



EMPATHETIC
TECHNOLOGY
FOR AGEING

Rethinking Health and Wellness
for the Elderly in Singapore:
Infocomm Technology Sector

EMPATHETIC TECHNOLOGY FOR AGEING

Rethinking Health and Wellness for the Elderly in Singapore:
Infocomm Technology Sector

Commissioned by



designsingapore.org

Research by

orcadesign:gn

orcadesign.net

 SUPRACOPULA

supracopula.com

Copyright © 2015
DesignSingapore Council
Ministry of Communications and Information

All Rights Reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage system and retrieval system, without the written permission of the copyright owner.

ISBN: 978-981-09-6504-4

FOREWORD

By 2030, Singapore will experience a profound shift in its age demographics with the elderly population increasing by three times. At the same time, rapid technological advancements will present opportunities for Information and Communications Technology (ICT) to permeate and improve the lives of the elderly in areas like healthcare.

There is a growing need to address health management and improve connectedness of the elderly in Singapore. One of the ways is by devising user-centred design and technological innovations that meet the needs of the elderly. The DesignSingapore Council's Asian Insights and Design Innovation (AIDI) programme embarked on a Rethinking Health and Wellness For the Elderly project. It brought together designers, infocomm technology professionals and stakeholders in the healthcare sector to collaborate in designing solutions for the elderly.

“How do the elderly think, act and feel towards managing their health at home?” “What are their needs and wants?” Those were some of the questions that we asked the elderly when we conducted a design ethnography study to gather deep qualitative insights into the habits and behaviours of the elderly. The challenge for us would be – how do we begin to design for behavioural change in the elderly, and solve some of these issues through ageing-in-place, peer-to-peer support and community platforms. In this publication, we illustrate the design thinking process through a selection of user insights, personas and design concepts.

I highly encourage companies and healthcare providers to tap into this rich database of ethnographic research to gain different insights into the lifestyles of the elderly in Singapore. Through this publication, enterprises will also better refine their approach to health management and care support systems, and be inspired to design new and improved products using technology for our growing ageing population.

Jeffrey Ho
Executive Director
DesignSingapore Council

ABOUT US



The vision of the DesignSingapore Council is for design to differentiate Singapore from global competition. As the national agency for design, the Council's mission is to develop the design sector, help Singapore use design for innovation and growth, and to make life better. The DesignSingapore Council is part of the Ministry of Communications and Information.

www.designsingapore.org

orcades:gn

Orcadesign Consultants is a forward-thinking innovation and strategy consultancy firm with over 20 years of experience in creating impactful solutions.

We work closely with our clients including SMEs, start-ups and global brands to solve problems, uncover business opportunities, innovate and grow sustainably. We advocate and adopt a human-centred and dynamic approach towards innovation. We also identify consumer trends and understand underlying user needs and motivations, before we translate them into meaningful insights and drive product and service design innovation.

Our work has gained international recognition such as the President's Design Award (Singapore), iF, Universal Design Award, IDEA Award and Geneva Innovation Awards.

www.orcadesign.net

SUPRACOPULA

SupraCopula is an innovation consultancy that integrates business and design thinking. We bridge consumer insights, business viability and technical know-how to define and support our clients' innovation strategy.

We help our clients discover business opportunities through consumer insight research and business model design, as well as develop and deepen innovation capabilities via process re-design, and customised innovation training. Through innovative and implementable solutions, we ensure our clients achieve maximum design impact.

Since the founding in 2012, we have been providing insightful advice to MNCs and SMEs across different sectors including consumer electronics, FMCG, retail and digital experience.

www.supracopula.com

PROJECT TEAM

Project Lead

Chen Ruiyuan
Jeremy Sun

Project Management

Nicky Goh
Priscilla Zhang

Research Lead

Michelle Chen

Research

Deborah Patterson
May Lee
Mervy Quek

Communication Design

Lim Nga Chi

DesignSingapore Council

Cindy Ng
Gan Huey Ying
Jacks Yeo
Jeffrey Ho
Joanne Teh
Marn Lim
Woo Huaijie


CREDITS

We would like to extend our heartfelt gratitude to our elderly respondents and their families for sharing their stories with us. We would also like to thank our senior care experts for their invaluable insights. Their contributions have enabled us to gain a deeper understanding about Singapore's elderly and to envision a new future of empowered elderly care.

We also appreciate Infocomm Development Authority of Singapore for industry insights and workshop assistance.

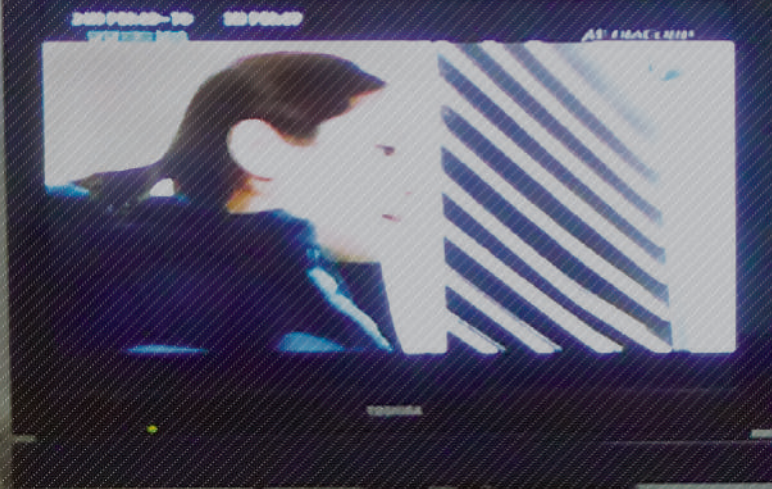
Lastly, we thank our workshop participants for their interest, creative ideas and expert knowledge. Their contributions have made the workshop a great success and led to many enlightening and compelling concepts.



A photograph of a kitchen with a light-colored countertop and white cabinets. On the counter, there is a silver kettle, a blue container, and a green bottle. In the foreground, a person is sitting in a wheelchair, partially visible. The image is overlaid with a semi-transparent blue rectangle containing text.

A handicapped elderly struggling to carry out his daily activities.

Can technology help the elderly regain control of their lives?



An elderly watching TV alone at home.

Can technology help the elderly achieve an active social life and empower them to have a strong connection to their community?





An elderly demonstrating the functions of a financial software.

Can technology help the elderly achieve a sense of worth, confidence and productivity?



An elderly leading a tai chi exercise.

Can technology help the elderly discover their interests, revive their passions and achieve their aspirations?



CONTENTS

INTRODUCTION

Foreword	03
About us	04
Project team	06
Credits	07
Executive summary	18
User-centred design innovation	22

CHAPTER 1 TRENDS IN HEALTH AND WELLNESS MANAGEMENT

1.1 Global trends	26
Living with chronic illness	28
Physiological deterioration	32
Feeling secure	36
Love and belonging	40
Capable me	44
Enriching the soul	48
1.2 A snapshot of health and wellness in Singapore	52

CHAPTER 2 THE DIFFERING NEEDS OF THE ELDERLY

2.1	From observations to insights	56
2.2	The 4 key motivations	58
	The 12 personas of the elderly	60
	Autonomy – Help me stay in control of my life	62
	Relatedness – Help me be connected	72
	Competence – Help me be useful	80
	Potential – Help me achieve my aspirations	88

CHAPTER 3 PRINCIPLES OF DESIGNING FOR THE ELDERLY

3.1	Principles of designing for the elderly	98
	Adapt for dignified experience	100
	Engage senses and emotions	101
	Empower independent living	102
	Connect with communities	103
	Encourage contribution	104
	Enable fulfilment of potential	105

CHAPTER 4 SCENARIOS OF THE FUTURE

4.1	Empowered elderly	108
4.2	Caring environment	112
4.3	Growing old as a community	116
4.4	Creating solutions for the future together	120
	Looking ahead	127
	References	128

EXECUTIVE SUMMARY

In recent decades, Singapore’s life expectancy has increased steadily to 80.2 years, ranking fifth in the world.¹ However, living longer also brings along challenges to remain healthy and meaningfully engaged.

With technological advancement, there is a diverse array of elderly care products and services on the global market. However, they are not widely utilised in Singapore due to a lack of awareness and relevance.

By sharing the insights discovered via the user-centred design thinking approach, this report aims to help enterprises gain empathy towards the needs of the elderly in Singapore, and inspire solutions that can create a positive impact on the elderly’s lives.

CHAPTER 1 TRENDS IN HEALTH AND WELLNESS MANAGEMENT

The trends are clustered into six key elderly needs, ranging from physiological to spiritual. Globally, many technological interventions seek to serve the needs of the elderly, however, most focus on alleviating the physical ailments of the elderly. Interventions targeting the elderly’s wellness and well-being are only starting to catch on, many in their early development stages.

Local trends mirror the observed global trends. Stakeholders in the local healthcare industry can take inspiration from global interventions and adapt them for the local context.

LIVING WITH CHRONIC ILLNESS

- Living longer, but sicker
- Bringing care services home

PHYSIOLOGICAL DETERIORATION

- Overcoming mobility challenges
- Increased risk of falling

FEELING SECURE

- Increasing cost of everything
- Age of anxiety and fear

LOVE AND BELONGING

- Living further away and becoming more isolated
- Increasing online presence

CAPABLE ME

- Increased capability
- Blurred line between employment and retirement

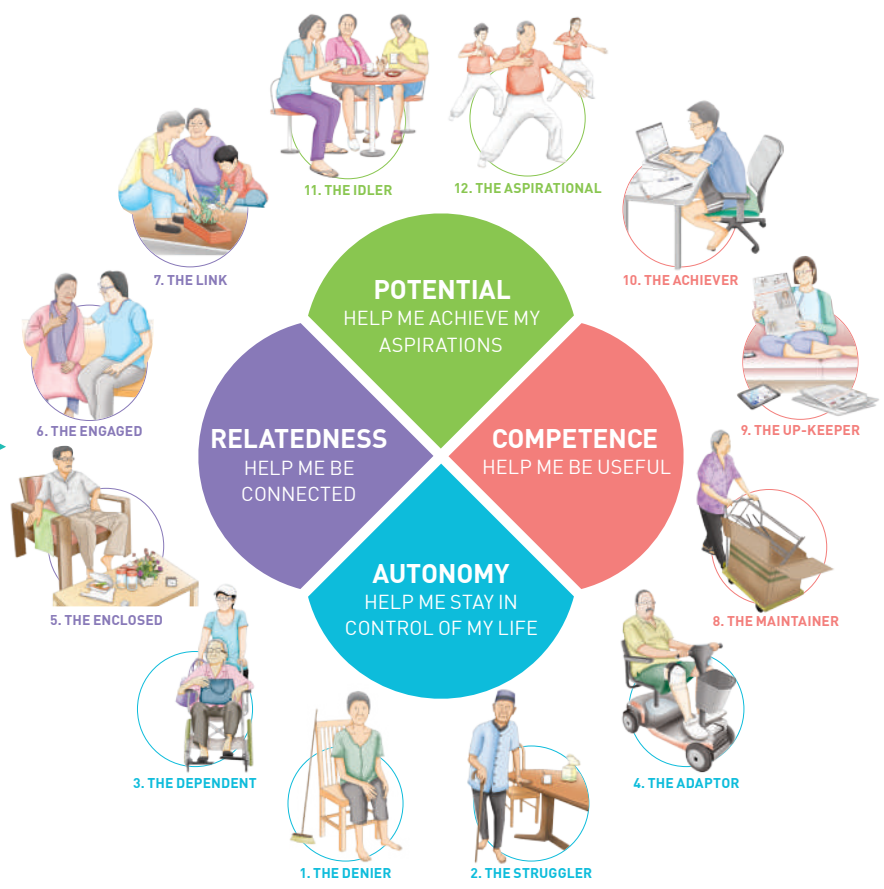
ENRICHING THE SOUL

- Life starts after 60
- Search for fulfilment

CHAPTER 2
THE DIFFERING NEEDS
OF THE ELDERLY

As observed through the ethnographic research, the elderly in Singapore display a wide variance in their needs, attitudes and behaviours. 12 personas were created to represent the different elderly profiles in Singapore. The personas are clustered into four key motivations – autonomy, relatedness, competence and potential.

When developing solutions for the elderly, it is important to identify which personas are being targeted, in order to create user-centred products and services that can enhance the way the elderly live their golden years.



CHAPTER 3 PRINCIPLES OF DESIGNING FOR THE ELDERLY

The “Principles of Designing for the Elderly” bridge the gap between existing technological solutions and the unmet needs of the elderly, and guide the design of empathetic products and services.

By applying the guidelines, the solutions will help establish, build and sustain positive user experiences that bring comfort and meaning to the elderly.

ADAPT FOR DIGNIFIED EXPERIENCE

- Remove anxiety
- Cater for variability
- Reassure capability

ENGAGE SENSES AND EMOTIONS

- Exercise the senses
- Heighten emotional experience
- Respond empathetically

EMPOWER INDEPENDENT LIVING

- Provide familiarity
- Nurture confidence
- Reinforce control

CONNECT WITH COMMUNITIES

- Spark conversations
- Activate support
- Sustain connections

ENCOURAGE CONTRIBUTION

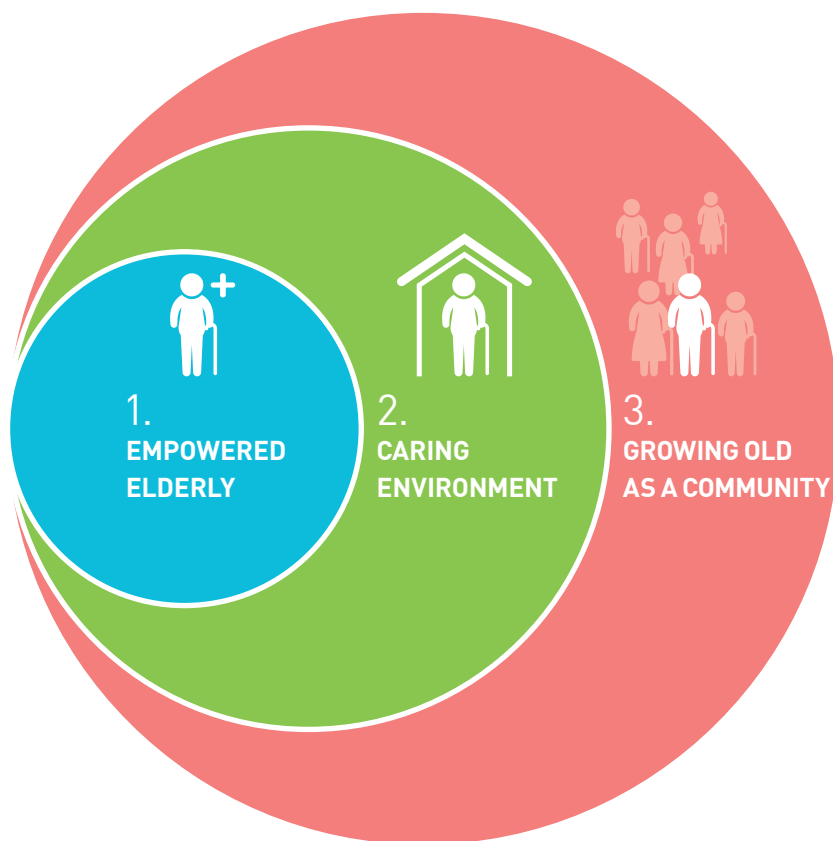
- Highlight value
- Motivate action
- Celebrate contribution

ENABLE FULFILMENT OF POTENTIAL

- Stimulate discovery
- Support learning
- Inspire mastery

CHAPTER 4 SCENARIOS OF THE FUTURE

Three future scenarios illustrate how thoughtful technological innovations can play a major part in making the lives of the elderly more engaging and meaningful. The scenarios depict the individual, his environment and community. They showcase the possibilities in the near future and also serve to inspire the creation and development of technological solutions for the elderly and their communities.



USER-CENTRED DESIGN INNOVATION

EMPATHISE

Learn about the user whom you are designing for

Context

research global and local trends for health and wellness management for the elderly

Observations

shadow elderly respondents in Singapore

Expert interviews

gather insights from social service professionals and academics

SYNTHESISE

Create a point of view based on user needs and insights

Insights

synthesise observations and interviews into clusters of insights

Personas

create personas based on needs and motivations

Themes

create future themes that illustrate how thoughtful innovations can change the lives of the elderly

IDEATE

Brainstorm and generate as many ideas as possible

Propositions

identify opportunities from insights and turn them into value propositions

Brainstorm

generate as many concepts as possible

Cluster

organise ideas into groups, evaluate and select



TEST

Build prototypes and test for feedback

Prototype

create rapid prototypes for key touchpoints

Test

test on target users for feedback

ITERATE

Develop and refine based on evaluation

Iterate

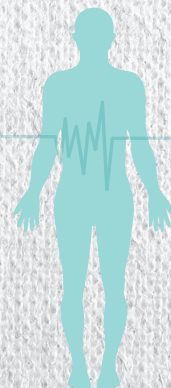
develop and refine the concepts based on user feedback and evaluation, revisit the process if any issues arise

The user-centred design innovation process allows practitioners to systematically gain empathy and insights into the latent needs and motivations of users. Its multi-phase process collaborations between different stakeholders (users, service providers, designers, business owners) to create concepts and test rapid prototypes. Instead of having users change and accommodate their behaviours, products and services are optimised around how the users may need or want them.

This publication elaborates and details the first three phases of the user-centred design innovation process – **empathise, synthesise and ideate.**

CHAPTER 1

TRENDS IN HEALTH AND WELLNESS MANAGEMENT



“Information technology is a game changer that can help us transform healthcare delivery... As the number of seniors increase and the ratio of younger to older Singaporeans shrink, information technology can serve as a critical enabler for Singapore in the provision of aged care.”¹

— Dr Amy Khor, Senior Minister of State for Health and Manpower



1.1 GLOBAL TRENDS

Spectrum of needs of the elderly

Ageing is a global issue. The “Silver Tsunami” is hitting countries like Japan, Singapore and the United States^{2,3,4}, resulting in an increasing burden on families, governments and societies. A deeper understanding of the elderly’s evolving needs and the changing health and wellness landscape is necessary to design effective, sustainable solutions.

To provide an overview of how the world is coping with the growing ageing population, global trends in health and wellness management are clustered into six key elderly needs ranging from physiological to spiritual.

LIVING WITH CHRONIC ILLNESS

Chronic illnesses are long-term health conditions that require ongoing medical attention. They can affect the elderly’s daily life deeply. However, appropriate management can reduce the challenges caused by chronic illnesses, and enable the elderly to maintain a good quality of life.

PHYSIOLOGICAL DETERIORATION

With ageing, physiological deterioration such as loss in mobility, cognitive and sensory abilities is natural and unavoidable. Actively recognising and managing such deterioration will promote better health and well-being.

FEELING SECURE

A sense of security, be it financial security or a permanent home, enables the elderly to live with a peace of mind. Having a stable environment reduces the elderly’s mental burden and enables their emotional and mental health to thrive. This helps them relax and embrace ageing as a natural process.



ILLNESS

WELLNESS

Minimising challenges

There is an abundance of technological interventions that seek to serve the needs of the elderly. However, most of the existing interventions focus on alleviating illnesses and minimising the physical challenges of ageing. Interventions that target the elderly's wellness and well-being are gradually catching on, but many are still in their early development stages.

This overview serves to stimulate the ideation of solutions that are feasible, desirable and contextualised to the local environment.

LOVE AND BELONGING

The need for human interaction, companionship and communication becomes more acute with the greying population as their friends pass away and younger family members become increasingly immersed in their own lives.



CAPABLE ME

The elderly still seek to remain as active contributors in society. They desire to continue to feel useful and capable, as well as to be independent so as not to burden family and friends.



ENRICHING THE SOUL

Prior to retirement, the elderly may have prioritised practical considerations like tough work schedules and family obligations over personal pursuits. As they live their golden years, some may want to devote more towards pursuits that will enrich their souls.



WELL-BEING

Maximising achievements

LIVING WITH CHRONIC ILLNESS

Chronic illnesses are long-term health conditions that require ongoing medical attention. They can affect the elderly's daily life deeply. However, appropriate management can reduce the challenges caused by chronic illnesses, and enable the elderly to maintain a good quality of life.

LIVING WITH CHRONIC ILLNESS

“When I was young, I did not have to take any medicine. Now because of my illnesses, I take medicine everyday. I think to myself, what kind of life is this? Why do I have to take so much medicine? Is it even necessary?”

— Auntie Tan, elderly respondent

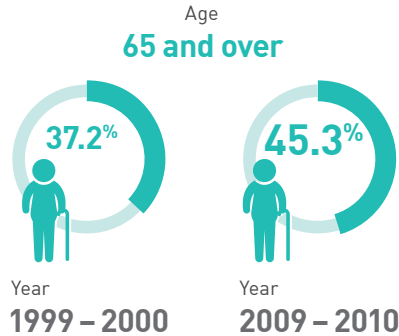
TREND

Living longer, but sicker

The world’s entire population is living longer. With advancements in sanitation and the medical field, many communicable and childhood diseases are either prevented or controlled. The global average life expectancy of humans has risen from 65.3 years in 1990, to 71.5 years in 2013⁵. However, many of the additional years are lived in poor health.

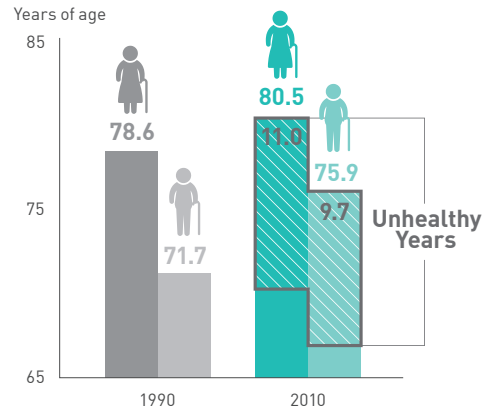
The percentage of adults aged 65 and above in the United States with two or more chronic illnesses have increased over the past decade.

Prevalence of two or more chronic conditions among adults in the United States⁶



Elderly in the United States are living longer, but with many years not in good health.

Life expectancy in the United States⁷



“There’s been a progressive shift from early death to chronic disability.”⁸

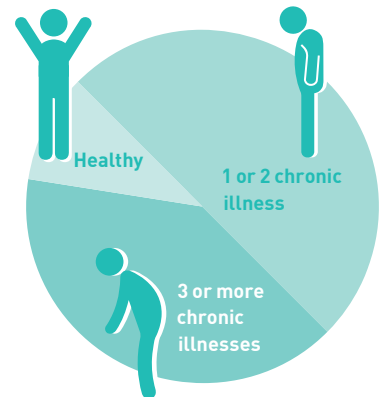
— Professor Christopher Murray, Institute for Health Metrics and Evaluation, on the Global Burden of Disease research study



9 out of 10 Singaporeans aged 55 and above have at least one chronic health condition.

4 in 10 have at least three chronic health conditions.

Chronic illness amongst Singaporeans aged 55 years and above⁹

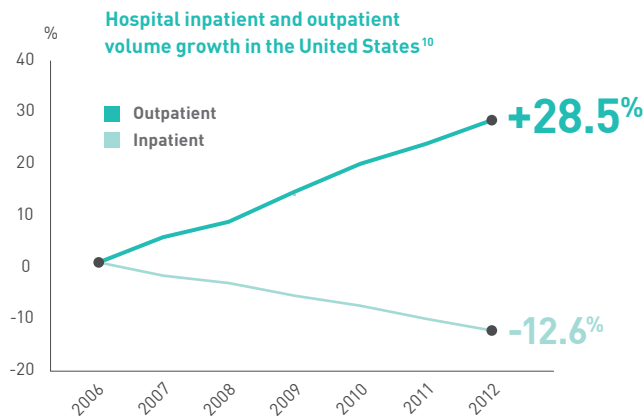


TREND

Bringing care services home

Healthcare services have evolved from short-term hospital services to home-based ongoing care for chronic conditions.

There is a growing preference to age in place where elderly prefer to age comfortably in their own homes and communities with dignity. This not only reduces hospitals' burdens but also allows the elderly to live out their years in a familiar environment. Home care services are made more effective with increased innovations in portable medical treatment, monitoring and communication devices.



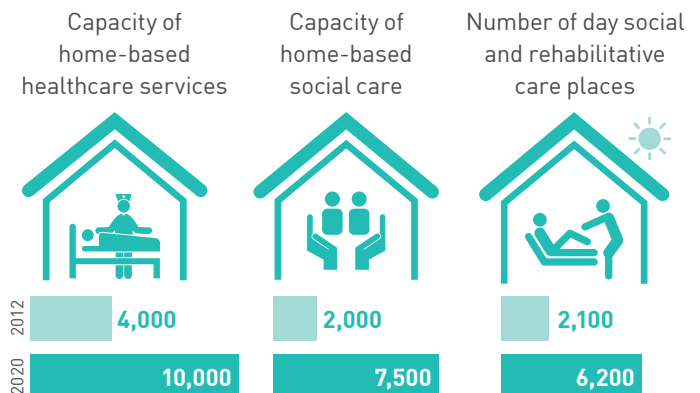
Fuelled by advancements in technology, such as in remote monitoring and communication electronics for healthcare, a **continuous shift from inpatient to outpatient procedures** is enabled.

90% of the elderly in the United States over the age of 65, want to stay in their residences for as long as possible.¹¹

“Ageing in place offers numerous benefits to older adults — including life satisfaction, health and self-esteem — all of which are keys to successful ageing.”¹²

— Ageing in Place, National Conference of State Legislatures (NCSL) and the American Association of Retired Persons (AARP) Public Policy Institute

To meet ageing demands, Singapore’s Ministerial Committee on Ageing plans to increase home and community based care services.¹³



PHYSIOLOGICAL DETERIORATION

With ageing, physiological deterioration such as loss in mobility, cognitive and sensory abilities is natural and unavoidable. Actively recognising and managing such deterioration will promote better health and well-being.



PHYSIOLOGICAL DETERIORATION

“I used to go to many places when I was younger, but my knees aren’t as good as before. They hurt especially when I have to walk long distances. It is difficult to go anywhere now.”

— Granny Lim, elderly respondent

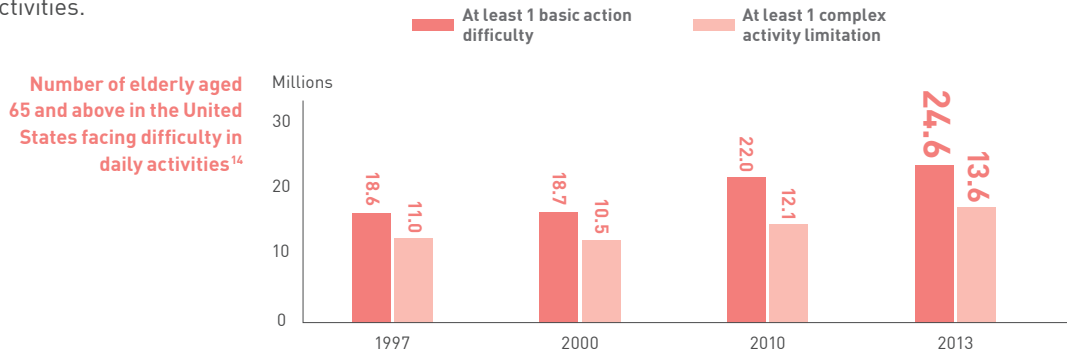
TREND

Overcoming mobility challenges

Ageing is an unavoidable phase of living. It is a natural process of change in a person, both mentally and physically. The weakening of one’s physical capacity results in a decline in mobility. With inactivity, the elderly might suffer severely from the deterioration of physical and mental health.

As such, there is an increasing demand for mobility equipment. More elderly are seeking to regain their ability to conduct daily and social activities.

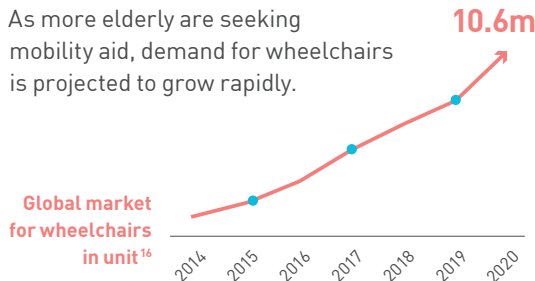
More elderly are facing difficulty in daily activities.



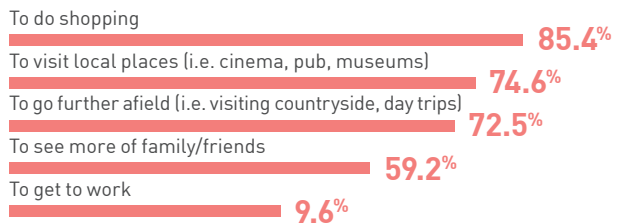
“If you’re unable to get out then you can’t go shopping, you can’t go out with your friends to eat dinner or go to the movies, and you become dependent on other people to get you places. So you become a recluse, you stay home, you get depressed.”¹⁵

— Dr Suzanne Salamon, Geriatrician and instructor at Harvard Medical School

As more elderly are seeking mobility aid, demand for wheelchairs is projected to grow rapidly.



Shopping is the biggest reason why the elderly need a wheelchair.¹⁷



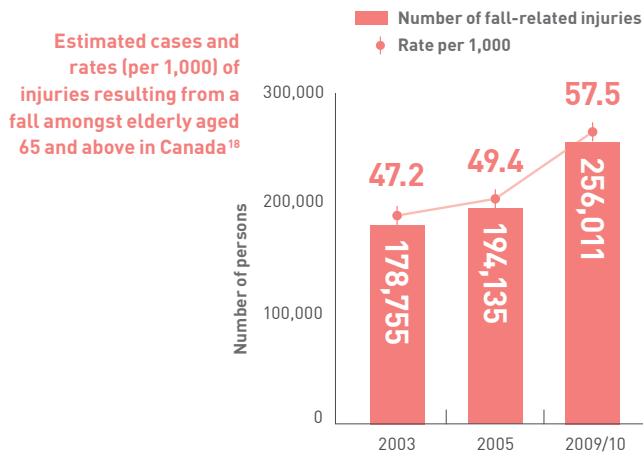
TREND

Increased risk of falling

Falling is one of the leading causes of deaths among the elderly. Changes in muscle mass and declining eyesight contribute to the increased risk of falling as one ages.

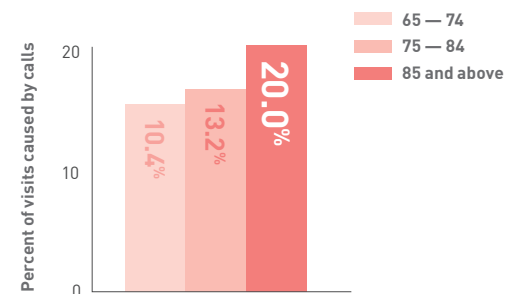
In recent years, there has been an increase in fall rates amongst the elderly. This may be due to various reasons including an increased number of elderly living alone with limited support in their day-to-day living, hence contributing to a higher risk for falls.

In Canada, there is a **20.3% increase** in the estimated rate of injuries resulting from a fall for adults aged 65 and above from 2003 to 2009/10.



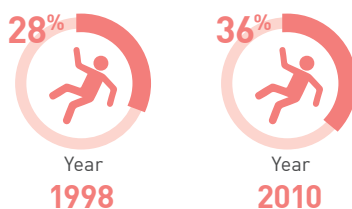
Those aged 85 and above are **twice as likely** to visit the emergency department for fall-related injuries compared to those aged 65 to 74 years.

Percentage of emergency department visits caused by falls for persons aged 65 and above in the United States¹⁹



In the United States, self-reported fall rates for adults aged 65 and above increased from 28% in 1998 to 36% in 2010.

Self-reported fall rates in the United States²⁰



“The term ‘fear of falling’ describes an exaggerated concern of falling that frequently leads to a self-imposed restriction in activities. The fearful older person narrows her world, often resulting in **social isolation and a spiralling physical, emotional, and functional decline.**”²¹

— Alan M. Jette, Director of the Health and Disability Research Institute, Boston University

FEELING SECURE

A sense of security, be it financial security or a permanent home, enables the elderly to live with a peace of mind. Having a stable environment reduces the elderly's mental burden and enables their emotional and mental health to thrive. This helps them relax and embrace ageing as a natural process.

FEELING SECURE

“I don’t worry about living alone. My neighbours and the elderly activity centre manager are very helpful. If I need any help such as seeing a doctor, I just need to call the centre manager and he will bring me there.”

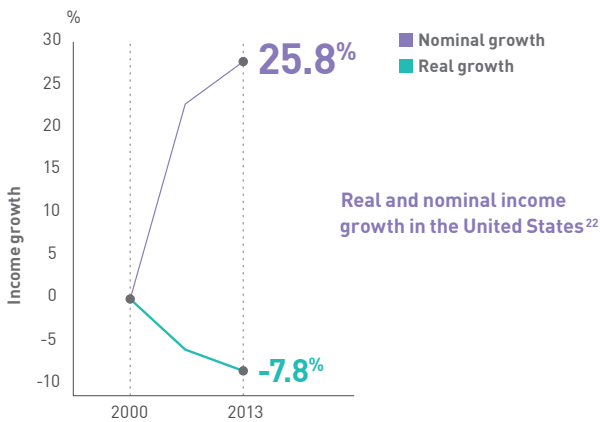
— Auntie Lacheemi, elderly respondent

TREND

Increasing cost of everything

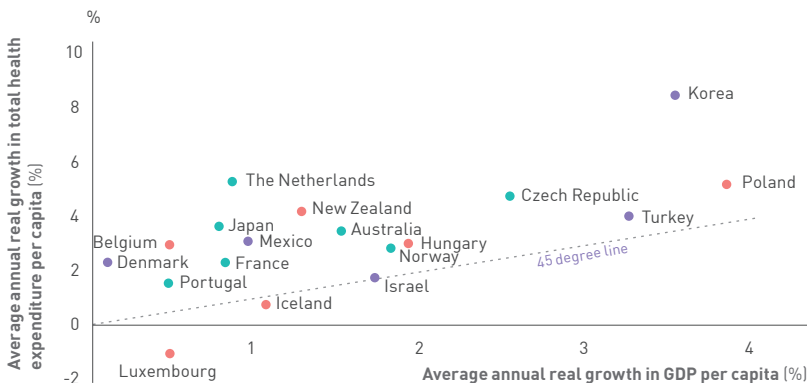
With an ageing population, governments, companies and individuals face a heavier healthcare financial burden. If longer life expectancy simply leads to more years in which the elderly are chronically ill and disabled, the cumulative cost of sustaining life through prolonged healthcare services would inevitably take a toll on the elderly's retirement funds.

In the United States, even though household income has increased by 25.8% since 2000, **real purchasing power has decreased by 7.8%**.



“Advances in modern medicine mean that we are generally **living longer lives, but also incurring healthcare costs over a longer period**. When higher costs are factored in for doctors’ salaries, larger investments in medical facilities and equipment, and increasingly expensive advanced medicines and biotechnology, the net result is rapid rise of overall healthcare costs.”²³

— Diagnosing Singapore’s Healthcare: The Need for a Healthy Supply / Demand Balance, KPMG



Globally, the growth in health expenditure exceeds the GDP growth.

Average annual growth in total health expenditures and GDP per capita across countries²⁴

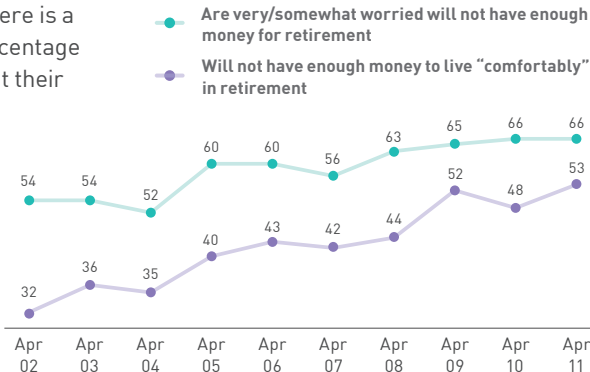
TREND

Age of anxiety and fear

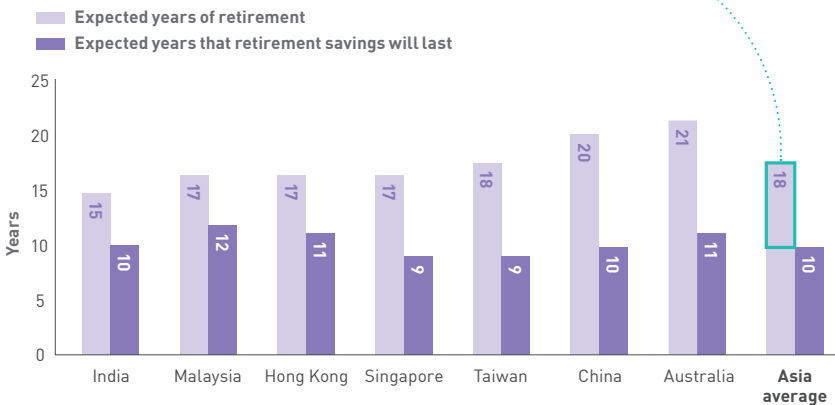
Ageing is a natural part of life, yet many men and women from their fifties are fearful of their approaching maturity. Uncertainty seeps in when ageing brings greater risks of physical and cognitive deterioration, that affect the overall quality of life. To top it off, health decline results in increased medical costs and financial liabilities as well. Many are unsure of their ability to last through the years with their current amount of retirement funds.

In the United States, there is a **steady increase** in percentage of people worried about their retirement finance.

Percentage of adults in the United States who worry about retirement finances²⁵



Expected years of retirement versus expected years which retirement savings will last²⁶



8 years

is the average number of years where people expect to live without financial savings post-retirement.

Globally, biggest concerns about life in old age:²⁷



58%

Losing self-reliance to care for basic needs



57%

Losing physical agility



51%

Losing mental agility



49%

Being a burden on family members or friends



44%

Not having enough money to live comfortably

LOVE AND BELONGING

The need for human interaction, companionship and communication becomes more acute with the greying population as their friends pass away and younger family members become increasingly immersed in their own lives.

LOVE AND BELONGING

“When I’m alone at home, I will think about my wife who has passed on. So I go to the coffee shop and hang out with my friends instead. However, over these years, some of my friends have passed on too.”

— Uncle John, elderly respondent

TREND

Living further away and becoming more isolated

As society gravitates towards faster-paced lifestyles and globalisation, the number of families growing distant from their aged parents increases. As a result, more and more elderly are living alone and facing the risk of becoming more isolated.



In the United States, about **28% (12.1 million)** of all non-institutionalized elderly aged 65 and above lived alone in 2013.²⁸

“People are becoming busier than ever with their increasingly hectic work and home lives which means that many are seeing less of their parents as they try to squeeze everything into their busy lifestyle.”²⁹

— Loneliness amongst older people and the impact of family connections, Royal Voluntary Service

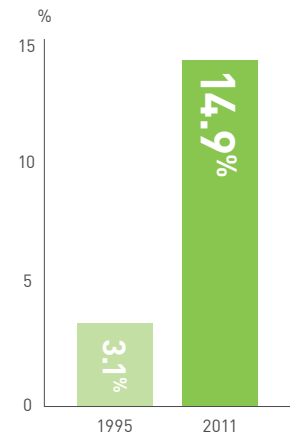


45%
higher risk of death
for the lonely elderly

Elderly who identified themselves as lonely faced **59%** more risk of physical decline and **45%** more risk of death, than those who were not lonely.³¹

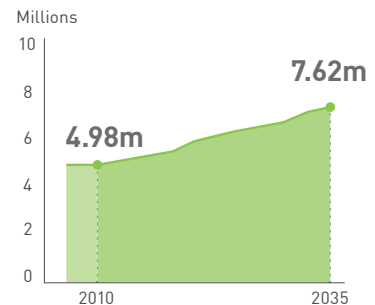
In Singapore, there is an almost **5 times increase** in the percentage of elderly living alone.

Percentage of adults aged 55 years and above living alone in Singapore³⁰



In Japan, the number of people aged 65 or older and living alone is estimated to **increase to 7.62 million in 2035 from 4.98 million in 2010.**

Number of people aged 65 years and above living alone in Japan³²



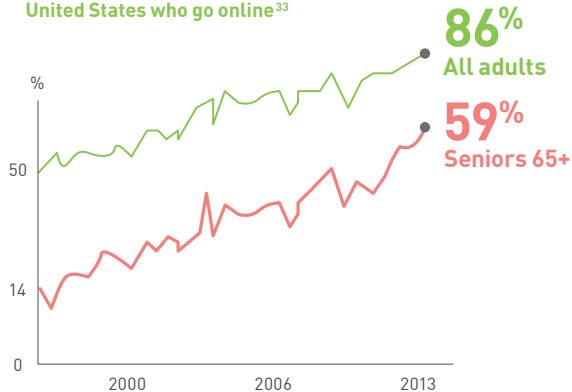
TREND

Increasing online presence

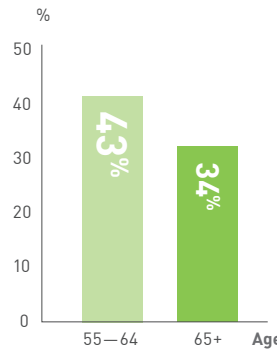
The rapid advancement and widespread accessibility of technology have resulted in an increase in elderly stepping out of their comfort zones to adopt digital alternatives. As a result, there is a growing presence of the elderly on the Internet and social media platforms.

American seniors **65 and above** are becoming increasingly connected to the Internet, just like the younger adults.

Percentage of population in the United States who go online³³



71% of American seniors who go online do so almost every day.³⁴



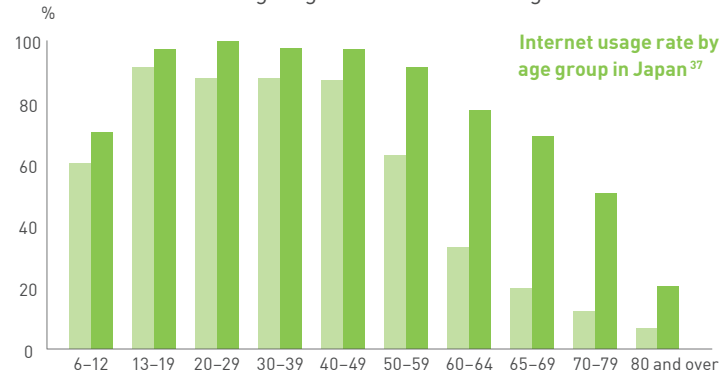
More than 1/3 of the elderly population aged 55 and above own a smartphone.

Weighted average of smartphone ownership from 11 developed countries including Singapore, Japan, and the United Kingdom³⁵

“We’re witnessing a dramatic difference in behaviour and attitudes of the baby boomer generation, relative to their older counterparts. Among other things, boomers are often **tech savvy: they increasingly shop online, blog, and own smartphones.**”³⁶

— Kim Walker, Founder and CEO of Silver Group

In Japan, adults aged 50 and above had the largest growth in Internet usage from 2003 to 2013.



CAPABLE ME

The elderly still seek to remain as active contributors in society. They desire to continue to feel useful and capable, as well as to be independent so as not to burden family and friends.

CAPABLE ME

“I can retire now. But I chose to work three days a week because if I were to retire and stop work totally, I will feel so bored and useless.”

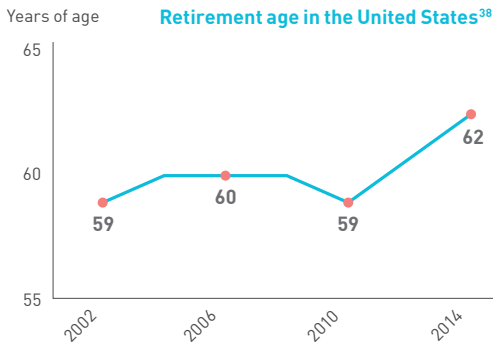
— Mdm Liew, elderly respondent

TREND

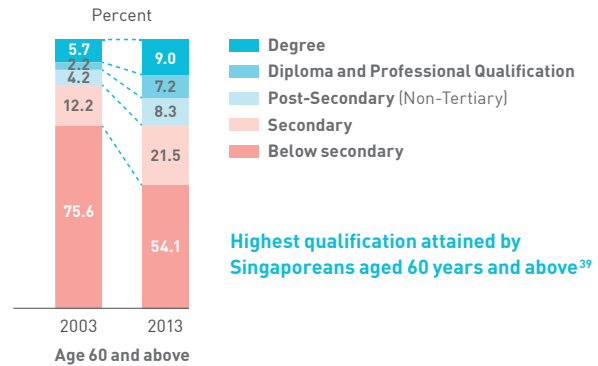
Increased capability

With increased opportunities for education, the elderly are more educated and capable than ever. They are better trained, possess richer work experience and can contribute more effectively to the society.

The average age at which Americans retire has increased from **59 in 2002, to 62 in 2014.**



Singaporean elderly are more educated than before. In 2013, almost 1 in 2 had secondary education or higher.

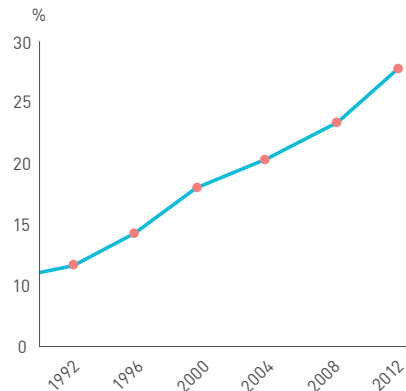


“(With age), productivity can decline in physically demanding jobs such as manufacturing and even in service sectors jobs, (however)... **older workers can actually be more productive than their younger counterparts** owing to their deep experience.”⁴⁰

— Global Ageing: How Companies can Adapt to the New Reality, Boston Consulting Group

In Canada, there are more start-ups by adults aged 50 and above than ever, doubling the rates from 1990 to nearly 30% in 2012.

Proportion of start-ups by adults aged 50 and above in Canada⁴¹



TREND

Blurred line between employment and retirement

Semi-retirement refers to the continuation of paid employment with shorter working hours as retirement approaches. It is popularly viewed as a way to stay active and connected with others in the golden years. Some stay in semi-retirement for as long as they can, while others see it as a way to enter retirement gradually.

In a global survey conducted with employees across 15 countries.⁴²

46% plan to continue working part-time temporarily or for an extended period of time during retirement.

WORK

32% of current employees plan to stop work immediately when they enter retirement.

STOP

According to a global survey conducted in 15 countries, people want to semi-retire for the following reasons...⁴³



In a survey conducted by Straits Times, **70% of Singaporeans aged 55 and above** said that they want to work past the age of 65, even if it means getting a lower salary.⁴⁴



“Many (older) people want to work as they **have a passion, interest and curiosity that doesn’t die with age** and is an essential part of their well-being.”⁴⁵

— Jean Stogdon, Founder of Grandparents Plus

ENRICHING THE SOUL

Prior to retirement, the elderly may have prioritised practical considerations like tough work schedules and family obligations over personal pursuits. As they live their golden years, some may want to devote more towards pursuits that will enrich their souls.

ENRICHING THE SOUL

“We see a different world out there when we travel. We do not have much time left. As long as it’s possible and we are still healthy, we will try to travel as much as we can.”

— Uncle Ho, elderly respondent

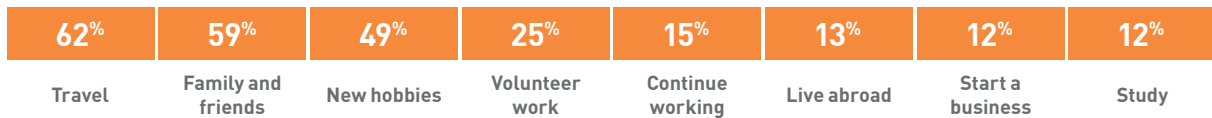
TREND

Life starts after 60

As people age, some gradually find themselves liberated from the responsibilities that they have had for a major part of their adult lives.

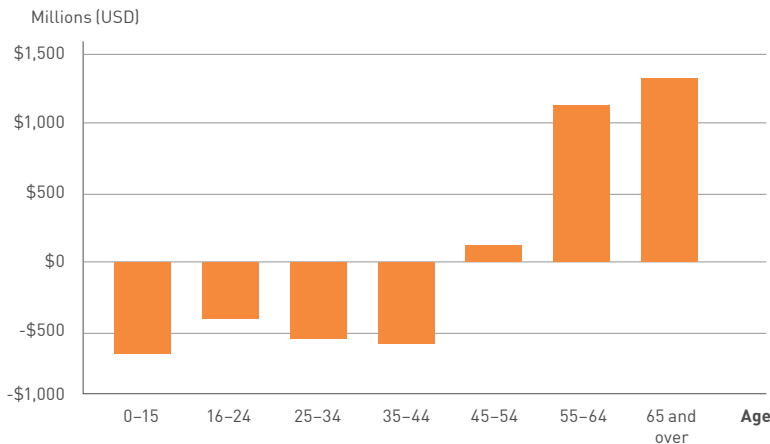
Retirement gives them the chance to embrace their hobbies and pursue passions that they had always postponed.

Globally, people aspire to have an active retirement which consists of travel, family, hobbies and work.⁴⁶



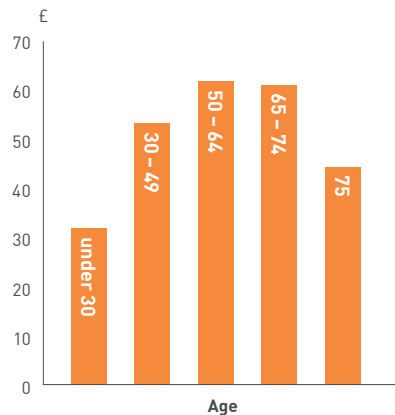
In the United Kingdom, from 1999 to 2011, the elderly are the only age group showing **significant growth in foreign travel expenditure.**

Change in foreign travel expenditure (real terms), in the United Kingdom⁴⁷



In the United Kingdom, people aged 50 to 74 **spend twice as much** per year on theatre and cinema tickets as compared to those under 30.

Average household per capita annual spending on theatre and cinema tickets in the United Kingdom⁴⁸

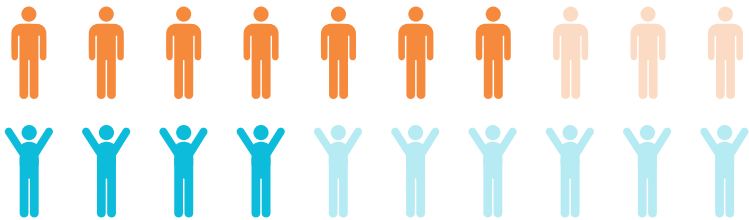


TREND

Search for fulfilment

Pursuing spiritual goals is a popular pursuit among the elderly, as they find solace and meaning in fulfilling spiritual and existential needs and cultivating charity.

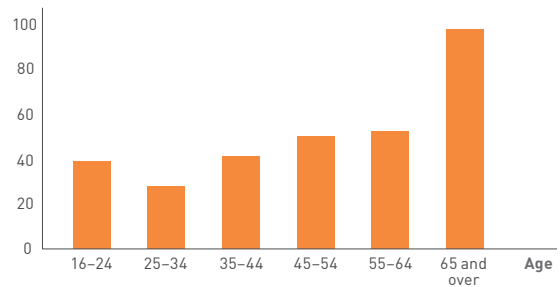
About **7 in 10 Singaporean seniors aged 50 and above** have intentions to pursue spiritual goals.



4 in 10 plan to engage in volunteer work.⁴⁹

Older Americans are more likely to **devote more hours to volunteer work** than younger adults.

Median hours of volunteer work across age in the United States⁵⁰



Studies⁵¹ have found that volunteering is linked to...



Increased well-being



Better self-reported health



Fewer Activities of Daily Living (ADL) limitations



Lower depression levels

“Volunteering provides structure and **adds defined meaning and purpose to life** when work and family roles and demands are lessening in the lives of older adults.”⁵²

— Volunteering and older adults, Volunteer Canada

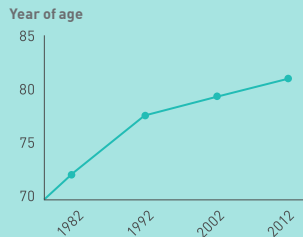
1.2

A SNAPSHOT OF HEALTH AND WELLNESS IN SINGAPORE

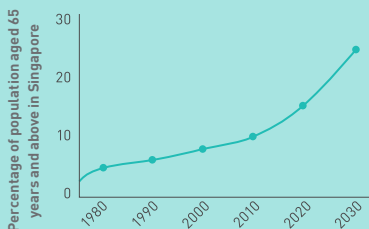
GROWING GREY POPULATION

The increased life expectancy and lower birth rates in Singapore lead to the growth of an ageing society. The shift in population structure will have a profound impact on the public healthcare infrastructure.

There has been a steady increase in life expectancy in Singapore since 1960.⁵³



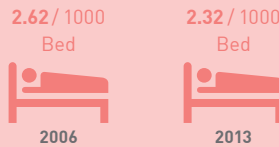
By 2030, more than 1 in 4 persons in Singapore will be aged 65 years and above.⁵⁴



INCREASING STRAIN ON LOCAL HEALTHCARE INFRASTRUCTURE

Long waiting times often plague government hospital emergency departments and polyclinics. Bed crunches and shortage of medical staff are also common issues.

15% decrease in hospital beds per 1,000 from 2006 to 2013.⁵⁵



“Older patients (tend) to stay longer in hospitals because it takes longer for their condition to stabilise ... With shrinking family sizes and weaker family support over time, family members may not be ready to take the patients home in a timely manner, and this will also result in a longer stay in the hospital.”⁵⁶

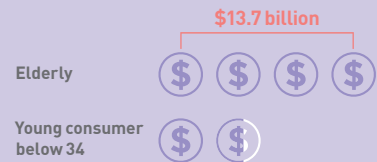
— Health Minister Gan Kim Yong, responding to the hospital bed crunch situation in Singapore



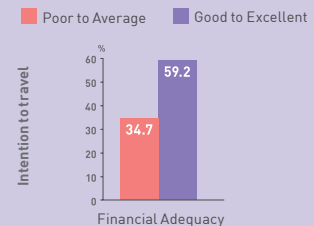
BURGEONING SILVER ECONOMY

With greater spending power, basic needs such as food and shelter are met easily. The more affluent, with greater disposable income, may then pursue other desires, such as travel.

By 2016, Singaporean elderly are projected to spend S\$13.7 billion – more than twice the spending power of those under 34 years old.⁵⁷



With increasing wealth, Singaporean adults aged 50 years and above are more likely to travel.⁵⁸



The Singapore health and wellness trends mirror those in the global context. There is an increasing strain on the healthcare infrastructure to cope with the needs of an ageing population. In recent years, the problems of bed crunches and long emergency waiting times have become more pressing.

At the same time, there is an increased number of elderly living alone and they may face a higher risk of isolation and mortality.

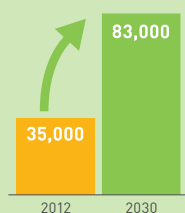
On the other hand, there is a growing trend of empowered elderly who have larger spending power and are increasingly tech-savvy. There is also keen interest to remain meaningfully engaged through employment and volunteer work.

This snapshot offers a glimpse of potential market opportunities for innovative products and services that cater to the evolving needs of the elderly population in Singapore.

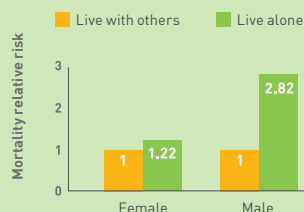
INCREASED ELDERLY LIVING ALONE

Due to family priorities and hectic schedules, more Singaporeans are living away from their parents. Elderly who are living alone are becoming more common.

By 2030, the number of elderly people living alone in Singapore is expected to rise to 83,000- up from 35,000 in 2012.⁵⁹



Isolated elderly face higher mortality risk.⁶⁰



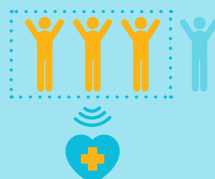
RISE IN TECH-SAVVY SENIORS

Technologies are becoming more accessible and affordable. Local elderly are increasingly more receptive to learning and using technology such as smartphones and computers.

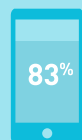
16% of elderly aged 60 and above use computer and Internet regularly.⁶¹



3 in 4 elderly want digital options to manage their health remotely.⁶²



83% of Singaporeans aged 55 and above own smartphones.⁶³



BLURRED LINE BETWEEN EMPLOYMENT AND RETIREMENT

A great number of Singaporean elderly would like to stay engaged with the society, via work or volunteer opportunities. They are keen to remain active and contribute to the community.

Singaporeans aged 50 years and above intend to embark on different pursuits including,⁶⁴



42.5%
volunteer work



40.1%
part-time work



18.3%
start a new career

When asked to indicate various motivators of employment after retirement,



91.1%

91.1% agreed that it is a good way to stay financially independent.



87.5%

87.5% agreed that it allows them to remain active and lead a productive life.⁶⁵

CHAPTER 2
THE
DIFFERING
NEEDS OF
THE ELDERLY





“The elderly is not one big homogenous group that ranges in age from 55 to 95. The needs of a healthy, active and employed 65 year old will differ sharply from a retiree of the same age with poor health. Who you target will greatly affect how your product or service will be distributed.”¹

— Dr Maria Henke, Assistant Dean of Gerontology,
University of South California

2.1

FROM OBSERVATIONS
TO INSIGHTS**OBSERVATIONS**

To form a deeper understanding of the elderly, 22 respondents were shadowed for at least eight hours over the course of a day to observe their daily routines, lifestyles and behaviours in places including their homes, workplaces and senior activity centres. The observations also included documentation of interactions between the elderly and their family, peers and the community as they are important influencers in the elderly's daily lives.

**INTERVIEWS**

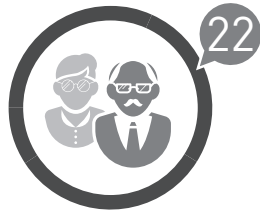
In-depth interviews were also conducted to probe deeper into the elderly's attitudes and motivations. Questions on topics such as lifestyles, health and ambitions were asked so that their perspectives, decision pathways and concerns could be understood.

**SYNTHESIS AND INSIGHTS**

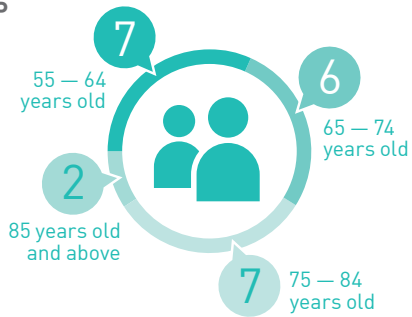
The findings from the ethnographic research were carefully analysed in order to define the pleasure and pain points within the daily lives of the elderly and to form insights which defined the 12 elderly personas.

DEMOGRAPHICS OF RESPONDENTS

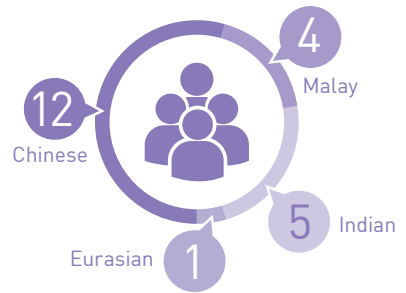
TOTAL NUMBER OF RESPONDENTS



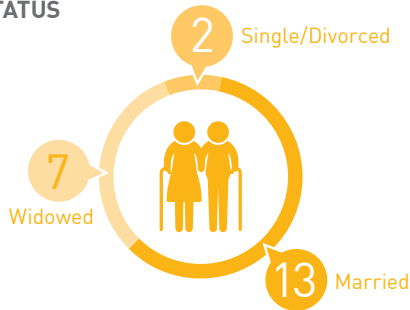
AGE GROUP



RACE



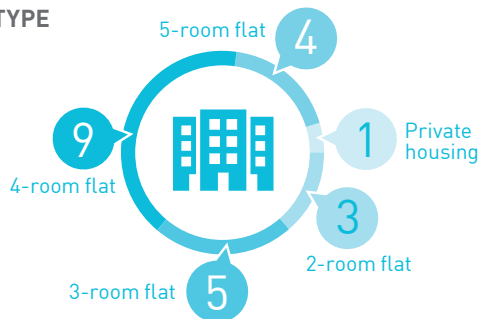
MARITAL STATUS



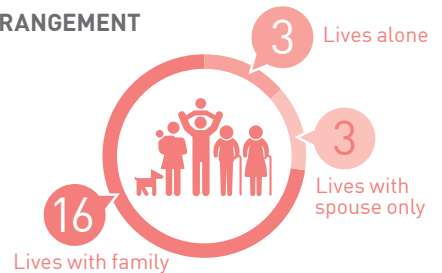
EMPLOYMENT STATUS



HOUSING TYPE



LIVING ARRANGEMENT

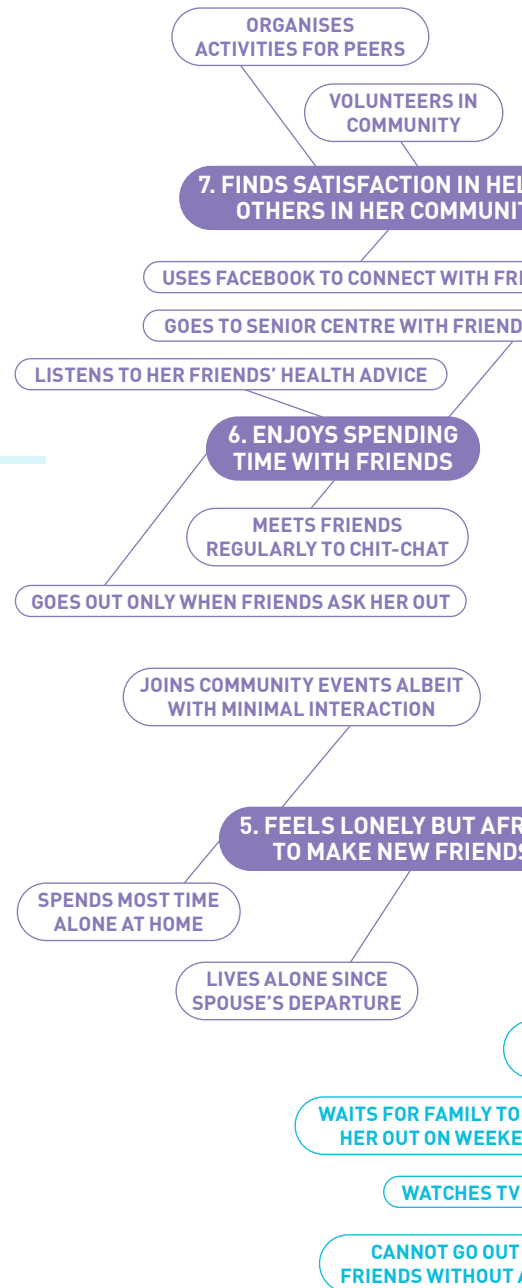


2.2 THE 4 KEY MOTIVATIONS OF THE ELDERLY

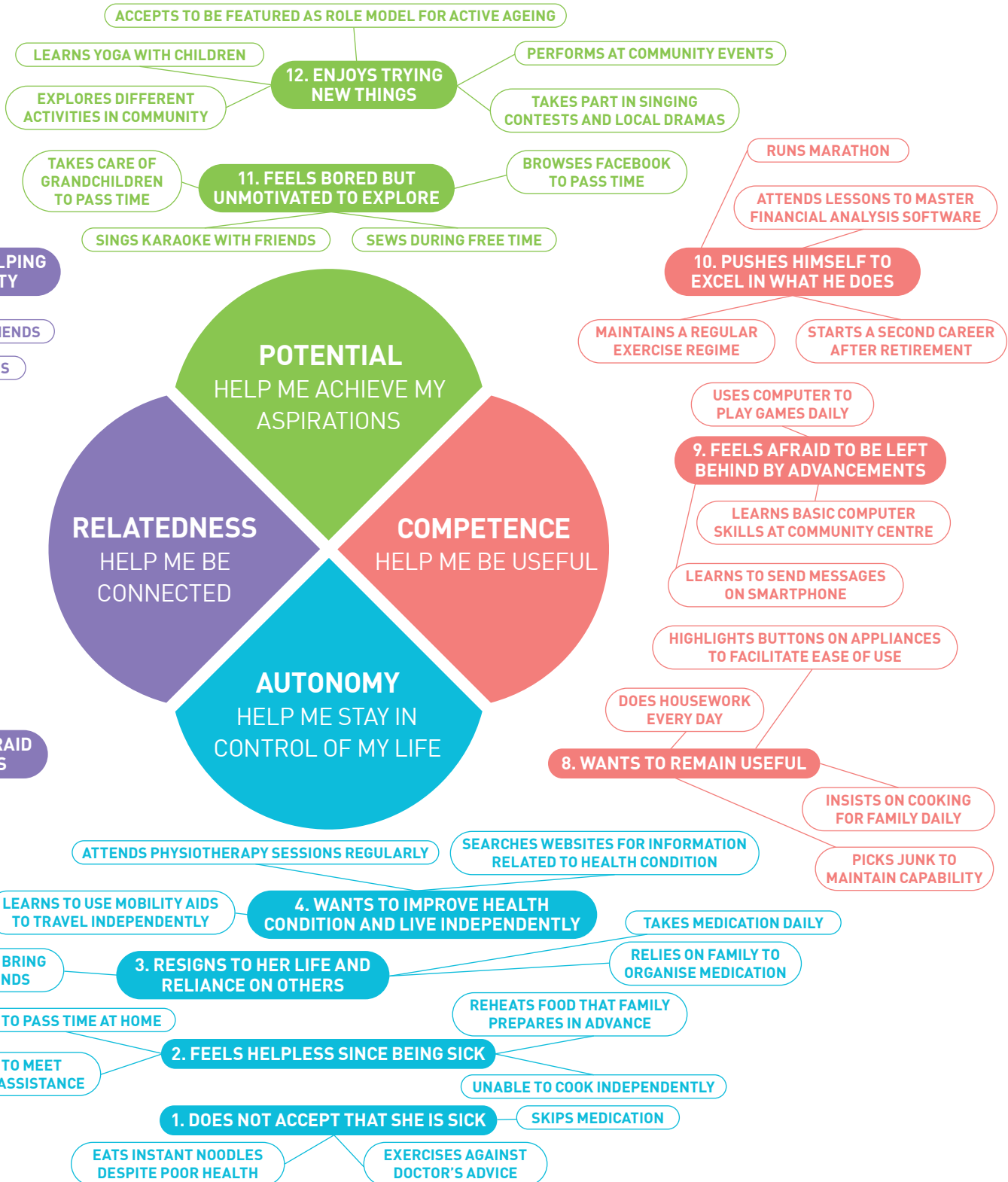
Through ethnographic research with 22 elderly respondents in Singapore, a wide spectrum of behaviours was observed. For example, an elderly respondent persists in exercising daily despite the doctor’s warning and the constant pain while exercising. On the other hand, another elderly devotes her time to volunteer work and contributes actively to the community.

Although each elderly is unique, their different behaviours can be attributed to four key motivations – **autonomy, relatedness, competence** and **potential**.

These four key motivations are derived from and based on two psychological theories – Deci and Ryan’s Self Determination Theory² and Maslow’s Hierarchy of Needs³ – which define fundamental human motivations and needs that influence behaviours.



Key characteristics
 Observed behaviours



THE 12 PERSONAS OF THE ELDERLY

Based on the research insights, 12 personas were defined to represent the segments within the elderly population. Each persona describes an elderly profile, his beliefs, values, habits, desires, motivations, emotions and needs.

In **autonomy**, personas are motivated primarily to have control over their lives. Personas who seek **relatedness** are motivated to be meaningfully connected with others such as their family, peers and community. Personas motivated by **competence** are focused on being capable and using their ability to perform and achieve. Finally, personas who seek **potential** are motivated to live their passions and lead the life they aspire.



7. THE L



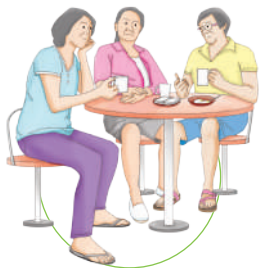
6. THE ENGAGED



5. THE ENCLOSED



3. THE DE



11. THE IDLER



12. THE ASPIRATIONAL



10. THE ACHIEVER



9. THE UP-KEEPER



8. THE MAINTAINER



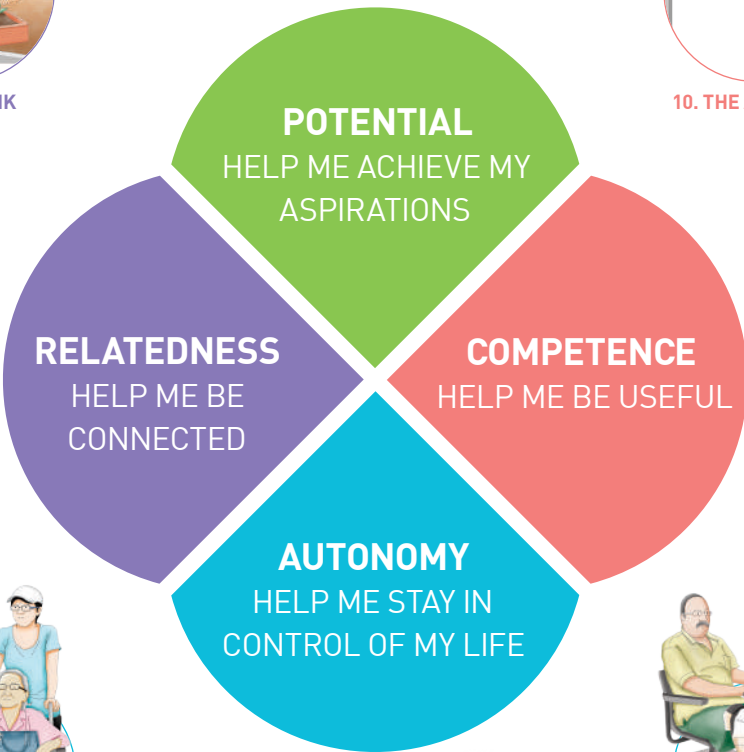
4. THE ADAPTOR



1. THE DENIER



2. THE STRUGGLER



INK



PENDENT



AUTONOMY

HELP ME STAY IN CONTROL OF MY LIFE

Elderly who seek autonomy are motivated by the need to have a direct influence over themselves and their environment. They desire to remain in control and to possess the freedom to express themselves. They want to be able to manage their lives and daily routines independently.

For instance, elderly who seek or have autonomy are motivated to carry out daily tasks such as grocery shopping or attending dental appointments with no or minimal assistance.

Elderly who have more autonomy perceive that their actions are directly determined by their choices. Hence, they are more likely to accept their life circumstances and to actively contribute to shaping them. In contrast, those with less autonomy experience a sense of helplessness and attribute their situation to external factors that are beyond their control. In addition, with less autonomy, it is challenging for them to fuel other motivations such as relatedness, competence and potential.

PERSONAS



THE DENIER



THE STRUGGLER



THE DEPENDENT



THE ADAPTOR



Age | 55 to 74 years old

Health | Struggling with illness

Happiness | Discontented

AUTONOMY

THE DENIER

Unable to cope nor accept the burdens of ageing, she rejects her ageing self.

“Why is my life so miserable? Do I have to take so much medicine? I don’t see the point at all.”

— The Denier

House type | Lives in a 1- to 3-room flat

Family | Lives alone or with spouse

Financial | Low to middle income

KEY INSIGHTS

Easier to deny than to accept

The Denier perceives the implications of her illness as immense, and accepting it requires significant lifestyle changes. Therefore, she finds it easier to deny her illness. She feels overwhelmed and lacks directions in her life.

Hides vulnerability within a shell

The Denier tries to find solace by performing her daily routines such as doing housework even if she can no longer do them with ease. She will not ask for help when needed and prefers to struggle through difficulties.

ATTITUDE TOWARDS HEALTH

The Denier has low awareness and motivation to learn more about her health condition, future implications or ways to manage it. In trying to maintain her lifestyle, she chooses to ignore her doctors’ advice and denies that she is in need of medical help.

ATTITUDE TOWARDS TECHNOLOGY

The Denier is physically and emotionally exhausted by her health condition, leaving her with limited motivation to consider the use of technology. She is focused on maintaining her previous way of life using only familiar products such as television and radio.

OPPORTUNITIES

- How might we make the benefits of taking medication and taking care of one’s health more obvious to the Denier?
- How might we encourage the Denier to adopt and maintain a healthy diet, that is in line with her current health situation?
- How might we help the Denier understand the consequences of her rejection of her health condition?

Diagnosed with illness not too long ago, the Denier is unable to cope with the burdens of ageing. Overwhelmed by the situation, she finds it easier to deny than to make adjustments to manage. She suffers from low self-esteem and is reluctant to accept help from family and friends.



She needs to take medication daily but does not do so regularly. She does not see the benefits of taking her medicine because the results are not immediate and obvious.



She naps for a few hours every day due to fatigue from illness. However, she sees it as part of ageing and does not bother to share it with friends and family.



Having lived independently all her life, she rejects seeking help from her family and forces herself to struggle through her housework.



She disregards her health condition and eats instant noodles. She does not bother to find out more about health, nutrition and diet.



She has membership for the elderly care centre, but is not keen as she is skeptical about making new friends.



She tries to exercise even though her traditional Chinese medicine (TCM) physician recommended otherwise.



AUTONOMY

THE STRUGGLER

With limited means and little help, his life deteriorates as he succumbs to the challenges of ageing.

“Ever since I became ill, I have not been able to go anywhere except around Bishan – where I live.”

— The Struggler

Age	65 years old and above
Health	Struggling with illness
Happiness	Discontented

House type	Lives in a 1- to 3-room flat
Family	Lives alone or with spouse
Financial	Low income

KEY INSIGHTS

My home, my ‘prison’

Poor health and limited resources confine the Struggler to his home and neighbourhood. He is unable to go far and cannot travel out of his neighbourhood without assistance. As such, he is removed from social interactions with his friends and community unless they make the effort to visit him.

Hopeful but passive about health outlook

While the Struggler desires to get better, he is passive and does not actively look for ways to adapt to his new self. He lacks the knowledge to monitor and improve his current situation, and is unaware of channels where he can find more information.

ATTITUDE TOWARDS HEALTH

The Struggler acknowledges his health condition and tries to take the medication regularly as advised by the doctor. However, he has limited knowledge on the outlook of his condition and does not make plans to improve his health management.

ATTITUDE TOWARDS TECHNOLOGY

The Struggler is preoccupied with trying to cope with his health situation and has neither resources nor interest to learn new technology. However, he knows how to use the television as it is his sole form of entertainment at home.

OPPORTUNITIES

- How might we design a social service channel to identify the Strugglers in our community and provide support in their daily lives?
- How might we help the Struggler envision a positive health outlook and encourage him to seek ways to regain control over his life?

Helplessness overwhelms the Struggler as he tries to cope with his deteriorating health and limited financial resources. His home has turned into his prison as he lacks social and financial support to travel around. Despite the challenges, he desires to get better and hopes that his life will one day return to the way it was before.



Even though he feels bad about being a burden, his poor physical health forces him to accept help from his wife in his daily tasks.



His health decline has been gradual, but his family did not foresee the consequences. His wife is suddenly forced to be his caregiver and the sole breadwinner of the house.



His wife cooks his lunch in advance and he heats up the food when he is hungry. He accepts this arrangement reluctantly as he has limited options since his weak physical state makes it difficult and dangerous for him to cook.



He is no longer able to cycle or exercise, however he keeps the bicycle, hoping that he can ride it again one day.



Unable to travel beyond his home without assistance, he engages in passive activities such as watching TV when his family is out.



Due to health deterioration, he is no longer able to visit the mosque independently and prays at home instead. However, he harbours hope to return to the mosque as he is comfortable with maintaining familiar rituals.



Age	65 years old and above
Health	Has control over or struggling with illness
Happiness	Indifferent

AUTONOMY

THE DEPENDENT

Resigned to her health status, she accepts dependence on external support.

“I do not want my children to be burdened further by my worsening condition. Just having a stable condition, not bed-ridden, that’s all I want.”

— The Dependent

House type	Lives in a 4- to 5-room flat
Family	Lives with spouse or family
Financial	Middle income

KEY INSIGHTS

No help, no life

The Dependent requires assistance to achieve her daily needs and relies on others to provide support. She accepts help as she does not see better alternatives. Her life is shaped around her caregiver’s schedule, as she is unable to do most tasks without her caregiver.

Fear of getting worse

The Dependent has grown accustomed to external assistance and does not actively seek ways to improve her health or situation. However, she gets anxious about the worsening health condition as she does not want to further burden her family and community.

ATTITUDE TOWARDS HEALTH

The Dependent has minimal knowledge about her health condition. She relies on her caregiver to take her to the doctor and to manage her medication. Even though she does not have a full understanding of her condition, she fulfils her medical obligations diligently with the help of her caregiver as she does not want her condition to deteriorate further.

ATTITUDE TOWARDS TECHNOLOGY

The Dependent is passive and lacks motivation to learn and pick up new technology as her family or caregiver is able to meet her needs and provide her comfort. Hence, she does not perceive any benefit from learning to use new technology.

OPPORTUNITIES

- How might we design an unobtrusive, remote monitoring and communication system between the Dependent and her caregiver to lessen the burden of caregiving and provide them with peace of mind?
- How might we create products that allow the Dependent to manage daily activities such as cooking and showering easily and independently?

For years, the Dependent has been coping with declining health and mobility. She has accepted her ageing self and has gotten used to her family members and caregivers providing for her daily needs. She perceives her life to be in an equilibrium. She does not find ways to improve her health but seeks only to stop it from declining further.



Worried that she will burden her family if her health condition worsens, she takes her medication faithfully every day.



Her family accepts that it is their responsibility to take care of her even though they find it exhausting. Concerned with her safety and well-being, they are overly cautious and help her with daily tasks even when she does not need help.



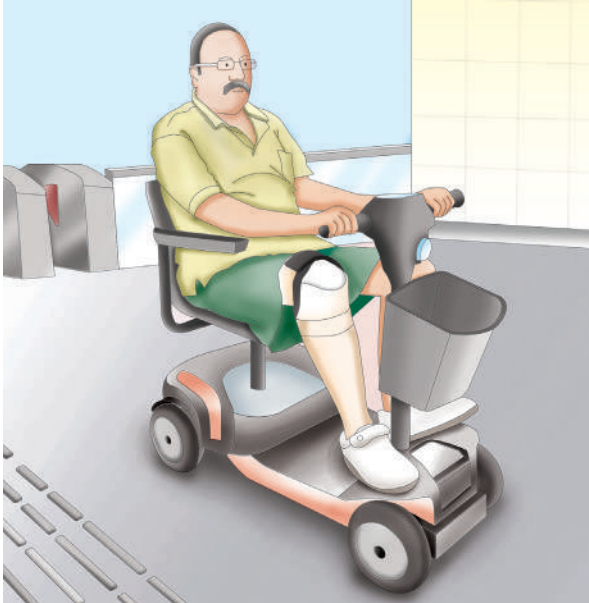
Due to restricted mobility, she spends most of the time at home alone. She spends 10 hours on the chair daily, with medicine, books, phones and snacks placed within easy reach.



As she requires assistance when she goes out, she is dependent on her family's schedule for opportunities to do so.



When brought to the park, she watches the other elderly do tai chi from afar. She does not try it because she believes it to be too difficult for her.



Age	55 to 64 years old
Health	Has control over or struggling with illness
Happiness	Contented

KEY INSIGHTS

Reactive, one thing at a time

Prior to health deterioration, the Adaptor was not health conscious and did not take preventive actions against his declining health. However, since being struck with illness and health deterioration, he reacts by seeking ways to resume control of his health and life. He is reactive and solves problems as they come.

ATTITUDE TOWARDS HEALTH

The Adaptor does not actively seek knowledge on health and wellness unless he is inflicted with illness. However, once diagnosed with sickness, he takes effort to understand his health condition and change his lifestyle for the better. He is committed to forming new health routines, so that he can regain control of his life.

OPPORTUNITIES

- How might we facilitate the Adaptor to perform and track his exercise and rehabilitation progress effectively?
- How might we design health management solutions that incentivise the Adaptor to plan beyond his immediate needs?

AUTONOMY

THE ADAPTOR

Constantly and proactively adjusts his lifestyle to manage the challenges of ageing.

“I encourage myself not to think about sadness, but to think about the future. I go for exercise, I want to walk, I don’t want to need somebody to hold me.”

— The Adaptor

House type	Lives in a 4- to 5-room flat
Family	Lives with spouse or family
Financial	Middle income

Motivated to resume life normally

Motivated to manage his daily tasks independently, he is adaptive: he builds new habits and adopts technology so that he can return to the life that he used to live.

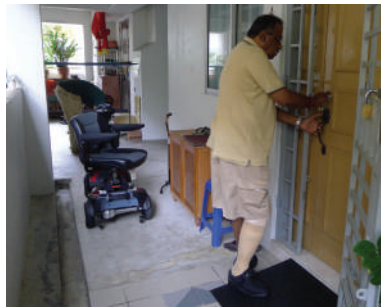
ATTITUDE TOWARDS TECHNOLOGY

The Adaptor is open to learning new technology that can help him adapt to his current situation. He surfs the Internet for information related to his health condition. However, he does not do more to pick up other technology as he perceives them to be irrelevant to his current situation.

The Adaptor is resilient and positive. When life hits him hard, he proactively seeks ways to manage his new circumstances. Ever since he had his leg amputated, he has worked hard to recover and to resume a normal life. He attends physiotherapy sessions diligently and looks forward to leading an independent life.



Motivated to commute independently, he has learnt to use his prosthetic limb, walking stick and electric scooter through consistent therapy and practice.



He actively seeks financial resources and community support, so that he can obtain mobility aids such as wheelchairs and ramps.



He is focused on recovery and attends physiotherapy sessions diligently. However, he neglects and pays minimal attention to his other health issues such as obesity.



His eagerness to recover quickly motivates him to exercise every day, often going beyond the physiotherapist's recommended exercise frequency and duration.



He takes public transport with his electric scooter. However, usage is limited to dry weather.



He does not hesitate to carry out his usual routines, even if it means doing it differently from before. Rather than hold on to his old ways of doing things, he adapts readily and focuses on achieving the final outcome instead.

RELATEDNESS

HELP ME BE CONNECTED

Elderly who seek relatedness are motivated by the need to interact with others and be emotionally connected. They want to be cared for, and to care for others.

On the most basic level, this means being able to chat and share with others about their experiences and thoughts. On a higher level, it means forming bonds and establishing trust in and with others.

Elderly who experience more relatedness feel a sense of belonging within a warm and supportive environment. They are confident that they can rely on others for their physical and emotional needs. Those who experience less relatedness experience loneliness, and face emotional and physical decline.

Relatedness goes beyond the physical presence of others, but instead, it is defined by the depth and intensity of one's engagement. Elderly who live alone can experience relatedness if they feel a strong sense of connection within their community. For example, they may share close and genuine relationships with their neighbours or peers, as they trust and confide in one another. Conversely, those who stay with their families may not necessarily experience relatedness. Lack of meaningful communication and quality time spent together may deter them from experiencing the warmth of familial connection.

PERSONAS



THE ENCLOSED

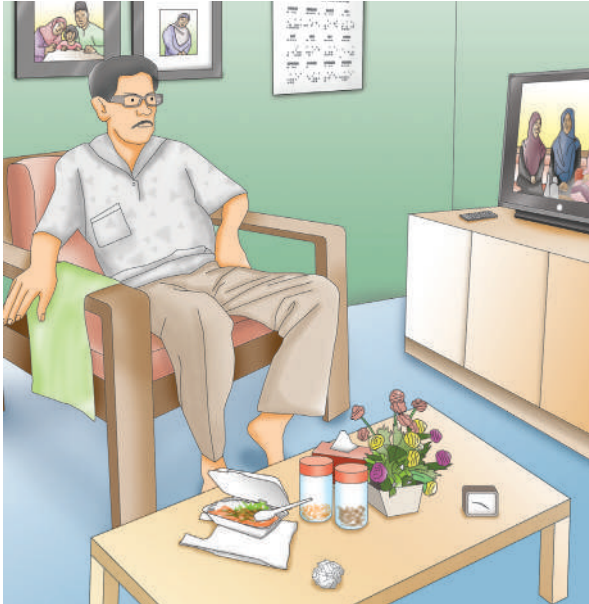


THE ENGAGED



THE LINK





RELATEDNESS

THE ENCLOSED

Lonely, and lacks motivation and/or means to seek social connections.

“I feel bored sometimes but I’m lazy and too old to make new friends.”

— The Enclosed

Age	65 years old and above	House type	Lives in a 1- to 3-room flat
Health	Healthy or has control over illness	Family	Lives alone or with spouse
Happiness	Discontented	Financial	Low to middle income

KEY INSIGHTS

Locked in the comfort of routine

Comfortably retired, the Enclosed has grown to rely on routine for comfort. However, with the passing of his spouse and friends, he suddenly finds himself alone in an uncertain situation. Despite being lonely, his fear of uncertainty puts him off from stepping out of his comfort zone to initiate conversations and build new relationships.

Masks uncertainty with elderly stereotypes

Fearful of uncertainty, he resists making changes such as picking up new skills. He justifies this by convincing himself that declining cognitive skills are part of ageing and that elderly lack the cognitive resources to learn new skills. Furthermore, due to his introversion, he rarely meets other positive elderly role models that can contradict his beliefs.

ATTITUDE TOWARDS HEALTH

Passive by nature, the Enclosed readily accepts that one faces cognitive deterioration as one ages. While he exercises to stay physically fit, he lacks the awareness and motivation to keep his mind active.

ATTITUDE TOWARDS TECHNOLOGY

Having a strong need for certainty and familiarity, the Enclosed is not interested in new technology that requires him to change his way of living. However, he is willing to consider technology that is presented to him in familiar formats, that do not effect significant changes to his life.

OPPORTUNITIES

- How might we help the Enclosed maintain his physical and mental health?
- How might we help the Enclosed build social connections in a way that is familiar and engaging to him?
- How might we help create new, easy-to-use technology solutions that break the Enclosed’s mental barriers towards technology?

Since retirement, the Enclosed has established a set of daily routines and carries them out faithfully. He is not overly concerned about his health and finances. However, since his spouse's demise, he longs for social companionship, but is unwilling to break out of his routine and comfort zone.



With the passing of his wife and friends, he lost his only social circle. Unsure about how to move on, he finds comfort in staying at home, the place he feels most familiar in.



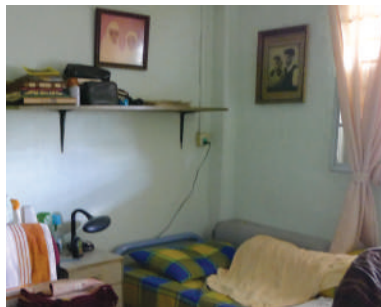
He goes to the senior activity centre when he is truly bored. However, uncertain about the new environment and people, he does not take initiative to engage the others and chooses to sit in a corner instead.



To pass time, he increasingly engages in solitary activities such as playing the piano in the comfort of his own home.



Reluctant to use a smartphone, he was convinced by his children to use an elderly-friendly mobile instead. It resembles the conventional phone that he is accustomed to, and the familiarity has put his anxiety towards using technology to rest.



Despite feeling lonely, he does not consider getting a new partner. He perceives the establishment of new connections as challenging and believes that his efforts will not lead to anything.



Used to having meals with his friends at the hawker centre, he now feels lonely eating out alone since their passing. Instead, he has his children prepare meals which he heats up in the day, so that he can stay entertained by watching TV at home during meal times.



Age	65 years old and above
Health	Healthy or has control over illness
Happiness	Contented

RELATEDNESS

THE ENGAGED

With encouragement and support from family and friends, she enjoys her social life.

“My life is great. I have my friends and neighbours whom I chat and joke with every day. I don’t have much to worry about.”

— The Engaged

House type	Lives in a 1- to 3-room flat
Family	Lives with spouse or family
Financial	Low to middle income

KEY INSIGHTS

Living in the present

The Engaged has strong social support from her family and community, who assist her in her daily chores, such as cleaning and getting food. She is content with her present situation and does not plan for the future as she expects that her community will continue to support her.

Easily influenced by social environment

The Engaged is generally passive and relies on others to engage her through conversations or activities. She does not take any initiative to establish contact or build new relationships. This leaves her vulnerable to changes in her social environment.

ATTITUDE TOWARDS HEALTH

Instead of relying on her doctor’s factual information, she prefers to listen to her friends’ anecdotal health information. Her friends and community have a strong influence over her health routines and lifestyle. For example, she only exercises in their company and lacks the motivation to do it alone.

ATTITUDE TOWARDS TECHNOLOGY

Wanting to stay connected with her loved ones, she learns the basics of technology such as calling and sending text messages on a smartphone. However, she deems social platforms such as Facebook too complicated and difficult for her. She finds it more engaging to call or meet her friends in person.

OPPORTUNITIES

- How might we create technology that allows the Engaged to stay connected with her family or community when they are not physically near her?
- How might we design activities or games that leverage the Engaged’s need for relatedness to enhance her physical and mental well-being?

The Engaged is happy and content in the company of her family and friends. They assist her in her daily chores and provide companionship through social interactions and activities. She is passive and relies on their physical and emotional support to attain happiness in life.



Initially reluctant towards making new friends, she started going to the senior activity centre every weekday under the encouragement of her neighbours.



She relies on the centre manager to bring her to the clinic and attend to her household needs. She does not see the need to plan for the future as she believes that her community will continue to support her.



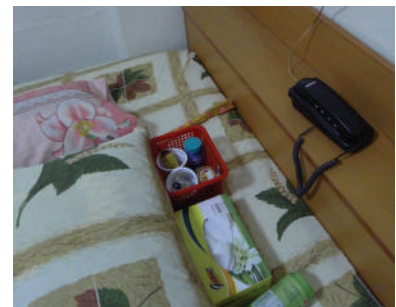
She enjoys group activities at the senior activity centre where she interacts with her peers through games such as Bingo.



She is passive and does not take the initiative to engage her neighbours. When alone at home, she chooses to engage in solo activities such as doing housework and watching TV to pass time.



Rather than rely on factual health information, she finds it easier to understand and believe her neighbours' anecdotal information on how her peers benefited from a healthier diet.



As she enjoys chatting with her loved ones, her family installed three phones in her home, so that she can chat wherever she wants.



RELATEDNESS

THE LINK

Outgoing and active, she facilitates connections within her community.

“I enjoy volunteering, and I want to show other seniors that there is a better way to age and grow old.”

— The Link

Age	55 to 74 years old	House type	Lives in a 4- to 5-room flat
Health	Healthy or has control over illness	Family	Lives alone or with spouse
Happiness	Contented	Financial	Middle to high income

KEY INSIGHTS

Mutual dependence between community and self

The Link finds meaning and gains satisfaction through social interactions with other elderly and within the community. Likewise, the community also benefits from The Link as she connects people, thus creating a tight-knit community.

Sharing is satisfying

Having successfully overcome challenges such as illness in her life, the Link seeks to share her positive outlook and experience with other elderly people. She hopes that they do not have to go through negative experiences like she did.

ATTITUDE TOWARDS HEALTH

The Link understands the importance of active ageing – both physically and mentally. She exercises to keep physically fit and plays games to stay mentally active. She seeks health information actively by attending talks and browsing health websites. She uses the information to shape her lifestyle and diet, and shares it with her community eagerly.

ATTITUDE TOWARDS TECHNOLOGY

The Link is tech-savvy and appreciates the benefits of using technology to stay up-to-date with the latest happenings and to reach out to her community. She picked up technology through frequent interaction with the younger community members.

OPPORTUNITIES

- How might we design solutions to help the Link share information and resources more effectively with her peers who might not be as tech-savvy?
- How might we create a platform for the Link to stay connected with her community, and to link the elderly with similar interests together, thus creating a mutually supportive community?

The Link is an active volunteer and is well-respected within her community. She organises community activities and takes part in services that befriend the vulnerable elderly. She is positive about life and her optimism is infectious. She keeps up-to-date with the latest news and events and shares them with her community.



Even though she is tech-savvy, she takes effort to share information with other elderly over the phone as they do not know how to use technology such as smartphone and computer.



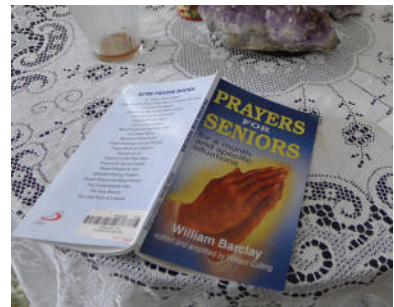
She initiates conversations with other elderly. The elderly open up to her when she engages them through stories and relevant information on elderly programmes and activities.



Through her involvement in maintaining the community garden, she is able to meet and reach out to diverse groups of people in her community. The community garden serves as a channel for her to engage the members and create connections within her community.



Featured in articles for her optimism and enthusiasm for life, she feels appreciated and seeks to be a role model of active ageing for the other elderly.



Underneath her bright front, she worries that she will one day face physical and mental deterioration as she ages. Hence, she exercises, does word puzzles and reads regularly.





COMPETENCE

HELP ME BE USEFUL

Elderly who seek competence are motivated by the need to stay capable and retain the ability to perform and achieve. Their self-esteem is dependent on their perceptions of what they can do, and how well they can do those tasks.

Those who desire to be more competent are eager to maintain their daily routines, as they find meaning in being capable of carrying out the tasks independently. Those on a higher level of competence seek to learn and master skills.

Elderly who lack competence may not attempt tasks they perceive to be challenging. Or they may give up easily upon failure, believing themselves to be lacking the ability to perform the task. In contrast, the elderly who are highly competent try tasks that appear difficult at first glance. While they may fail at first, they persist until they are eventually capable of performing or mastering those tasks.

PERSONAS



THE MAINTAINER



THE ACHIEVER



THE UP-KEEPER



Age	75 years old and above
Health	Healthy or has control over illness
Happiness	Indifferent

COMPETENCE

THE MAINTAINER

Faced with challenges of ageing, she refuses to succumb to physical decline and strives to stay useful.

“Even though my children want to hire a maid to take care of me, I don’t want help because I want to do things myself.”

— The Maintainer

House type	Lives in a 4- to 5-room flat
Family	Lives with spouse or family
Financial	Middle income

KEY INSIGHTS

Refusal to be a burden

Due to old age, the Maintainer’s health and mobility declines. Despite this, she strives to maintain her self-esteem by remaining useful through simple chores like cooking for her family. She worries about being a burden to her family.

Strives to remain status quo

Accustomed to her way of living, the Maintainer struggles to hold on to her routines despite her declining physiological capabilities. It leaves her with limited physical and mental resources to pick up new skills or make new friends.

ATTITUDE TOWARDS HEALTH

The Maintainer’s knowledge of health and wellness is built on tradition and hearsay. She has her own recipes for treating common colds and ailments. When she is unwell, she prefers to seek traditional Chinese medicine (TCM) first, before considering modern medicine.

ATTITUDE TOWARDS TECHNOLOGY

Stubborn about retaining her way of living, she is reluctant to change her life and routines with new technology. However, she is willing to consider technology for tasks that she can no longer manage alone.

OPPORTUNITIES

- How might we design channels or programmes that tap into the Maintainer’s skills and capabilities such that she can contribute to her family and community in mutually beneficial ways?
- How might we help the Maintainer remain independent and competent by introducing technology that resembles tools that she is familiar with?

Physically frail, but mentally active, the Maintainer strives to remain useful. Despite having supportive family members, she worries about being a burden to them. She strives to contribute to her family but lacks means to do so. She attempts to do simple household chores to feel useful and fulfilled.



Due to her declining health, her children do not want her to travel to the supermarket. Reluctantly, she accepts their arrangement of buying groceries for her instead.



Eager to find ways to contribute to her family, she insists on doing household chores and cooking every day despite her family's concerns about her safety.



To maintain her independence, she has her family highlight buttons on household appliances for her ease of use.



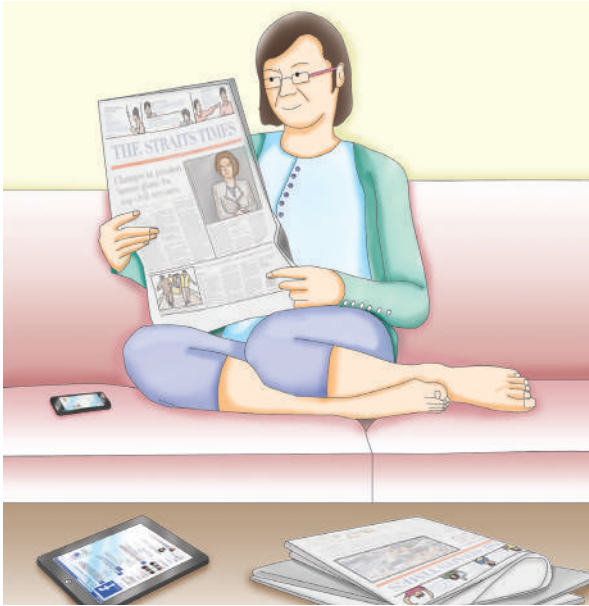
Even though she does not have financial needs, she collects junk in the neighbourhood to sell. She sees it as a way to stay occupied and to keep physically fit.



Even though her family bought her a washing machine, she continues to wash her clothes by hand. By doing so, she feels capable that she is able to help out with household chores.



She constantly finds way to keep herself occupied with housework and only takes a break when she is exhausted. When resting, she finds comfort in watching TV, an easy and familiar source of entertainment.



Age	55 to 64 years old
Health	Healthy or has control over illness
Happiness	Contented

COMPETENCE

THE UP-KEEPER

Unwilling to be left behind, she learns new skills to stay relevant.

“I don’t want my children to feel that their mother is unable to keep up with times.”

— The Up-Keeper

House type	Lives in a 4- to 5-room flat
Family	Lives with family
Financial	Middle income

KEY INSIGHTS

Life as a checklist: keeping up is good enough

Afraid of being left behind by societal and technological advancements, the Up-Keeper tries to upgrade herself and pick up new skills. She is primarily motivated by her need to belong and only strives to learn skills that help her fit in with her peers and family. She is not interested to excel and improve beyond what is required to fit in.

Open to new experiences

The Up-Keeper devotes time to keeping herself updated on societal trends via television, radio and media platforms. She is open to learning new skills or participating in unfamiliar activities, especially if she perceives them to be popular amongst her peers. She does not hesitate to ask others for help, as she views it as a part of her bonding experience with them.

ATTITUDE TOWARDS HEALTH

Her need to belong extends beyond her immediate social circle to the society at large. She follows public messages that advocate healthy lifestyle. However she only seeks to have a general understanding of health and does not take effort to gain in-depth health knowledge.

ATTITUDE TOWARDS TECHNOLOGY

Unwilling to be left behind by her tech-savvy children and peers, she learns social applications such as Whatsapp and Facebook to stay connected to them. However, she is not interested to learn private yet functional applications such as Internet banking, unless she observes that others are using them as well.

OPPORTUNITIES

- How might we engage the community to help the Up-Keeper to learn varied functions on the computer in an engaging and sustainable manner?
- How might we create user-friendly and easy-to-use platforms that help the Up-Keeper engage technology in more aspects of her life such as orientation via online maps and online banking?

The Up-Keeper leads a comfortable life. Her children hold stable jobs and are starting to form their own families. She has time for herself and attends lessons to upgrade or pick up new skills. She is motivated to keep up with society and technology. She has a general knowledge of health and fitness, but does not go further to gain deeper understanding.



Recommended by mass media and friends, she buys and consumes organic products for good health. However, she does not find it necessary to learn about the specific ways in which the products benefit her health.



She learns how to use social media platforms, to keep up with latest events and news, and to stay connected with her community. But she does not learn to use other applications, such as Internet banking, because none of her friends are using them.



Although initially encouraged by her children to learn to use the computer, she did not do so. However, she readily signed up for computer lessons when her friends put her up to it.



She devotes her time to watching TV and reading newspaper. She prides herself as one who is modern and up-to-date with current affairs and the latest events.



Influenced by her peers who had emphasised the importance of keeping track of one's blood pressure, she bought herself a monitoring machine even though she does not have any blood pressure-related illness.



Age | 55 to 74 years old

Health | Healthy or has control over illness

Happiness | Contented

COMPETENCE

THE ACHIEVER

Motivated to challenge himself, he strives hard to perform in whatever he chooses to do.

“I still hope that I can expand my business base. I also attend financial analysis class to help me serve my clients better.”

— The Achiever

House type | Lives in a 4- to 5-room flat

Family | Lives alone or with spouse

Financial | Middle to high income

KEY INSIGHTS

Highly driven by performance

Intrinsically motivated, the Achiever finds great satisfaction in setting goals, working towards them diligently and achieving them. The process empowers him and makes him feel competent. He uses his hobbies and second career as a means to keep himself challenged.

Disregards age stereotypes

Driven by a strong intrinsic belief in himself, the Achiever disregards age stereotypes that the elderly are too old to learn new skills or attempt challenging activities. For example, the Achiever may set a goal to complete a marathon even though most would not consider it to be suitable for elderly people.

ATTITUDE TOWARDS HEALTH

Proactive and self-motivated, the Achiever maintains a strict diet and a regular exercise regime. He actively seeks health knowledge, and believes that he needs his good health to continue achieving his current and future goals.

ATTITUDE TOWARDS TECHNOLOGY

The Achiever is tech-savvy and enjoys the challenge of mastering new apps and functions on his smartphone and computer. At the same time, he also regards technology as an enabler that helps him meet his goals in his second career and his hobbies more effectively. He is not afraid to ask for help or make mistakes, as he views them as part of the learning process.

OPPORTUNITIES

- How might we create solutions that help the Achiever monitor, manage and share his goals, progress and performance?
- How might we enable the Achiever to discover new technology such as websites, software or mobile apps which are directly relevant to his work and goals?

The Achiever is not bothered by his age and always strives to achieve as much as possible in life. He is generally healthy and leads an active lifestyle. In his work and personal life, he sets goals and diligently strives to improve himself. Upon achieving his goals, he sets new goals to continue challenging himself.



Motivated to keep fit and to challenge himself physically, he maintains a strict exercise routine that includes regular tai chi and running.



Intrigued by how his children use applications such as Facebook to stay in touch with their friends, he asked his children to teach him. Having learnt the basics, he now explores new functions on his own.



Initially bored after retirement, he searched and found a second career as a part-time financial consultant. Even though most of his friends have fully retired, he is determined to improve his business and serve his clients well.



He is tech-savvy, and feels competent and proud that he is able to use and master complex financial analysis software to help his clients.



He devotes his time to keeping himself up-to-date with the latest news and events as they have direct impact on his work and performance.



Eager to master the financial analysis software, he searched for a suitable course online and signed up for it. He attends the lessons diligently and clarifies doubts with his classmates or the instructor.

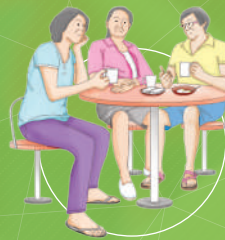
POTENTIAL

HELP ME ACHIEVE MY ASPIRATIONS

Elderly who seek potential are motivated by the need to live their passions and lead a life they aspire to. They seek experiences more than possessions. They desire a greater meaning in life that goes beyond themselves.

Unbound by societal norms and stereotypes, they are open to new experiences. For instance, an elderly may desire to take on a new hobby in music, not for the mastery of the skill, but to seek a new experience that illustrates a different aspect of life.

PERSONAS

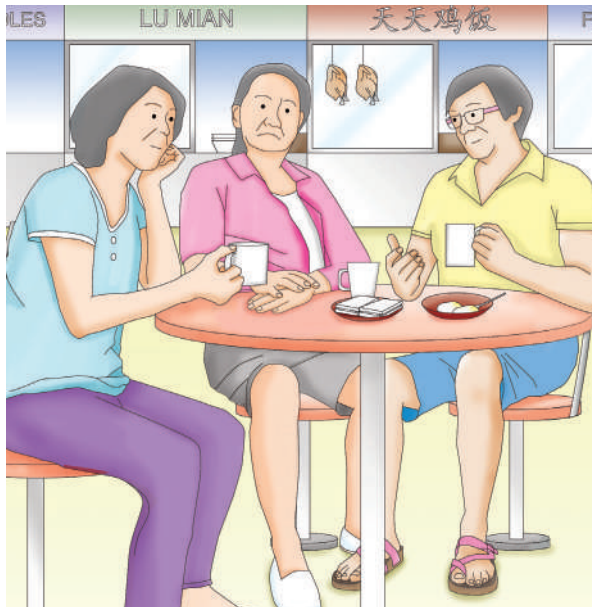


THE IDLER



THE ASPIRATIONAL





Age | 65 to 74 years old

Health | Healthy or has control over illness

Happiness | Discontented

POTENTIAL

THE IDLER

Freshly retired, she faces a new lifestyle and ponders about the goal and meaning of her life.

“After retirement, I wanted to do something different, but I didn’t know what. So I thought I’d look after my grandsons first.”

— The Idler

House type | Lives in a private property

Family | Lives with spouse or family

Financial | High income

KEY INSIGHTS

Desires greater meaning in life

The Idler feels bored, empty and uncertain about her life. After years of holding a stable but busy job, she retired with great enthusiasm, thinking that she can finally engage in her personal hobbies and leisure activities such as karaoke and travelling. However, she gradually realised that such activities do not bring sustained fulfilment to her life.

Dislikes routines but lacks motivation to explore further

Retiring from a routine of a stable job, she looks forward to having a more varied lifestyle. However, she finds herself unwilling to take risks to explore new experiences. She is afraid to disrupt the stability and comfort in her life, and reverts to safer options such as caring for her grandchildren.

ATTITUDE TOWARDS HEALTH

Afraid that sickness will disrupt the stability and comfort of her life, she maintains a healthy diet and establishes a regular exercise regime during her free time. She prefers exercises familiar to her such as brisk walking and stretching.

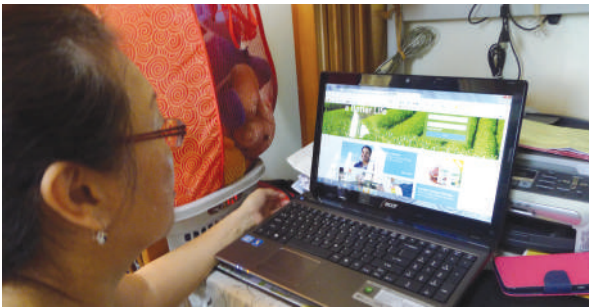
ATTITUDE TOWARDS TECHNOLOGY

Tech-savvy, the Idler regards technology as a means to help her pass time and stay occupied during retirement. She spends her time playing Facebook games and browsing websites for information relating to news, health and hobbies.

OPPORTUNITIES

- How might we provide ways to help the Idler plan for a meaningful retirement in advance?
- How might we design engaging platforms for the Idler to discover activities and opportunities?
- How might we design channels for the Idler to share or apply their skills and hobbies in the community, meaningfully?

Having just retired recently, the Idler is adjusting to her new lifestyle. However, without her job, she feels uncertain and is trying to find greater meaning in life as a retiree. Despite this, she lacks motivation to actively seek out new passions and goals.



To stay occupied, she browses Facebook, health and hobby websites every day. She feels envious when she reads about her friends pursuing second careers or taking part in singing contests. However, afraid of introducing instability into her life, she convinces herself that it is not worthy to invest time and effort into these experiences.



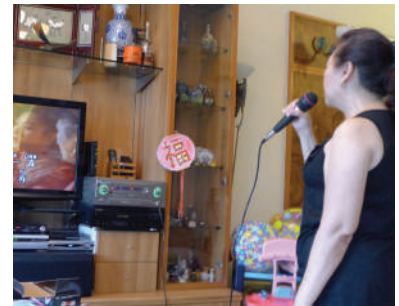
With no clear retirement plan before retiring, she started to take care of her grandchildren first. She thought it would be an easy way to keep herself occupied with the abundance of free time she suddenly had.



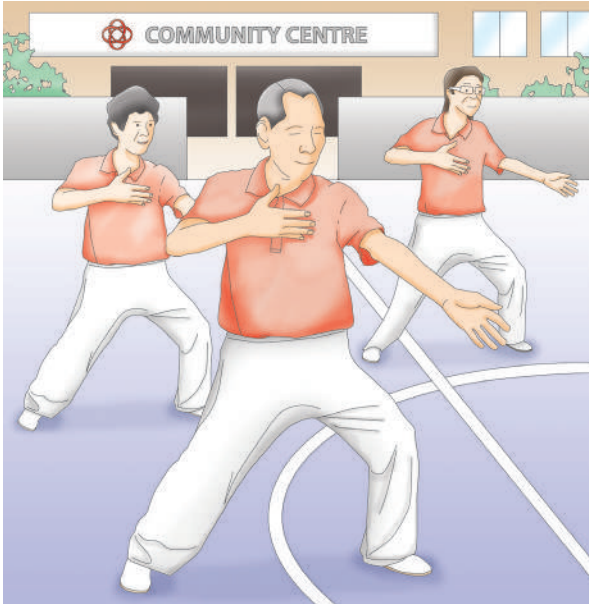
Fearful of having to change her current way of life if she falls sick, she takes an assortment of supplements faithfully to ensure that she remains healthy.



Having always been interested in sewing as a hobby, she devotes time to sew for pleasure since retirement. However, with no channel to share or use her sewing skills meaningfully, she got bored and started sewing less.



Feeling bored after retirement, she has a home karaoke system installed and invites friends over to sing with her regularly. Even though she enjoys singing and her friends' company, she sometimes wonders if she is spending her retirement meaningfully.



Age	55 years old and above
Health	Healthy or has control over illness
Happiness	Contented

POTENTIAL

THE ASPIRATIONAL

Pursues his ambition and aims to be whom he truly wants to be.

“I spent my life working so hard to support my family. Now that my children are grown up, I don’t have much to worry. I can finally pursue my hobbies and live life for myself.” — The Aspirational

House type	Lives in a 4- to 5-room flat
Family	Lives alone, with spouse or family
Financial	Middle to high income

KEY INSIGHTS

Embraces life

Having dedicated his life to a hectic work schedule and family obligations, the Aspirational seeks to pursue his passions and live life to its fullest during his retirement. As he still possesses good health, he spends time travelling, pursuing hobbies, attending to his religious beliefs and spending quality time with family.

Highly open to new experiences

Open-minded and comfortable with uncertainty, the Aspirational goes out of his comfort zone to pick up new skills and hobbies. For example, he has no qualms attending a yoga lesson filled with other young people. He has a positive outlook and is not afraid to make mistakes while learning.

ATTITUDE TOWARDS HEALTH

Acknowledging that he is old and has limited years ahead, the Aspirational takes great care of his health. He takes part in different activities such as community walks and dance to stay physically fit and mentally active so that he can make the most out of his golden years.

ATTITUDE TOWARDS TECHNOLOGY

Proud of his varied experiences, the Aspirational learns to use a smartphone so that he can document and share memories with his family and friends. He also browses community websites to explore new activity options that he can participate in.

OPPORTUNITIES

- How might we help the Aspirational document and share his experiences easily with his loved ones?
- How might we create solutions that help the Aspirational stay updated, discover and sign up for the activities that he is interested in (e.g. karaoke, singing contests, local productions)?

The Aspirational leads a comfortable life, has stable finances and minimal health concerns. His children are grown up and independent, and he has finally found time to pursue his own passions and ambitions. He is comfortable in his own skin and believes in living his life to the fullest.



Keen to explore different parts of Singapore and to make new friends, he signs up for a community excursion after reading about it on the community website.



He is well-respected by the other elderly in the community and is proud to be featured in advertisements as a role model for active ageing.



He started to volunteer as a tai chi instructor as he was initially bored during retirement. Over time, he continues to do so, as he finds satisfaction in being able to contribute back to his community.



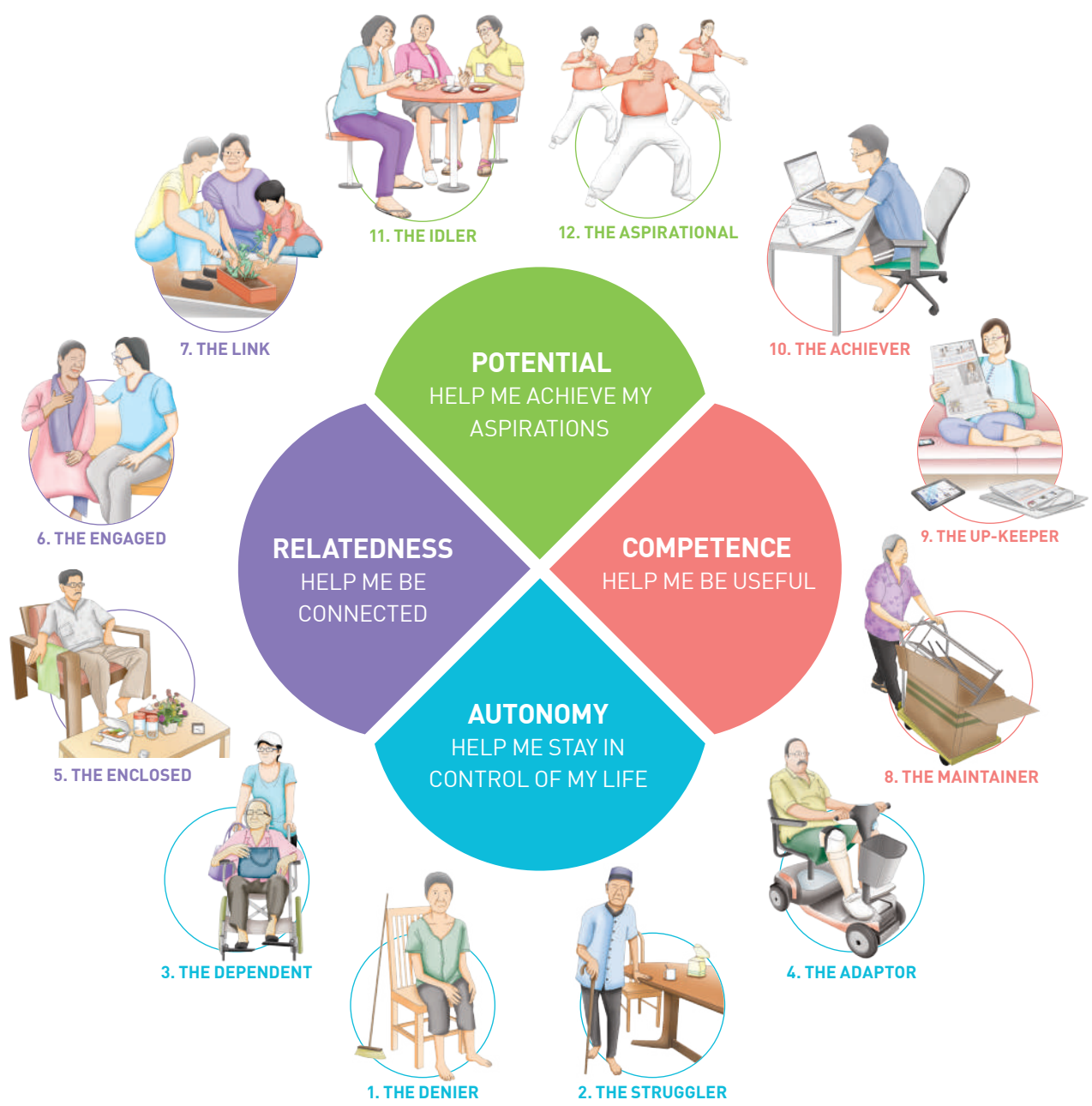
Eager to share his varied experiences with his family and friends, he learns to use his smartphone to take photos and share them via Whatsapp.



Having dedicated his life to work and family obligations, he feels that he has missed out on many things in life. He compensates by going out of his comfort zone to participate in varied activities such as the Chingay parade, singing contests and local drama productions.

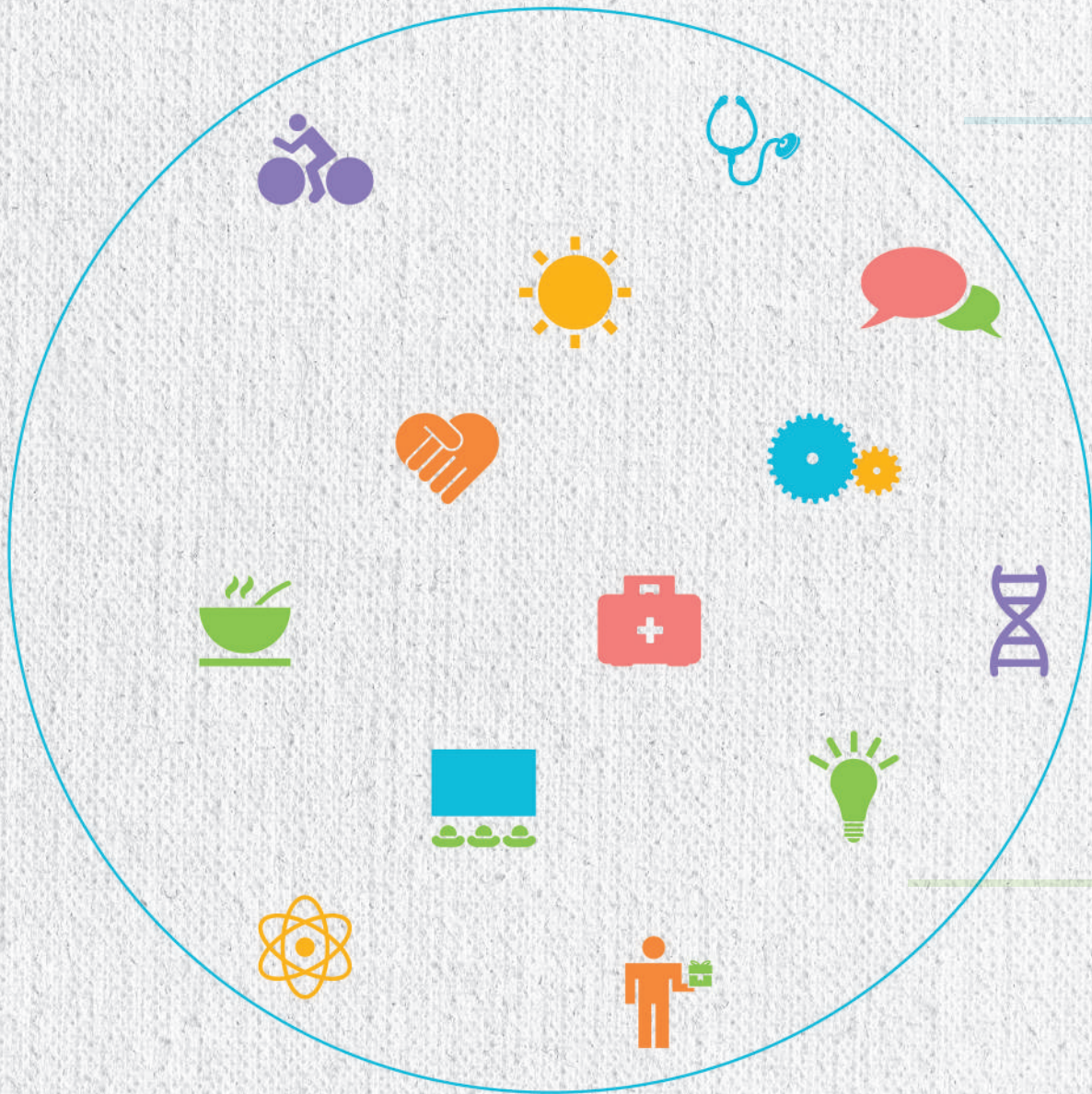
WHICH PERSONAS ARE YOU TARGETING?

Each persona possesses its own needs and motivations. To link technology and the elderly, we must consider the elderly's perspectives. Thus, it is important to identify which of the personas (one or a few) are the target users. The goal is to design products that are relevant to them and will help the elderly age in an enriching and purposeful way.



CHAPTER 3

PRINCIPLES OF
DESIGNING FOR
THE ELDERLY



Created based on the differing needs and motivations of the elderly, the “Principles of Designing for the Elderly” serves as a guide in the development of empathetic solutions. An empathetic solution bridges the gap between technology and elderly, ensuring the solution can be readily accepted and continuously utilized by the elderly.

3.1

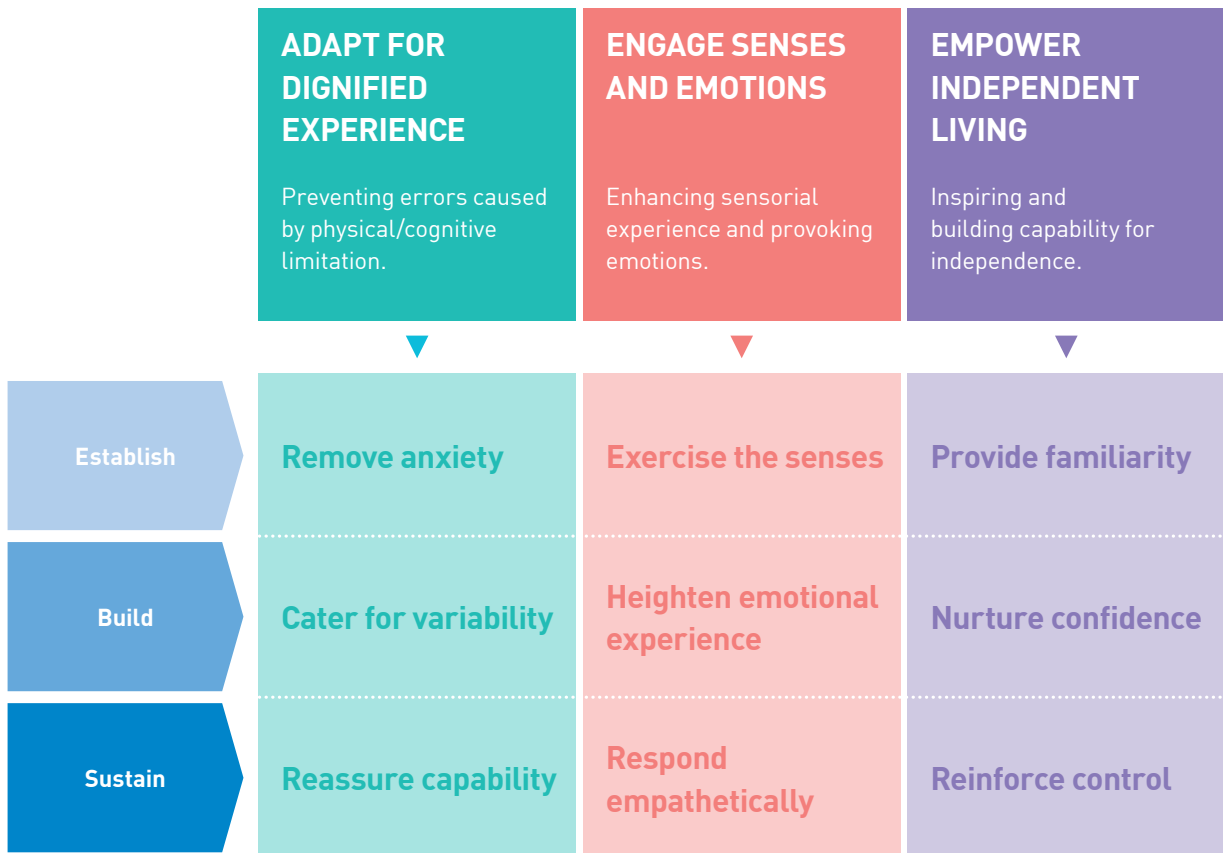
PRINCIPLES OF DESIGNING FOR THE ELDERLY

To address the different physical and psychological needs of the elderly, six key categories of design principles were thoughtfully defined to guide the development of empathetic solutions that can enhance various aspects of their lives.

Each category consists of three principles which progressively establish, build and sustain confidence and technological acceptance in the elderly.

For each principle, two examples demonstrate how the principle when applied, can change the elderly's lives for the better.

However, it is not necessary to take every design principle into consideration, but those which are most relevant to the target users. The application of appropriate principles will help the elderly use and access technological innovations better, thus supporting and empowering the elderly more effectively.



CONNECT WITH COMMUNITIES

Connecting people together for understanding and support.

ENCOURAGE CONTRIBUTION

Showing the elderly their value in the community.

ENABLE FULFILMENT OF POTENTIAL

Helping the elderly get the most out of their golden years.



Spark conversations

Highlight value

Stimulate discovery

Activate support

Motivate action

Support learning

Sustain connections

Celebrate contribution

Inspire mastery

ADAPT FOR DIGNIFIED EXPERIENCE



ESTABLISH

Remove anxiety

Acknowledges pain points faced by the elderly and removes unnecessary stress and anxiety for them and their care communities.



Active monitoring

Health monitoring wearables can help the elderly track their breathing patterns and offer insights about their state of mind. By acting as a reminder to slow down or take a moment to rest, it reduces the anxiety triggered by stressful activities or environments.

Self-adjusting toilet

For elderly with limited mobility, toileting independently can be a difficult task. By designing a toilet which can gently lower and raise the elderly on and off the toilet, it can remove their anxiety toward using the toilet.



BUILD

Cater for variability

Caters to the diminishing cognitive and physical capabilities of the elderly and enables reliable and safe completion of daily tasks.

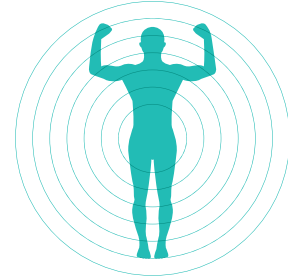


Responsive traffic lights

To cater to the walking speed of the elderly and the disabled, traffic lights can be designed to give them more time when crossing the road to provide safe road experiences.

Dynamic autonomous car

Self driving cars allow elderly with varying driving skills to commute to places safely and independently.



SUSTAIN

Reassure capability

Listens to the elderly's varying use patterns and adapts to their tendencies for errors, thereby reassuring the elderly of their capabilities in the completion of daily tasks independently.



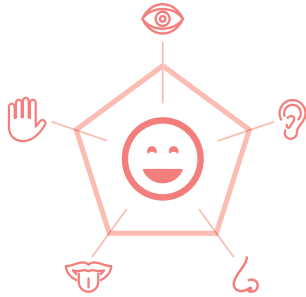
Assistive wear

Walking shoes with self-stabilizing technology help elderly to regain their balance when they are about to fail. This reassures the elderly of their capability and encourages them to commute independently.

Stabilising cutlery

Elderly with motion disorders face difficulties eating independently. Cutlery can be redesigned to self-adjust to their involuntary movements, thereby enabling them to enjoy their meals again.

ENGAGE SENSES AND EMOTIONS



ESTABLISH

Exercise the senses

Provides multi-sensorial stimuli to exercise the elderly's senses so as to maintain their mental and physical health.



Multi-sensorial entertainment

4D cinemas allow its audience to not only watch, but also hear, feel and smell a movie through combining 3D technology with motion and atmospheric effects like wind, fog, rain, lightning and scent. This can create an immersive and multi-sensorial experience for the elderly to exercise their senses.

Taste-enhancing cutlery

Instead of adding salt to enhance the taste of food, electrodes on a spoon can be designed to electrically simulate the salty taste on the tongue. This can help the elderly to exercise one's gustatory senses while staying healthy.



BUILD

Heighten emotional experience

Creates engaging and arousing experiences that cater to the diverse emotional needs of the elderly.



Comforting environment

Lamps that detect the elderly's emotions and change colours accordingly can create an emotionally engaging and comforting living environment for them.

Interactive rehabilitation aid

The process of rehabilitation can be painful and time-consuming. Incorporating therapy games in rehabilitation can heighten the elderly's emotional engagement and stimulate a more enjoyable and rewarding experience.



SUSTAIN

Respond empathically

Responds in an empathetic and emotionally intelligent manner, while creating enjoyable touchpoints and experiences for the elderly.



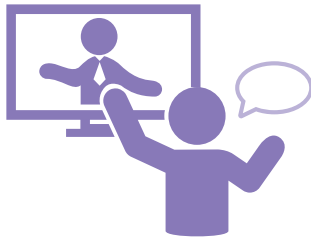
Assuring medical procedures

Having a medical scan can be an unfamiliar and nervous experience for the elderly. By incorporating role-playing and storytelling in the process, it allays the fear of medical procedures and transforms the experience into a fun one.

Incentivised medication adherence

To encourage elderly to build positive habits such as taking medication regularly, wearable technology can be designed to offer empathetic reminders and celebrate achievements through happy sounds and lights.

EMPOWER INDEPENDENT LIVING



ESTABLISH Provide familiarity

Enables independence for the elderly while employing familiar experiential elements that enable access, learning and usage without assistance.



Visual messaging aid

By replacing the keyboard with familiar and intuitive pictures, elderly can send messages to others easily.

Tele-care monitoring

In the design of tele-care monitoring systems, familiar devices such as television offer an excellent channel to connect the elderly with family, medical and social workers. The elderly will be able to receive visual reminders for exercise, medication and healthcare visits while watching television.



BUILD Nurture confidence

Delivers experiences which promote capability and completion, thus reviving confidence in the elderly and their care communities in decision-making and daily activities.



Smart mobility aid

Walking sticks with built-in display and GPS enable the elderly to commute independently without the fear of getting lost. It builds confidence and gives them the freedom to go anywhere they like.

Non-intrusive home monitoring

Passive activity sensors monitor the elderly's living patterns and alert the caregivers if anything out-of-the-ordinary happens. This nurtures confidence for both the elderly and their caregivers, and enables the elderly to live independently with assurance that they will receive help in emergency situations.



SUSTAIN Reinforce control

Empowers the elderly by facilitating their expression of daily decisions and routines. Integrates their preferences into technology and provides enhanced control over the elderly's lives.



Personalised diet management

To assist the elderly in managing their eating habits, mobile apps can be designed to allow the elderly to input their health management goals and dietary preferences for personalised meals and grocery shopping recommendations.

Customisable fitness programme

Sustainable and empowering fitness regimes can be achieved with a personalised training programme that adapts to the elderly's physical capability and interest. It should also enable the elderly to rate the difficulty of various workouts and adapts to his/her workout capacity accordingly.

CONNECT WITH COMMUNITIES



ESTABLISH

Spark conversations

Stimulates conversations and emotional connections between the elderly and their communities such that they are meaningfully engaged.



Targeted social platform

Online social platforms catered specifically for mature adults can reduce the physical and psychological barriers for them to find the companionship they need, be it dinner dates, travel partners or activity groups.

Remote interest-matching

Elderly who enjoy fitness can be connected to personal trainers and like-minded peers from the comfort of their homes via live videos. This allows the elderly to easily find others with similar interests and to support each other in reaching their fitness goals.



BUILD

Activate support

Connects the elderly and their care communities such that community members can actively identify the elderly's physical, emotional or social needs and provide support before emergencies take place.



Reactive home monitoring

By wirelessly monitoring the elderly's body temperature via smart thermometers, caregivers can be alerted in the event of irregular temperature change and thus activate the right support to alleviate illness.

Mutual support network

By creating a community of senior helpers, elderly in need can easily receive support from their peers. In addition, it also motivates senior helpers to keep active and be productive in their communities.



SUSTAIN

Sustain connections

Unites the elderly and their care communities to maintain a sustained, mutually supportive relationship while promoting continuous self-reliance.



Rewarding community experience

Online communities can be designed to enable socially isolated elderly to share depressive episodes and receive timely responses from others. It can further sustain connections by having the community reward good responses with an upvoting system.

Emotional presence

To facilitate constant communication, wireless responsive lamps can light up depending on the activity status of elderly's social group. Such subtle, effort-free environmental cues enable the elderly to sustain connections easily.

ENCOURAGE CONTRIBUTION



ESTABLISH Highlight value

Creates an environment that helps the elderly recognise their capabilities and value, thus encouraging them to remain productive in the community.



Task matching

Community programmes can be designed to link elderly with community members, offering the elderly a channel to help others with household errands. It recognises the elderly's varied capabilities and skills, and enables them to stay active at the same time.

Knowledge sharing

Language exchange programmes enable the elderly to help foreign students learn English through conversational exchanges. It also provides them with the opportunity to pass on their knowledge and realise their value to the community.



BUILD Motivate action

Motivates the elderly to continue assuming productive roles that will benefit the communities that they live in.



Community-based working platform

Community cafes which recruits elderly who are at risk of being socially isolated, provide a platform for the elderly to earn income. At the same time, the elderly can also build social connections and share their cooking with others.

Matched volunteering

By offering a variety of 'feel-good' social goals, platforms which match mature volunteers with nonprofit organisations motivate the elderly to contribute to their communities in their own preferred ways.



SUSTAIN Celebrate contribution

Rewards contribution of the elderly in meaningful ways, intrinsically or extrinsically. Reassures value and encourages continued contribution through tangible feedback.



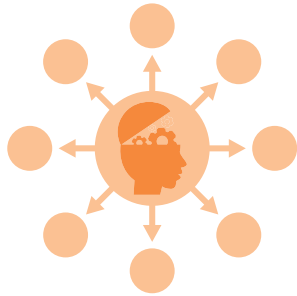
Celebrating work achievements

Performance platforms can help mature employees to monitor their work progress, as well as celebrate their accomplishment of tasks. It builds their sense of competence and fuels their intrinsic drive to achieve.

Recognising voluntary contributions

Recognising the elderly's contribution to their communities and forward-thinking mindset with annual community awards can encourage them to stay active and engage their communities meaningfully. It will also inspire other elderly to take on an active role in the community.

ENABLE FULFILMENT OF POTENTIAL



ESTABLISH

Stimulate discovery

Stimulates curiosity and the desire to continue learning by facilitating discovery and exploration of aspirations.



Collaborative discovery

Communities, be it physical or virtual, can inspire the elderly to achieve their dreams and goals by providing inspirations through 'dream boards'. People with similar aspirations can also be matched, so that they can encourage each other during their pursuit.

Explorative gateway

Platforms which consolidate opportunities, resources and inspirations related to specific fields like culinary and botany can enable the elderly to independently discover and explore their passion.



BUILD

Support learning

Supports learning for older people with diminishing cognitive abilities through adopting an understanding, patient and assistive voice.



Ubiquitous learning

To enable home-bound elderly to learn about different topics such as art in the comfort of their own homes, learning packs can be delivered to their doorsteps. The booklets then act as a visual learning aid during lectures conducted over the telephone.

Assistive learning device

Smart pens which read music scores and play music notes simultaneously, allow the elderly to learn music easily. It can also further support learning by allowing budding musicians to slow down the playback speed.



SUSTAIN

Inspire mastery

Encourages the elderly to maximise their capabilities, master new skills or knowledge and realise their potential.



Mastery through employment


Clothing companies can encourage the elderly to refine their craft by employing them to create handmade knitwear. This allows the elderly to improve and make meaningful use of their knitting skills.

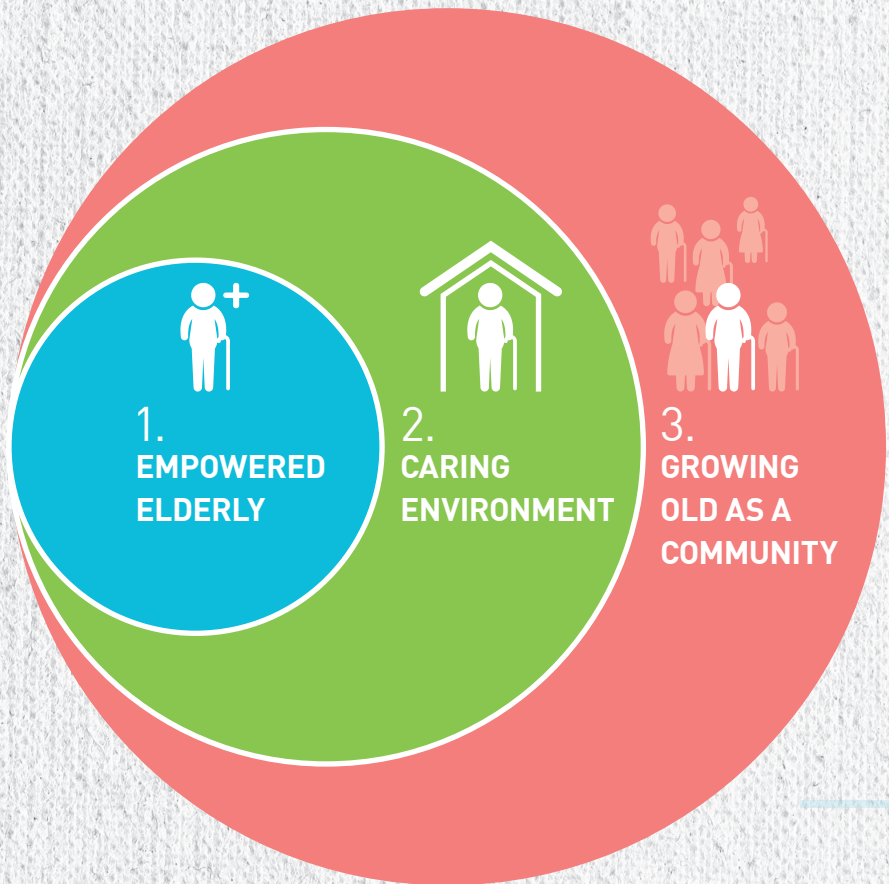
Role modelling

Engaging tech-savvy elderly to mentor other seniors to pick up IT skills provides motivation for the tech-savvy elderly to hone their skills and become a role model for their community.

CHAPTER 4

SCENARIOS OF THE FUTURE





In this chapter, three future scenarios are presented. Based on emerging trends in health and wellness interventions, the future scenarios help us to envision what growing old in Singapore will be like in the future. Ideally, the elderly will be able to move around independently and live autonomously, while remaining integrated in their communities. They will be able to share their knowledge and skills with the younger generation, and above all, live in dignity and security, knowing that their future can be lived fully and meaningfully.

In each scenario, challenges have been identified and opportunities derived to inspire potential solutions.

This chapter also presents concepts produced during a collaborative workshop between designers, technologists, healthcare practitioners and business owners. These concepts illustrate some possibilities for the future.

SCENARIO 1

4.1

EMPOWERED ELDERLY

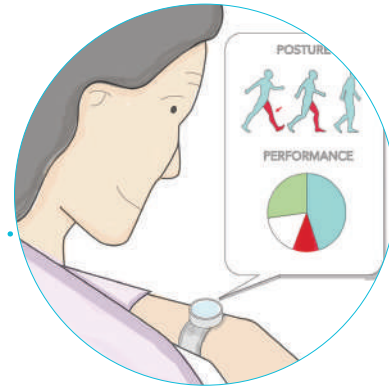
Empowerment is a self-driven motivation of the elderly to possess control over themselves and their environments. Empowered elderly are able to fulfil their needs, shape their environments, solve problems and tap into resources to improve their lives.

With the advancement of technology, the elderly will have more access to tools that can enhance their ability to decide and act on their own behalf. How might we help the elderly to maximise autonomy and control by leveraging on such advancements?



Enhancing Physiological Capabilities

Feeling exhausted, Auntie Susan braces herself to complete the final round on a brisk morning walk around the park. Her battery-powered knee exoskeleton gives her weak arthritic knees extra support and strength, allowing her to maintain an active lifestyle.



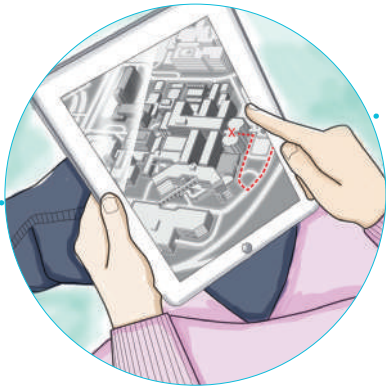
Enhancing Physiological Capabilities

She also wears a watch that analyses her walking patterns through motion sensors. It provides real-time feedback through haptic vibrations once it senses bad posture. After exercising, the watch wirelessly sends a summary of her performance to an online medical data bank.



“With the new technology, I feel empowered. Not only can I maintain my lifestyle, I also have the freedom to discover, choose and achieve what I want.

— The Maintainer, Year 2020



Connectivity and Mobility

After washing up, Auntie Susan decides to visit her friend who stays in the East. On her tablet, she uses a 3D map system to view and locate the nearest car park beforehand. She is also informed about potential accident zones and elderly fall-prone areas.



Connectivity and Mobility

She inserts her tablet into the car's navigation system which then plots the fastest route to her destination. Auntie Susan sits behind the wheel hands-free, as the car automatically navigates itself through the busy city. While on the road, she remotely activates her washing machine and dishwasher via her tablet so that she will have clean clothes and dishes when she gets home.



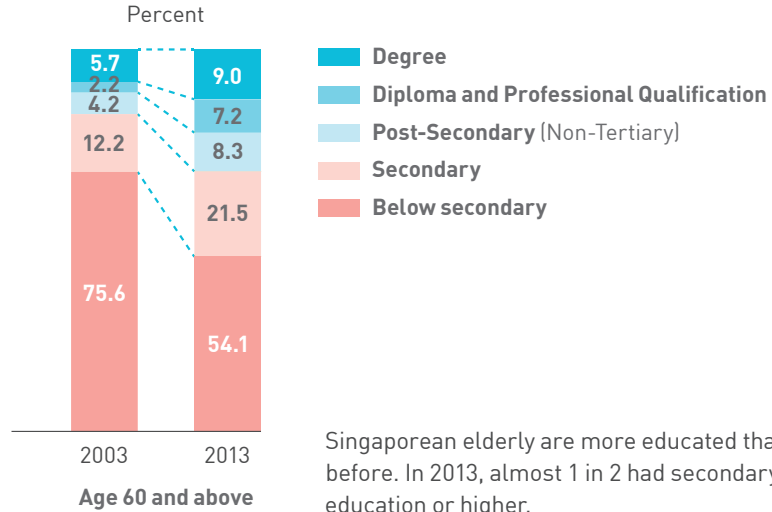
Continuous Learning and Exposure

At home, she logs into an open source knowledge portal that provides a virtual learning environment. She searches 'coffee brewing' and receives video links from baristas, showing different brewing processes. She watches attentively while sharing her new knowledge with her friends online.

SUPPORTING TRENDS

The elderly are becoming more educated

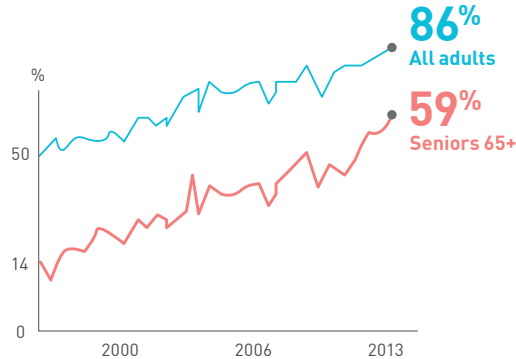
Highest qualification attained by Singaporeans aged 60 years and above¹



Singaporean elderly are more educated than before. In 2013, almost 1 in 2 had secondary education or higher.

Growing usage of technology

Percentage of population in the United States who go online²



American seniors **65 and above** are becoming increasingly connected to the Internet, just like the younger adults.

Shifts in elderly behaviour



“We’re witnessing a dramatic difference in the behaviour and attitudes of the baby boomer generation, relative to their older counterparts. Among other things, boomers are often tech-savvy: they increasingly shop online, blog, and own smart phones.”³

— Kim Walker, Founder and CEO of Silver Group

OPPORTUNITY AREAS



MAINTAINING ABILITY

Technology has a huge potential to promote exercise and engage the elderly both mentally and physically.

Thought Starters:

How might we employ technology to help the elderly cope with physical and cognitive deterioration or disabilities?

How might we increase the physical and mental capacity of the elderly through caring and engaging experiences?

How might we craft new care experiences to promote active ageing amongst the elderly?



SUPPORTING INDEPENDENCE

Sustaining independence and autonomy are important in maintaining a high standard of living and self-esteem, while reducing the burden on family members and caregivers.

Thought Starters:

How might we empower independent living and self-sufficiency through the use of technology?

How might we increase autonomy and confidence in the elderly in planning for their futures through new solutions?

How might we use technology to foster discovery and lifelong learning amongst the elderly?



BUILDING DIGITAL CONFIDENCE

Confidence with technology helps the elderly access more support resources and connects them to caregivers more efficiently.

Thought Starters:

How might we integrate more familiar elements into wearable technology to digitally empower the elderly?

How might we provide technological experiences which are entertaining and pleasurable for elderly?

How might we enable the elderly to confidently leverage monitoring technology and big data and use it to inform their care decisions?

SCENARIO 2

4.2

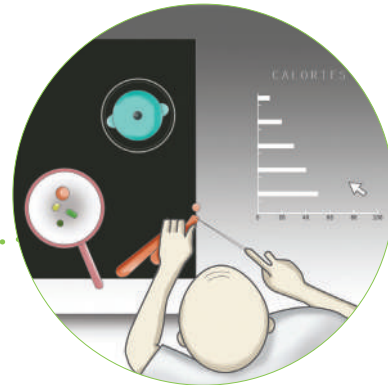
CARING ENVIRONMENT

Conventionally, an elderly-friendly environment is focused on monitoring and preventing accidents. With the advancement of technology and availability of real time information, elderly dwellings can now assume an active role in supporting ageing.

The design of a safe and supportive environment involves the integration of seamless services and products that delivers physical and psychological wellness to the elderly. How might we push beyond the conventional mindset of passive prevention to that of active caring?

**A Caring Home – Sleep**

Richard wakes up to subtle vibrations as his sleep tracker located next to his mattress alerts him about his morning routine. He is also able to observe the recorded readings from his previous night's sleep while the data is shared with his family members through a mobile update.

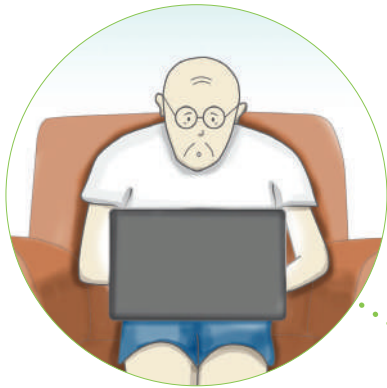
**A Caring Home – Cook**

As Richard prepares his breakfast, the kitchen counter registers the amount of calories in his meal. Richard's smart kitchen uses motion sensors to detect his movement within the kitchen. The stove automatically turns off when he forgets to, lighting up a beacon lamp in his living room to notify him.



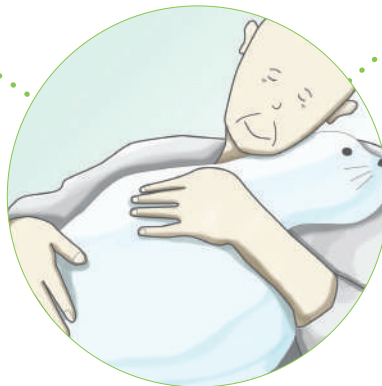
“My caring environment helps me feel more secure and comfortable when I am carrying out my daily tasks. Now I can focus on my hobbies and do what I enjoy the most.”

— The Dependent, Year 2020



A Caring Home – Relax

As Richard takes a seat in the living room, the sensor-embedded armchair picks up his presence and automatically plays music according to his mood while recording his vital signs. The data is then transmitted wirelessly to his healthcare specialists.



A Caring Companion

Feeling bored, Richard reaches out to his digital companion – an interactive robot that recognises and responds to his tactile engagement by imitating a voice of a baby seal and making subtle motions.



A Caring Environment

Before heading out to purchase groceries, Richard compiles a grocery shopping list. Linked to his smart kitchen, Richard's smartphone receives suggested produce and supplements that would benefit his diet.

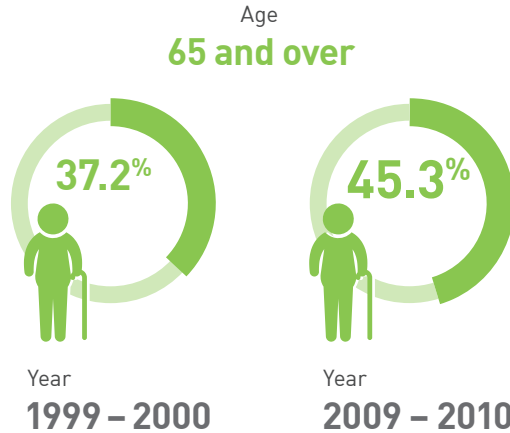
As he reaches the grocery store, he taps his smartphone on the NFC store directory and receives the store's digital map that directs him towards the location of the items on the grocery list.

SUPPORTING TRENDS

Living longer but sicker

Prevalence of two or more chronic conditions among adults in the United States⁴

The percentage of adults aged 65 and above in the United States with two or more chronic illnesses have increased over the past decade.



Rising demand for ageing in place

90% of the elderly in the United States over the age of 65, want to stay in their residences for as long as possible.⁵

Using technology to enable ageing in place



“Using technologies to help elderly people remain in their homes is a really important way of ensuring a healthy, safe and secure future for our ageing population. Prevention and in-home support has not been properly foreseen as critical for the future, and this needs to be addressed.”⁶

— Vaughan Beck, Director of the Australian Academy of Technological Sciences and Engineering

OPPORTUNITY AREAS



CREATING CARE COMMUNITIES

Support networks are a vital element of well-being, especially for the elderly who may not always be self-reliant. By creating technology which helps identify and connect them with care communities, the elderly are able to activate the support they need from the people around them.

Thought Starters:

How might we educate, involve and equip the public for assistance in elderly care?

How might we utilise the wider community to distribute resources to passive elderly that are not well connected to assistance services?

How might we enable the elderly to create their own support networks and communicate with them in a meaningful way?



COMFORTING EXPERIENCES

Creating care experiences where the elderly would feel comfortable and relaxed is important for their well-being. When utilising technology to deliver care, it needs to be done in an intuitive and reassuring manner, instead of in an intrusive way.

Thought Starters:

How might we utilise or improve non-intrusive monitoring technologies to improve the quality and comfort of elderly care?

How might smart homes play a role in providing preventive care experiences to maximise comfort for elderly?

How might we enable public spaces to deliver familiarity and comfort to elderly living?



CONNECTED CARE

Connected care experiences which establish sustainable links between the elderly, medical professionals, caregivers and communities ensure consistent and manageable care delivery. This reduces stress and promotes well-being.

Thought Starters:

How might we integrate professional care into the daily life of the elderly?

How might we create integrated physical and virtual care?

How might we promote companionship for home bound elderly living alone?

How might we create intuitive mobile services to effectively connect the elderly with caregivers?

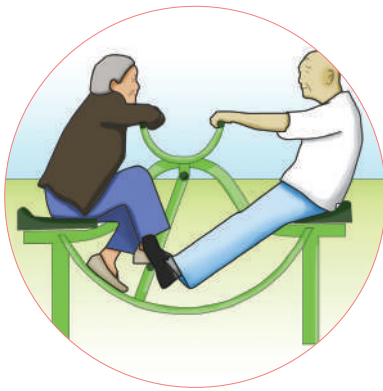
SCENARIOS 3

4.3

GROWING OLD AS A COMMUNITY

With the advancement of information communication technology, communities are no longer limited by the boundaries of physical distance, nor immediate personal relationships. This opens up endless potential to fulfil the elderly's needs for active social connection and engagement with their family and community.

In a strong community, the elderly will actively contribute back to the community and achieve physical and mental well-being while doing so. Beyond designing individualistic solutions for elderly, how might we leverage the power of community and create solutions that better fulfil their needs?

**Elderly Infrastructure**

Since retirement, Madam Tan lived alone for 2 years, before she decided to move into Happy Valley – a district made available only to retirees. Not only does this place provide professional medical services, it also allows the elderly to live, learn, and enjoy life together. There are public exercise facilities that promote healthy living and offer social bonding opportunities. This is a place where the elderly come to live voluntarily.

**Social Connectivity**

From an application on her personal tablet, Madam Tan receives notifications and updates from friends. She keeps in touch with them through video calls. Madam Tan also volunteers to make house visits to needy elderly to help them with housework such as sweeping and washing clothes.



“I am connected to more people both physically and virtually and I know that if I need support, I can always rely on my community.”

— The Enclosed, Year 2020



Social Connectivity

She travels occasionally with her friends and uses an online platform to book elderly friendly accommodations. This helps her to locate places with elderly services such as nursing amenities, thus allowing her to travel with peace of mind.



Skills and Employment

With her sewing skills, Madam Tan managed to get a job referral through an online platform that provides professional employment advice to the elderly.



Skills and Employment

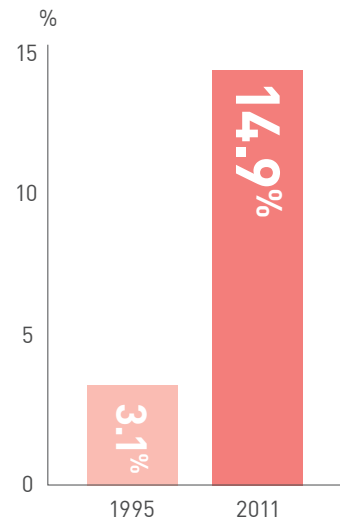
Madam Tan works in an online fashion foundation that produces customised dresses. She is able to remain socially and physically active through frequent skill sharing and collaboration work with young designers. She also gets a percentage of the earnings which serves as a healthy source of income during her retirement.

SUPPORTING TRENDS

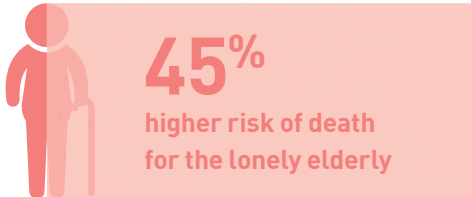
The growing trend of elderly living alone

In Singapore, there is an almost **5 times increase** in the percentage of elderly living alone.

Percentage of adults aged 55 years and above living alone in Singapore⁷



Loneliness within the elderly



Elderly who identified themselves as lonely faced **59%** more risk of physical decline and **45%** more risk of death, than those who were not lonely.⁸

Using technology to bridge social gaps



“The new future of old age is about staying in society, staying in the workplace and staying very connected. And technology is going to be a very big part of that, because the new reality is, increasingly, a virtual reality. It provides a way to make new connections, new friends and new senses of purpose.”⁹

— Joseph F. Coughlin, Director of the AgeLab, Massachusetts Institute of Technology

OPPORTUNITY AREAS



SOCIALLY CONNECTED ELDERLY

For the elderly to feel a sense of love and belonging, it is vital for them to build emotional connections and meaningful relationships with others. This will help them create a rich and fulfilling life.

Thought Starters:

How might we encourage the elderly to be socially active through technology?

How might we create accessible platforms for the elderly to gather, interact and stay socially connected?

How might we integrate technology into public spaces to create places that encourage relationship building and social interaction?

How might we ensure social connectivity of elderly who live alone and are prone to social isolation?



AGEING IN THE COMMUNITY

Fostering meaningful interaction of the elderly both among themselves and with the younger generations will help strengthen community bonds. Strong and happy communities are key to improving quality of life.

Thought Starters:

How might we engage younger generations to be part of the elderly's journey of active ageing?

How might we enable the elderly to help one another during the process of retirement through technology?

How might we create employment opportunities for the able elderly to contribute care to the community?

How might the community help in the learning aspirations of the elderly?

How might we foster collaboration among the lonely elderly by creating a sense of belonging?



COMMUNITY SOLUTIONS

Technology can broaden the access to care solutions. Big data can also inform targeted solutions for elderly communities.

Thought Starters:

How might we apply economies of scale to reinvent elderly care?

How might we create care solutions which can be scaled to serve a large population of elderly through technology?

How might we use big data to better inform solutions for the elderly?

How might we draw different resources from the community to develop a larger scale of solutions for the elderly?

4.4

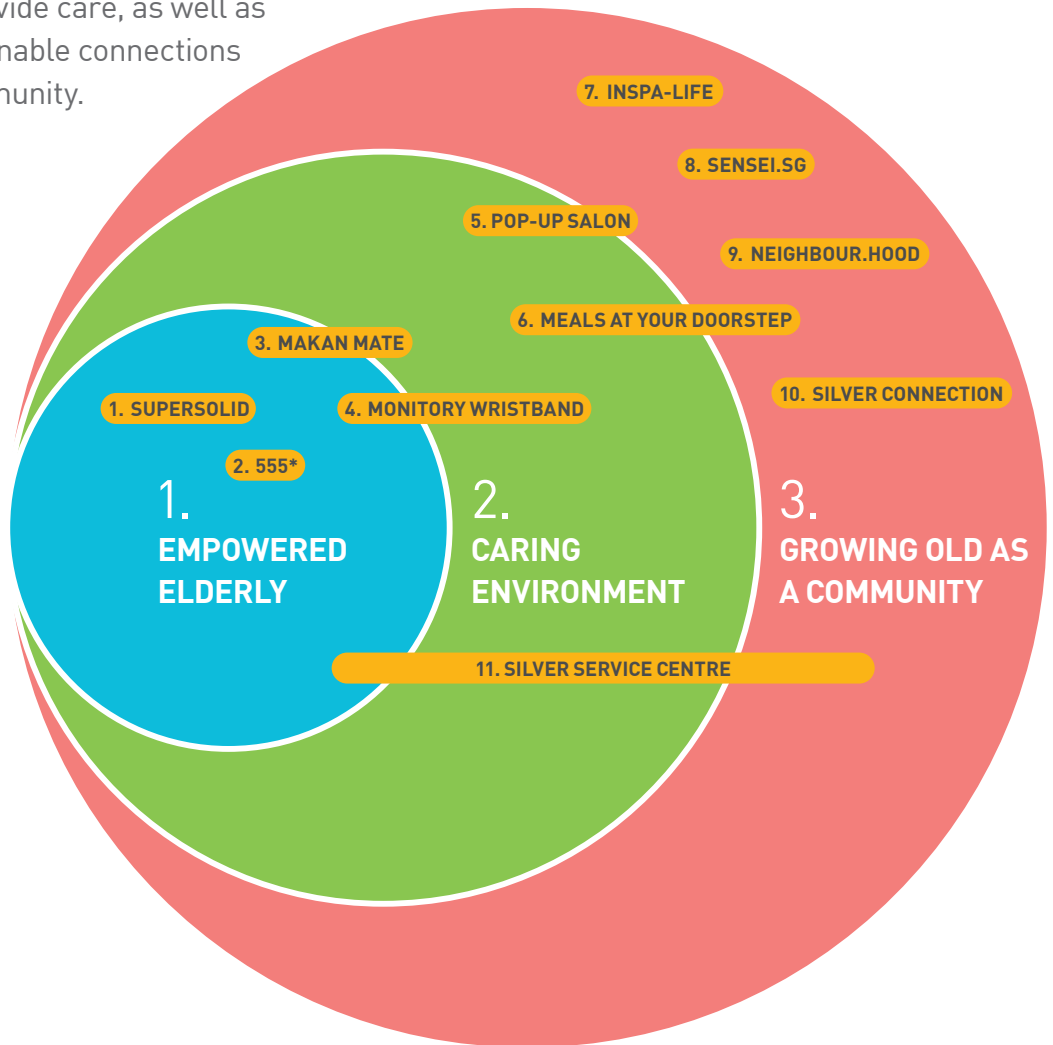
CREATING SOLUTIONS FOR THE FUTURE TOGETHER

The DesignSingapore Council, IDA Labs, Orcadesign and SupraCopula conducted a 3-day open innovation workshop. The workshop was intensive and elicited collaborative exchange of ideas and knowledge among healthcare providers, technologists and designers, on the topic **Rethinking Health and Wellness for the Elderly**.



WORKSHOP CONCEPTS

The open innovation workshop culminated in a myriad of meaningful, innovative and scalable ideas from the participants. These ideas encompass many aspects of a senior's life, from daily activities to post-retirement, aiming to empower the elderly, provide care, as well as facilitate sustainable connections with their community.



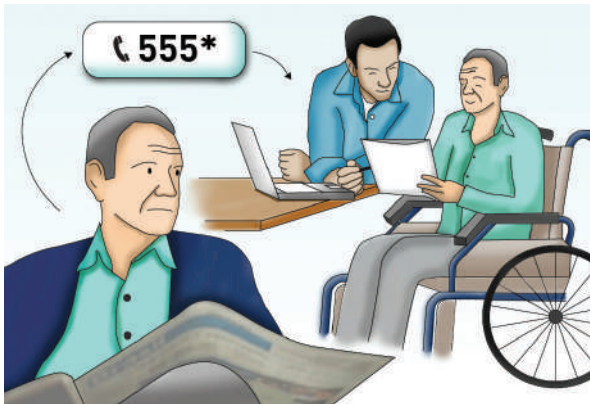


EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

1. SUPERSOLID

BE SURE, BE PREPARED!

Super Solid is a directional guide that helps the elderly plan for their retirement. It is an interactive and elderly-friendly web portal which offers information and services relating to leisure, learning, financial planning and medical support. It also links elderly who share similar medical conditions, and facilitates peer support for each other.

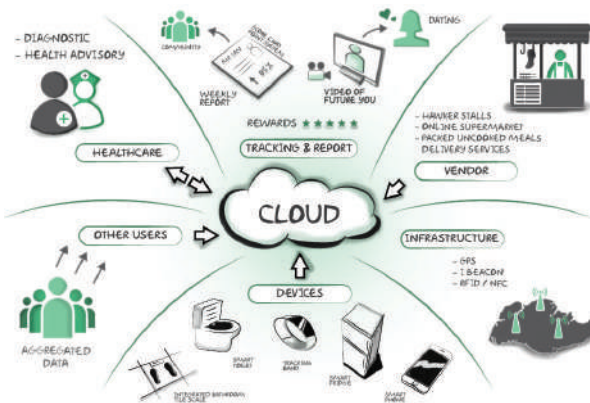


EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

2. 555*

SENIORS HELPLINE FOR JOBS

Solving the problem of lack of opportunities (jobs/tasks) for the elderly to be meaningfully engaged, 555 is a personal one-stop job/task matching service. It allows the job providers to offer feedback to the elderly, so as to encourage and affirm their self-worth and achievement.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

3. MAKAN MATE

ACTIVE HEALTH & WELLNESS MINDER

Makan Mate is an interactive lifelong health and wellness system that seamlessly integrates into one's lifestyle, utilising one's genetic health data to predict his or her future health. It is a customised self-diagnosis and body awareness system that monitors, informs and encourages one to better manage their lifestyle. This relieves pressure on the nation's healthcare system and also generates more health awareness.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

4. MONITORY WRISTBAND

PERSONALISING PREVENTIVE CARE

It comes in a form of a wristband that captures, collects and shares health data of the elderly user. Based on the individual's health data, the user receives detailed personalised health information. This helps increase health awareness and offers users motivation for good health practices.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

5. POP-UP SALON

BRINGING HAIR SALONS CLOSER TO THE ELDERLY

Offering personalised haircuts at subsidised prices, Pop Up Salon brings the salon nearer to the elderly. Tapping on infrastructure such as senior centres and hairdressing services by social workers, this service also provides a platform for seniors to socialise.

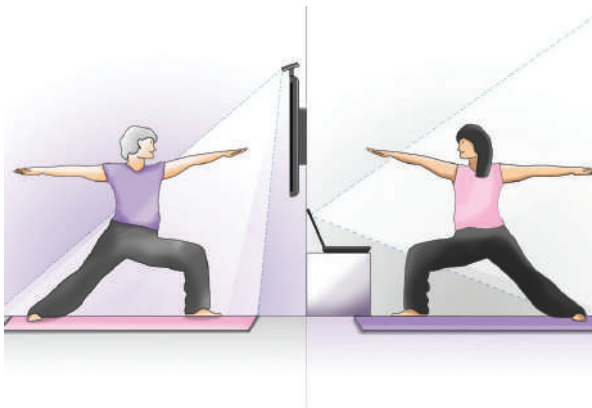


EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

6. MEALS AT YOUR DOORSTEP

FOOD-SHARING COMMUNITY

Advocating a communal kitchen concept where food is cooked and shared throughout the community, Meals At Your Doorstep starts out in the HDB neighbourhood and hopes to expand into a community network of food services. By doing so, it creates more social networking opportunities among the elderly and also allows them to get fresh meals delivered to their doorsteps.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

7. INSPA-LIFE

CONNECTING THE YOUNG AND OLD

Inspa-life is a TV platform which supports mutual learning for the elderly and their community. Elderly are paired up with community members to learn new skills, as well as pass on their experiences to the younger generations, from the comfort of their homes. Not only does it bridge the generation gap between the elderly and youths, but it also empowers the elderly with new found knowledge.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

8. SENSEI.SG

PEER-TO-PEER LEARNING PLATFORM

Tailored for the elderly who seeks meaningful engagements, or wants to grow and sustain self-worth, Sensei.sg is a peer-to-peer learning platform that links providers to receivers. Likened to a 'Coursera' for the silver generation, it allows one to sell time and knowledge to interested parties, promoting a silver sharing economy.

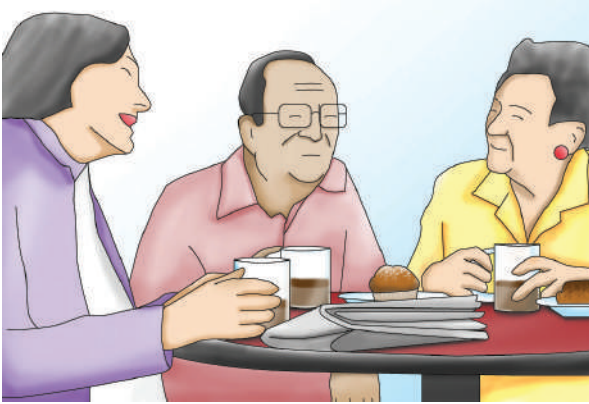


EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

9. NEIGHBOUR.HOOD

LINKING ELDERLY WITH VOLUNTEERS

NEIGHBOUR.HOOD is an online and offline collaborative platform that connects both the elderly (seeking help) with the people who want to help, be it young or old. It fosters a collaborative eco-system that increases community outreach and engagement, as well as the elderly's sense of fulfilment and self-actualisation.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

10. SILVER CONNECTION

BRIDGING ELDERLY TOGETHER

Silver Connection is a platform that uses incentives (e.g. free coupons) to entice elderly to engage other elderly who are more enclosed. This ensures the creation of a mutually-supportive elderly community and a mentally and physically active lifestyle for everyone.



EMPOWERED ELDERLY CARING ENVIRONMENT GROWING OLD AS A COMMUNITY

11. SILVER SERVICE CENTRE

ONE-STOP SENIOR CARE

Aimed at facilitating connections and fostering the 'kampong spirit' within the community, Silver Service Centre is a platform for a myriad of services such as healthcare, grocery shopping and social services for elderly. It uses a suite of technology to bring convenience to the daily lives of the elderly. For example, it features a smart shopping trolley which records what the user has bought and updates the shopping list accordingly. The centre brings facilities closer to the elderly, increasing mutual community involvement, interaction and support, while also reducing the burden or stress of a caregiver.



LOOKING AHEAD

This report demonstrates how the user-centred design innovation approach can translate user insights into innovative, meaningful products and services for the elderly. It serves as an inspiration for enterprises to empower the ageing population in Singapore and help them live a more enriching life that is ripe with possibility and growth, through design innovation.

As a stakeholder in the healthcare system, you can take the following steps:

1. Understand your target users

Seek to understand the values and the motivations of the 12 personas and identify which of the personas are your target users. This can help identify opportunities to cater better to the needs of a contemporary Singaporean elderly.

2. Explore new concepts based on user insights

By utilising the insights from the research and adopting an empathetic mindset, it will help you develop innovative and feasible products and services for the elderly. Test out prototypes with your target users and refine the concepts based on their feedback. Then, develop them into products and services that can resonate with your target users.

3. Apply design ethnography in your targeted consumer segment

Engage a design ethnographer to gain deeper understanding of your user's behaviour and latent needs. Utilise the insights to develop innovative products and services that consumers want.

4. Adopt the user-centred design innovation approach in your organisation

Adopt the user-centred design innovation approach to gain empathy towards your target users and discover new opportunities. This will build sustainable innovation capability within your organisation, and ensure the continuous development of user-centred solutions to meet the changing demands of your target users.

REFERENCES

INTRODUCTION

1. World health statistics 2014: Large gains in life expectancy. (2014, May 15). *World Health Organization*.

CHAPTER 1

1. Ministry of Health. (2013). *Speech by Dr Amy Khor, Senior Minister of State for Health and Manpower, at the inaugural HIMSS digital healthcare week*. Singapore. Retrieved from https://www.moh.gov.sg/content/moh_web/home/pressRoom/speeches_d/2013/speech-by-dr-amy-khor--senior-minister-of-state-for-health-and-m.html
2. Silver tsunami & dwindling workforce can destabilise economies: Lee Yi Shyan. (2013, February 6). *Channel NewsAsia*. Retrieved from <http://www.channelnewsasia.com/news/silver-tsunami---dwindling-workforce-can-destabilise-economies--lee-yi-shyan/578720.html>
3. Cities face a silver tsunami: Ageing citizens. (2011, July 11). *CBS News*. Retrieved from <http://www.cbsnews.com/news/cities-face-a-silver-tsunami-aging-citizens/>
4. Ministry of Health. (2015). *Speech by Mr Gan Kim Yong, Minister for Health, at the SG50 scientific conference on ageing*. Singapore. Retrieved from https://www.moh.gov.sg/content/moh_web/home/pressRoom/speeches_d/2015/speech-by-mr-gan-kim-yong--minister-for-health--at-the-sg50-scie.html
5. Global burden study 2013 mortality and causes of death collaborators. (2015). Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, 385, 117-71. Retrieved from [http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(14\)61682-2.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(14)61682-2.pdf)
6. Freid, V. M., Bernstein, A. B., & Bush, M. A. (2012). *Multiple chronic conditions among adults aged 45 and over: Trends over the past 10 Years [Data brief 100]*. Department of Health and Human Service, National Centre for Health Statistics (NCHS), United States. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db100.htm>
7. Salomon, J. A., Wang, H., Freeman, M. K., Vos, T., Flaxman, A. D., Lopez, A. D., & Murray, C. J. L. (2012). Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the global burden disease study 2010. *Lancet*, 380, 2144-62. Retrieved from [http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(12\)61690-0.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(12)61690-0.pdf)
8. Dreaper, J. (2012, December 13). We live 'longer but sicker' as chronic diseases rise. *BBC News*. Retrieved from <http://www.bbc.com/news/health-20715310>
9. Ng, T. P. (2009). *Chronic disease, functional status and quality of life among the elderly in Singapore* [Presentation slides]. Retrieved from <http://medicine.nus.edu.sg/pcm/Chronic%20Disease%20Functional%20Status%20and%20QOL%20Elderly%20in%20Singapore.pdf>
10. Medicare Payment Advisory Commission. (2014). *Report to the congress: Medicare payment policy*. Washington, DC. Retrieved from http://www.medpac.gov/documents/reports/mar14_entirereport.pdf?sfvrsn=0
11. AARP. (2010). *Home and community preferences of the 45+ population*. Washington, DC. Retrieved from <http://assets.aarp.org/rgcenter/general/home-community-services-10.pdf>
12. National Conference of State Legislatures & AARP Public Policy Institute. (2011). *Ageing in place: A state survey of liveability policies and practices*. Washington, DC. Retrieved from <https://assets.aarp.org/rgcenter/ppi/liv-com/aging-in-place-2011-full.pdf>

13. Ministry of Health. (2012). *Speech by Minister Gan on ministerial committee on ageing's initiatives*. Singapore. Retrieved from https://www.moh.gov.sg/content/moh_web/home/pressRoom/speeches_d/2012/COS_speech_by_Minister_Gan_on_MCA_initiatives.html
14. Department of Health and Human Services. (2014). *Health, United States, 2014, with special feature on adults aged 55-64*. Washington, DC. Retrieved from <http://www.cdc.gov/nchs/data/abus/abus14.pdf>
15. Godman, H. (2013, September 18). Two questions can reveal mobility problems in seniors. *Harvard Health Publications*. Retrieved from <http://www.health.harvard.edu/blog/two-questions-can-reveal-mobility-problems-in-seniors-201309186682>
16. Global Industry Analyst, Inc. (2015) *Wheelchairs (powered and manual): A global strategic business report* [Presentation Slides]. Retrieved from <http://www.slideshare.net/GlobalIndustryAnalystsInc/wheelchairs-powered-and-manual-a-global-strategic-business-report>
17. Research Institute for Consumer Affairs (Rica). (2014). *Mobility scooters: A market study*. United Kingdom. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362989/Rica_Mobility_scooter_market_study_final.pdf
18. Public Health Agency of Canada. (2014). *Seniors' fall in Canada second report*. Ottawa, ON. Retrieved from http://www.phac-aspc.gc.ca/seniors-aines/publications/public/injury-blessure/seniors_falls-chutes_aines/assets/pdf/seniors_falls-chutes_aines-eng.pdf
19. Albert, M., McCaig, L. F., & Ashman, J. J. (2013). *Emergency department visits by persons aged 65 and over: United States, 2009-2010* [Data brief 130]. Department of Health and Human Service, National Centre for Health Statistics (NCHS), United States. Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db130.htm>
20. Falls are on the rise among US seniors. (2015, January 22). *University of Michigan Health System News*. Retrieved from: <http://medicine.umich.edu/dept/family-medicine/news/archive/201501/falls-are-rise-among-us-seniors>
21. Philips Lifeline. (n.d.). *Fear-of-falling in older persons*. Retrieved from http://lifelinesys.com/content/ebooks/Fear_of_Falling_in_Older_Persons.pdf
22. Short, D. (2015, March 27). Median Household Income Up Slightly in February. *Advisor Perspectives*. Retrieved from <http://www.advisorperspectives.com/dshort/updates/Median-Household-Income-Update.php>
23. KPMG. (2014). *Diagnosing Singapore's healthcare: The need for a healthy supply/demand balance*. Singapore. Retrieved from <http://www.kpmg.com/SG/en/SingaporeBudget/budget2014/Documents/Singapore-Budget-Alert-2.pdf>
24. Canadian Institute for Health Information. (2014). *National health expenditure trends, 1975-2014*. Canada. Retrieved from http://www.cihi.ca/web/resource/en/nhex_2014_report_en.pdf
25. Morin, R., & Fry, R. (2012, October 22). More Americans worry about financing retirement. *Pew Research Centre*. Retrieved from <http://www.pewsocialtrends.org/2012/10/22/more-americans-worry-about-financing-retirement/>
26. HSBC. (2013, September 2). *Retirees in Singapore face 8 years of hardship after savings run out*. Retrieved from <http://www.hsbc.com.sg/1/2/personal/wealth/retirement/retirees-in-singapore>
27. Nielsen. (2014). *The age gap: As global population skews older, its needs are not being met*. Retrieved from <http://www.nielsen.com/content/dam/nielsen-global/au/docs/reports/nielsen-global-aging-report-february-2014.pdf>
28. Department of Health and Human Services. (2013). *A profile of older Americans*. Washington, DC. Retrieved from http://www.agingresources.com/cms/wp-content/uploads/2014/07/Profile-of-Older-Americans_2013_Profile.pdf
29. Royal Voluntary Service. (2012). *Loneliness amongst older people and the impact of family connections*. Cardiff. Retrieved from http://www.royalvoluntaryservice.org.uk/Uploads/Documents/How_we_help/loneliness-amongst-older-people-and-the-impact-of-family-connections.pdf

30. Kang, S. H., Tan, E. S., & Yap, M. T. (2013). National survey of senior citizens 2011. *Institute of Policy Studies*. Singapore. Retrieved from http://app.msf.gov.sg/Portals/0/National%20Survey%20of%20Senior%20Citizens%202011_Complete_amended_use%20this%20CH.pdf
31. Perissinotto, C. M., Censer, I. S., & Covinsky, K. E. (2012). Loneliness in older persons: A predictor of functional decline and death. *Arch Intern Med*, 172(14). Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/22710744>
32. Hatayama, A. (2014, April 12). Population of seniors living alone to increase 53% by 2035. *The Asahi Shimbun*. Retrieved from http://ajw.asahi.com/article/behind_news/social_affairs/AJ201404120038
33. Smith, A. (2014, April 3). Older adults and technology use. *Pew Research Centre*. Retrieved from <http://www.pewinternet.org/2014/04/03/older-adults-and-technology-use/>
34. Smith, A. (2014, April 3). Attitudes, impacts, and barriers to adoption. *Pew Research Centre*. Retrieved from <http://www.pewinternet.org/2014/04/03/attitudes-impacts-and-barriers-to-adoption/>
35. Deloitte. (2014). *The smartphone generation gap: over-55? there's no app for that*. London. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology-Media-Telecommunications/gx-tmt-2014prediction-smartphone.pdf>
36. Greying Asia: Public and private sector healthcare solutions for a growing elderly population. (2015, Jan 12). *Hospital Management Asia*. Retrieved from <http://hospitalmanagementasia.com/greying-asia-public-and-private-sector-healthcare-solutions-for-a-growing-elderly-population/>
37. Statistics Bureau, Ministry of Internal Affairs and Communications. (2014). *Statistical handbook of Japan*. Tokyo. Retrieved from <http://www.stat.go.jp/english/data/handbook/>
38. Average U.S. retirement age rises to 62, younger Americans are more likely to expect to retire before age 55. (2014, April 28). *Gallup*. Retrieved from <http://www.gallup.com/poll/168707/average-retirement-age-rises.aspx>
39. Ministry of Manpower. (2013). *Labour force in Singapore*. Singapore. Retrieved from <http://stats.mom.gov.sg/Pages/Labour-Force-In-Singapore-2013.aspx>
40. Boston Consulting Group. (2011). *Global ageing: How companies can adapt to the new reality*. Boston, MA. Retrieved from <https://www.bcg.com/documents/file93352.pdf>
41. Tal, B. (2012). Start-ups: Present and future. *CIBC World Markets Inc*. Retrieved from http://research.cibcwm.com/economic_public/download/if_2012-0925.pdf
42. Aegon. (2014). *The changing face of retirement: The Aegon retirement readiness survey 2014*. Retrieved from <http://www.aegon.com/Documents/aegon-com/Research/2014-Retirement-Survey/Aegon-Retirement-Survey-2014.pdf>
43. HSBC Insurance Holdings Limited. (2012). *The future of retirement: Life after work?* London. Retrieved from http://www.hsbc.com.sg/1/PA_ES_Content_Mgmt/content/singapore/personal/wealth-management/pillars/retirement/law_sg_approve.pdf
44. Toh, Y. C., & Tan A. (2014, May 3). Less pay is okay, says older workers. *The Straits Times*. Retrieved from <http://www.straitstimes.com/news/singapore/more-singapore-stories/story/less-pay-okay-say-older-workers-20140503>
45. Meyer, H. (2013, August 24). Older, healthier and working: Britons say no to retirement. *The Guardian*. Retrieved from <http://www.theguardian.com/society/2013/aug/24/working-britons-retirement>
46. Aegon. (2014). *The changing face of retirement: The Aegon retirement readiness survey 2014*. Retrieved from <http://www.aegon.com/Documents/aegon-com/Research/2014-Retirement-Survey/Aegon-Retirement-Survey-2014.pdf>
47. Kingman, D. (2012). *Spending power across the generations*. Intergenerational Foundation. London. Retrieved from <http://www.if.org.uk/wp-content/uploads/2013/01/Spending-Power-Across-the-Generations-Report.pdf>
48. Kingman, D. (2012). *Spending power across the generations*. Intergenerational Foundation. London. Retrieved from <http://www.if.org.uk/wp-content/uploads/2013/01/Spending-Power-Across-the-Generations-Report.pdf>

49. Matthews, M., & Straughan, P. T. (2014). *Results from the perception and attitudes towards ageing and seniors survey 2013/2014* [Working paper]. Institute of Policy Studies. Retrieved from http://lkyspp.nus.edu.sg/ips/wp-content/uploads/sites/2/2014/10/wp22_151015.pdf
50. Bureau of Labour Statistics, United States Department of Labour. (2015, February 25). *Volunteering in the United States news release*. Washington, DC. Retrieved from <http://www.bls.gov/news.release/volun.htm>
51. Lum, T. Y., & Lightfoot, E. (2005). The effects of volunteering on the physical and mental health of older people. *Research on Ageing*, 27(1), 31-55. Retrieved from <http://casw.umn.edu/wp-content/uploads/2014/07/Agging-volunteering.pdf>
52. Volunteer Canada. (2013). *Volunteering and older adults*. Retrieved from <https://volunteer.ca/content/volunteering-and-older-adults-final-report>
53. World Bank. (2015). *Life expectancy* [Data file]. Retrieved from http://data.worldbank.org/indicator/SP.DYN.LE00.IN?order=wbapi_data_value_2010+wbapi_data_value+wbapi_data_value-first&sort=asc
54. International Longevity Centre Singapore. (2011). *A profile of older men and older women in Singapore 2011*. Singapore. Retrieved from http://tsaofoundation.org/doc/Profile_Of_Older_Men_-_Singapore.pdf
55. Huang, C. (2014, July 17). Hospital bed crunch a cumulative problem. *The Business Times*. Retrieved from <http://www.businesstimes.com.sg/top-stories/hospital-bed-crunch-a-cumulative-problem>
56. Ng, J. Y. (2014, January 21). Ageing society contributes to hospital bed crunch: Gan. *Today*. Retrieved from <http://www.todayonline.com/singapore/ageing-society-contributes-hospital-bed-crunch-gan>
57. Lee, M. (2013, July 26). Enhancing quality of life of the elderly. *The Straits Times*. Retrieved from <http://business.asiaone.com/news/enhancing-quality-life-the-elderly>
58. Matthews, M., & Straughan, P. T. (2014). *Results from the perception and attitudes towards ageing and seniors survey 2013/2014* [Working paper]. Institute of Policy Studies. Retrieved from http://lkyspp.nus.edu.sg/ips/wp-content/uploads/sites/2/2014/10/wp22_151015.pdf
59. Tai, J., & Lim, L. K. (2012). Seniors living alone may rise to 83,000 by 2030. *The Straits Times*. Retrieved from <http://app.msf.gov.sg/Portals/0/Summary/pressroom/MediaCoverage/Apr2012/120412%20ST%20SpB6%20Seniors%20living%20alone.pdf>
60. Ng, T. P. (2013). *Singapore longitudinal ageing studies (SLAS): Psychosocial, lifestyle, behavioural, biomedical determinants of ageing and health outcomes* [Presentation slides]. Retrieved from http://www.ils.i.org/SEA_Regio/Documents/2013%20Conference%20on%20Healthy%20Ageing%20%28Singapore%29/Plenary%20Session%205/04%20Tze%20Pin%20Ng%20Singapore%20Longitudinal%20Ageing%20Study%20.pdf
61. Infocomm Development Authority. (2012). *Individual computer and internet usage by age group, 2012* [Data]. Singapore. Retrieved from <http://www.ida.gov.sg/Tech-Scene-News/Facts-and-Figures/Infocomm-Usage-Households-and-Individuals>
62. Tech-savvy seniors in Singapore seek digital tools to manage health. (2014, February 17). *Accenture*. Retrieved from <http://www.accenture.com/sg-en/company/newsroom-singapore/Pages/tech-savvy-seniors-seek-digital-tools.aspx>
63. Blackbox Research Pte Ltd (2012). *Smartphones in Singapore: A whitepaper release*. Singapore. Retrieved from <http://www.blackbox.com.sg/wp/wp-content/uploads/2012/05/Blackbox-YKA-Whitepaper-Smartphones.pdf>
64. Matthews, M., & Straughan, P. T. (2014). *Results from the perception and attitudes towards ageing and seniors survey 2013/2014* [Working paper]. Institute of Policy Studies. Retrieved from http://lkyspp.nus.edu.sg/ips/wp-content/uploads/sites/2/2014/10/wp22_151015.pdf
65. Matthews, M., & Straughan, P. T. (2014). *Results from the perception and attitudes towards ageing and seniors survey 2013/2014* [Working paper]. Institute of Policy Studies. Retrieved from http://lkyspp.nus.edu.sg/ips/wp-content/uploads/sites/2/2014/10/wp22_151015.pdf

CHAPTER 2

1. Wilson, E. (2009, April 16). Find hidden opportunities in the senior market. *Entrepreneur*. Retrieved from <http://www.entrepreneur.com/article/201292>
2. Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
3. Maslow, A.H. (1943). A theory of human motivation. *Psychological Review*, 50 (4), 370–96. Retrieved from <http://psycnet.apa.org/journals/rev/50/4/370/>

CHAPTER 4

1. Ministry of Manpower. (2013). *Labour force in Singapore*. Singapore. Retrieved from <http://stats.mom.gov.sg/Pages/Labour-Force-In-Singapore-2013.aspx>
2. Smith, A. (2014, April 3). Older adults and technology use. *Pew Research Centre*. Retrieved from <http://www.pewinternet.org/2014/04/03/older-adults-and-technology-use/>
3. Greying Asia: Public and private sector healthcare solutions for a growing elderly population. (2015, Jan 12). *Hospital Management Asia*. Retrieved from <http://hospitalmanagementasia.com/greying-asia-public-and-private-sector-healthcare-solutions-for-a-growing-elderly-population/>
4. Freid, V. M., Bernstein, A. B., & Bush, M. A. (2012). *Multiple chronic conditions among adults aged 45 and over: Trends over the past 10 Years* [Data brief 100]. United States Department of Health and Human Service, National Centre for Health Statistics (NCHS). Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db100.htm>
5. AARP. (2010). *Home and community preferences of the 45+ population*. Washington, DC. Retrieved from <http://assets.aarp.org/rgcenter/general/home-community-services-10.pdf>
6. Dearne, K. (2010, July 24). Technology the ticket to elderly home care. *The Australian*. Retrieved from <http://www.theaustralian.com.au/news/health-science/technology-the-ticket-to-elderly-home-care/story-e6frg8y6-1225895832045>
7. Kang, S. H., Tan, E. S., & Yap, M. T. (2013). *National survey of senior citizens 2011*. Institute of Policy Studies. Retrieved from http://app.msf.gov.sg/Portals/0/National%20Survey%20of%20Senior%20Citizens%202011_Complete_amended_use%20this%20CH.pdf
8. Perissinotto, C. M., Cenzer, I. S., & Covinsky, K. E. (2012). Loneliness in older persons: A predictor of functional decline and death. *Arch Intern Med*, 172(14). Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/22710744>
9. Social networking for seniors. (2009, June 1). *The New York Times*. Retrieved from http://newoldage.blogs.nytimes.com/2009/06/01/social-networking-for-seniors/?_r=0

Commissioned by



designsingapore.org

Research by

orcades:gn

orcadesign.net

 **SUPRACOPULA**

supracopula.com

ISBN: 978-981-09-6504-4

©2015 DesignSingapore Council. All Rights Reserved.