack of up-to-date laws that ease the use of gerontech or regulate legal liabilities.	0 (0%)	3 (7.5%)	26 (65%)	6 (15%)	1 (2.5%)	2 (5%)	0.14
4	The existing retirement protection scheme provides insufficient support for elderly retirement living. Despite the Government's offering of a variety of schemes (such as the Mandatory Provident Fund, Reverse Mortgage Programme, Life Annuity Plan, etc.) financial support for purchasing gerontech remains insufficient.	2 (5%)	4 (10%)	27 (67.5%)	6 (15%)	0 (0%)	1 (2.5%)	-0.05
(2) Applied research stage								
5	Both the Government and the private sector underinvest in gerontech applied research.	1 (2.5%)	6 (15%)	6 (15%)	22 (55%)	3 (7.5%)	2 (5%)	0.53

Gaps		Significantly worsened	Slightly worsened	No change	Slightly improved	Significantly improved	“Don’t know” or “no opinion”	Final score
(2) Applied research stage								
6	The Hong Kong society lacks the R&D personnel in gerontech. STEM programmes failed to attract the highest caliber of students. Furthermore, STEM programme graduates rarely opt for a career in innovation and technology.	1 (2.5%)	9 (22.5%)	14 (35%)	1 (2.5%)	0 (0%)	7 (17.5%)	0.09
7	The University Grant Committee assessment criteria neglects the impact of knowledge transfer, causing academics to focus on academic publications. This negatively impacts the commercialisation of gerontech.	3 (7.5%)	6 (15%)	6 (15%)	3 (7.5%)	2 (5%)	9 (22.5%)	-0.06
(3) Prototype stage								
8	The time required for universities to license intellectual property for spin-offs is too long, hindering the technology transfer of gerontech.	0 (0%)	4 (10%)	15 (37.5%)	7 (17.5%)	2 (5%)	12 (30%)	0.25
9	Gerontech start-ups encounter funding gaps throughout the latter stages of prototyping and product enhancement. They also lack government support, channels to obtain guidance, and opportunities to network with other firms.	0 (0%)	6 (15%)	11 (27.5%)	15 (37.5%)	1 (2.5%)	7 (17.5%)	0.33

Gaps		Significantly worsened	Slightly worsened	No change	Slightly improved	Significantly improved	“Don’t know” or “no opinion”	Final score
(3) Prototype stage								
10	Local start-ups fear having their business ideas and intellectual property stolen by competing firms and are therefore reluctant to share ideas or collaborate with other companies.	0 (0%)	6 (15%)	14 (35%)	14 (35%)	1 (2.5%)	5 (12.5%)	0.29
11	A number of gerontech products are classified as medical devices. Given that registration with the Medical Device Control Office (MDCO) takes anywhere between 8 and 12 months, the amount of time taken hinders the commercialisation process for companies.	2 (5%)	3 (7.5%)	20 (50%)	1 (2.5%)	0 (0%)	14 (35%)	-0.23
(4) Enhancement stage								
12	The enhancement of gerontech products to specifically target individual needs is hindered by insufficient user testing opportunities. In addition, elderly persons think the use of gerontech reflect poorly on their condition or disability, which leads them to avoid such products.	1 (2.5%)	2 (5%)	14 (35%)	19 (47.5%)	2 (5%)	2 (5%)	0.50
13	Residential care homes are reluctant to test new gerontech products due to being understaffed and the steep learning curve associated with products. This reluctance prevents gerontech products from receiving user feedback.	2 (5%)	13 (32.5%)	5 (12.5%)	15 (37.5%)	4 (10%)	1 (2.5%)	0.15
14	Gerontech products from other countries require localisation. But the small size of the gerontech market makes it difficult for foreign firms to justify the high cost, reducing overseas companies’ willingness to import into Hong Kong.	2 (5%)	10 (25%)	10 (25%)	14 (35%)	0 (0%)	4 (10%)	0.00

Gaps		Significantly worsened	Slightly worsened	No change	Slightly improved	Significantly improved	“Don’t know” or “no opinion”	Final score	
(5) Gerontech market									
15	Producer	Hong Kong’s small gerontech market size limits the profit potential of the local gerontech industry.	1 (2.5%)	6 (15%)	24 (60%)	8 (20%)	1 (2.5%)	0 (0%)	0.05
16		Gerontech products lack variety and are not customised to user needs. For example, whereas there are a wide variety of baby carriages, wheelchair users are only offered two options, i.e., mechanical or electronic.	0 (0%)	4 (10%)	15 (37.5%)	17 (42.5%)	2 (5%)	2 (5%)	0.45
17		Gerontech companies face a host of risks when renting products. For example, when companies reclaim products from low-income elders who cannot keep up with rental costs, they run the risk of negative press coverage. This in turn reduces investors’ willingness to fund the rental market.	1 (2.5%)	3 (7.9%)	16 (36.8%)	15 (37.5%)	1 (2.5%)	4 (10%)	0.33
18	Consumer	The price of gerontech products in Hong Kong is too expensive.	2 (5%)	5 (12.5%)	14 (35%)	17 (42.5%)	0 (0%)	2 (5%)	0.21
19		The application process of gerontech subsidies is complex and time-consuming. Thus, residential care homes are likely to opt for hiring more staff instead of buying gerontech.	0 (0%)	7 (17.5%)	12 (30%)	11 (27.5%)	4 (10%)	6 (15%)	0.35
20		Elders have a preference for products they are familiar with. Their unfamiliarity with gerotechnology and their fear of being deceived deter them from using gerontech.	1 (2.5%)	4 (10%)	13 (32.5%)	16 (40%)	4 (10%)	2 (5%)	0.47

Gaps		Significantly worsened	Slightly worsened	No change	Slightly improved	Significantly improved	“Don’t know” or “no opinion”	Final score
(6) Collaboration between stakeholders								
21	<p>There exists a lack of collaboration between universities and the Government’s five R&D centres, limiting the opportunities for joint innovation and technology transfer between the two.</p> <p>(Note: R&D centres are the Automotive Platforms and Application Systems R&D Centre; R&D Centre for Information and Communications Technologies; Hong Kong Research Institute of Textiles and Apparel; Logistics and Supply Chain MultiTech R&D Centre; and Nano and Advanced Materials Institute.)</p>	0 (0%)	2 (5%)	13 (32.5%)	13 (32.5%)	1 (2.5%)	11 (27.5%)	0.45
22	The Government’s R&D centres seldom collaborate with the private sector, which prevents the latter from commercialising the gerontech innovations of the former.	0 (0%)	2 (5%)	14 (35%)	14 (35%)	1 (2.5%)	9 (22.5%)	0.45
23	The private sector lacks collaboration with NGOs. Elderly services provided by NGOs (including their gerontech services) are hard to commercialise. These services therefore cannot incentivise private sector participation, which limits the sustainability of gerontech services.	3 (7.5%)	5 (12.5%)	12 (30%)	15 (37.5%)	3 (7.5%)	2 (5%)	0.26
24	Medical organisations do not sufficiently collaborate with welfare organisations in the social services sector. For instance, elderly homes wish to use automatic tablet machines but are restricted by the Hospital Authority’s regulations.	3 (7.5%)	5 (12.5%)	12 (30%)	11 (27.5%)	1 (2.5%)	8 (20%)	0.06

Annex II. \$1 billion Innovation and Technology Fund for Application in Elderly and Rehabilitation Care (I&T Fund): Recognised Technology Application Products' directory

Category	Gerontech product
1. Hospital bed and Accessories	1.1 Electric nursing / wheelchair bed
	1.2 Smart hospital bed with extra low position
	1.3 Lateral rotation mattress
	1.4 Powered mattress with adjustable back section and leg section
	1.5 Smart hospital bed with powered rotating / turning mechanism
2. Chair for special purpose	2.1 Electric tilt-in-space / height adjustable commode / shower chair
	2.2 Multi-function electric chair
3. Infection control equipment	3.1 Disinfection robot
4. Appliances for kitchen	4.1 Purée diet system machine
	4.2 Cutter/Mixer for Soft Diet
5. Bathing accessories	5.1 Portable hair washer
	5.2 Bed shower system
	5.3 Electric tilt-in-space / height adjustable bathing stretchers / shower tables
6. Personal care appliance and accessories	6.1 Automated vacuum oral care
7. Shower and bath trolley/bench/bed	7.1 Automatic bathing device
	7.2 Automatic shower seat (with sit / stand mode)
8. Special feeding equipment	8.1 Assistive eating device
	8.2 Electronic stabilising handle with feeding accessories
9. Toileting accessories	9.1 The automatic toileting aid system
	9.2 Smart toilet seat
	9.3 Toilet seat lift
10. Equipment for psychomotor training	10.1 Exercise bicycle with physically activated screen
	10.2 Simulated exercise system
	10.3 Smart interactive panel for psychomotor training
11. Communication aid equipment	11.1 Eye tracking technological communication system
	11.2 Assistive technology device for elderly/people with visual impairment
	11.3 Personal amplifier for elderly/people with auditory impairment
	11.4 Guided tour system

Category	Gerontech product
12. Hoist/raiser/lifter/climber	12.1 Robotic transfer aid
	12.2 Electric stair climber
	12.3 Electric raiser
	12.4 Electric mobile hoist
13. Wheelchair	13.1 Electric-assisted stair climbing wheelchair
	13.2 Electric push and brake aid / Electric assisted rear wheel for wheelchair
	13.3 Electric standing wheelchair
14. Bed monitoring system	14.1 Bedside sensor alarm system
	14.2 Wireless bed sensor pad / mattress
15. Security equipment	15.1 Smart anti-wandering solution
16. Near-field communication device	16.1 NFC recording device:
	- NFC card reader
	- NFC card
	- NFC wristband
17. Computer software	17.1 Smart management system that can:
	- Record activities, health conditions;
	- Manage drug use;
	- Record case management;
	- Manage fixed assets
18. Equipment, assessment tools and accessories for occupational therapy / physiotherapy / speech therapy	18.1 Pressure assessment system
	18.2 Smart table / Smart projector
	18.3 Dynamic arm support
	18.4 Multi-function coordination and agility trainer
	18.5 Ultra short throw interactive projector
	18.7 Interactive therapy surface for motor training
	18.8 Smart Glove
	18.9 Robot assisted rehabilitation device
	18.10 Standing device with specialised design
	18.11 Virtual reality rehabilitation with biofeedback
	18.12 Interactive training system
	18.13 Vertical vibration therapy device
	18.14 Treadmill with suspension or weight reduction mechanism for gait and walking training
	18.15 Gait and walking trainer
18.16 Balance training system	
18.17 Active passive trainer for upper and lower limbs training	

Category	Gerontech product
18. Equipment, assessment tools and accessories for occupational therapy / physiotherapy / speech therapy	18.18 Visual cues device for gait training
	18.19 Airway clearance vest
	18.20 Computerised system for assessment and/or training of cognitive functions
	18.21 Real-time biofeedback device training for for cognitive or motor function
	18.23 Virtual reality-based rehabilitation system
	18.24 Robotic exoskeleton for training
	18.25 Biofeedback system that provides swallowing training for patients with dysphagia
	18.26 Hydro massage table
	18.27 Massage/percussion therapeutic device
	18.28 Computerised evaluation and training system for motor function
19. Equipment and accessories for multi-sensory therapy	18.29 Functional electrical stimulation device
	19.1 Multi-sensory therapy system
	19.2 Mobile interactive floor / wall projector for multi-sensory therapy
	19.3 Companion robot
20. Medical equipment and supplies	19.4 Smart interactive device for sensory stimulation and psychosocial support
	20.1 Body composition analyser
	20.2 Device for early screening, early identification, assessment, and monitoring of sleep disorder
	20.3 Wireless health monitoring equipment (as the tools attached to a monitoring/ record system)
21. Domestic training equipment	20.4 Portable ultrasound bladder scanner
	21.1 Electrical adjusted basin
22. Smart sensor	21.2 Height-adjustable and moving towards user cupboard
	22.1 Smart sensors
23. Smart system	22.2 Wearable sensor with biofeedback
	23.1 Smart rehabilitation system
	23.2 Continuous contact-free smart monitoring system
	23.3 Telepractice platform

Source: Social Welfare Department

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ABBREVIATIONS

\$1 billion I&T Fund

Innovation and Technology Fund for Application in Elderly and Rehabilitation Care

AAL Programme

Ambient Assisted Living Programme

AGE-WELL

Aging Gracefully across Environments using Technology to Support Wellness, Engagement and Long Life NCE Inc.

AI

Artificial Intelligence

ATA

Association for Technical Aids

C&SD

Census & Statistics Department

CABHI

Centre for Aging + Brain Health Innovation

CCS

Community care services

CCSV

Community Care Service Voucher

CRSSC

Community Rehabilitation Service Support Centre

CSB

Civil Service Bureau

CSSA

Comprehensive Social Security Assistance

CUHK

The Chinese University of Hong Kong

CWL

Central Waiting List

DECC

District Elderly Community Centre

DE/DCU

Day Care Centre/Unit for the Elderly

DH

Department of Health

DHC

District Health Centre

EHC

Elderly Health Centre

EHCVS

Elderly Health Care Voucher Scheme

EMSD

Electrical and Mechanical Services Department

EOC

Equal Opportunities Commission

EPIC

Early Professionals, Inspired Careers

ERB

Employees Retraining Board

EU

European Union

FHB

Food and Health Bureau

GAES

Golden Age Expo & Summit

GBA

Greater Bay Area

GIES

Gerontech and Innovation Expo cum Summit

GT Platform

Gerontechnology Platform

HKAG

Hong Kong Association of Gerontology

HKCSS

The Hong Kong Council of Social Service

HKHS

Hong Kong Housing Society

HKPC

Hong Kong Productivity Council

HKRC

Hong Kong Red Cross

HKSARG

The Government of the Hong Kong
Special Administrative Region

HKSTP

Hong Kong Science and Technology
Parks Corporation

HKTDC

Hong Kong Trade Development Council

HKU

University of Hong Kong

HKUST

The Hong Kong University of Science and
Technology

HSBC

The Hongkong and Shanghai Banking
Corporation

I&T

Innovation and technology

ICT

Information and communications
technology

ILC

International Longevity Centre

IP

Intellectual property

ITB

Innovation and Technology Bureau

ITF

Innovation and Technology Fund

KOL

Key Opinion Leader

KPIs

Key Performance Indicators

LegCo

Legislative Council

LingnanU

Lingnan University

LTC

Long-term care

LWB

Labour and Welfare Bureau

NEC

Neighbourhood Elderly Centre

NGOs

Non-governmental organisations

NRC

National Rehabilitation Centre

OHKF

Our Hong Kong Foundation

OT

Occupational therapist

PFS

Pay-for-success

PolyU

The Hong Kong Polytechnic University

PPP

Public-private partnership

PT

Physiotherapist

PwD

Persons with disabilities

QF

Qualifications Framework

R&D

Research and development

RCS

Residential care services

RCSV

Residential Care Service Voucher

RSPs

Recognised service providers

SIE Fund

Social Innovation and Entrepreneurship
Development Fund

SMEs

Small and medium-sized enterprises

STEM

Science, technology, engineering and
mathematics

SWD

Social Welfare Department

TSSSU

Technology Start-up Support Scheme for
Universities

VR

Virtual reality

VTC

Vocational Training Council

URA

Urban Renewal Authority

UGC

University Grants Committee

UNESCAP

United Nations Economic and Social
Commission for Asia and the Pacific

WERP

Welfare Equipment Rental Program

WHO

World Health Organization

ACKNOWLEDGEMENTS

We would like to thank Mr Tung Chee-hwa, Chairman of Our Hong Kong Foundation, for his encouragement and support. We would also like to express our gratitude to Mrs Eva Cheng, President of Our Hong Kong Foundation, for her unwavering support which made this report possible.

Our Hong Kong Foundation would like to thank all stakeholders who have shared their valuable insights, expertise and pearls of wisdom that contributed to this research.



In particular, we would like to thank the Gerontechnology Platform, its collaborative partners, and its intermediary, the Hong Kong Council of Social Service, for providing us with key inputs and help in arranging meetings with various important gerontechnology stakeholders.

This report does not necessarily reflect the views of these stakeholders.

Funded by 撥款資助



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The Social Innovation and Entrepreneurship Development Fund (SIE Fund) aims to be a catalyst for promoting the development of social innovation in Hong Kong. It connects the different sectors of the community, including businesses, non-governmental organisations, academics, philanthropies, etc. to address poverty and social exclusion as well as foster the well-being and cohesion of the society through innovative solutions. Partly through the intermediaries, the Fund provides visionary individuals and organisations with resources in support of research, capacity building and the entire life cycle of innovative ventures, from supporting idea incubation, providing seed funding to implement prototype and start-up projects, to assisting their eventual scale-up. The ultimate goal is to foster the development of the social innovation ecosystem where social entrepreneurs can thrive and potential talents can be unleashed to develop innovative ideas, products and services that can effectively meet social needs.

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We would also like to thank John Wong, Alex O, Ambrose Leung, Boris Chiu, Yolanda Lam, and Rhyme Luk for their contributions to this research project.



OUR HONG KONG
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團結香港基金

Our Hong Kong Foundation (OHKF) is a leading non-government, non-profit organisation founded in November 2014 under the chairmanship of Mr C.H. Tung, Vice Chairman of the National Committee of the Chinese People’s Political Consultative Conference. OHKF’s core mission is to promote and contribute to Hong Kong’s long-term and sustained prosperity and stability under the “One Country, Two Systems” principle. It harnesses Hong Kong’s collective wisdom, dynamism, and resilience to take full advantage of the unique opportunities that our country and the two systems together can offer. To fulfil our broad mission, the OHKF has set up an array of specialist institutes and platforms. They are the Public Policy Institute, China Institute for Knowledge, SciTech Innovation Platform, Business for Social Good Platform, Academy of Chinese Studies, and Hong Kong Chronicles Institute.

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OUR HONG KONG FOUNDATION LIMITED

19/F Nan Fung Tower, 88 Connaught Road Central, Hong Kong

December 2021

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OHK/202112015E

