

Creating a Dementia-Friendly



Neighbourhood



A YIO CHU KANG PILOT PROJECT

Co-developed by:



CENTRE for
LiveableCities
SINGAPORE

SUTRA | Social Urban
LABORATORY
SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN



In support of:

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The **Agency for Integrated Care (AIC)** coordinates the delivery of aged care services, and enhances service development and capability-building across both the health and social domains. AIC works closely with community care partners to support them in service development and manpower-capability building, to raise the quality of care and bring care support closer to those in need.

The **Centre for Liveable Cities (CLC)** is a division of the Ministry of National Development, with a mission to distill, create and share knowledge on liveable and sustainable cities. The CLC’s work spans four main areas—Research, Capability Development, Knowledge Platforms, and Advisory. Through these areas, CLC provides urban leaders and practitioners with the knowledge and support needed to make our cities better.

Social Urban Laboratory (SOULab) is a design research lab based in the Singapore University of Technology and Design (SUTD), focusing on evidence-based design for health, equity, agency, and life, through investigating the relationships between people and the environment. Our research interests include demographic shifts, healthy longevity, place-making, place-keeping, asset-based community design, and other emerging urban phenomena.

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Foreword

By Yip Hon Weng
Adviser to Yio Chu Kang Grassroots Organisations



As Singapore's population is ageing rapidly, there is a greater need to better care for our seniors, including persons living with dementia and their caregivers.

Yio Chu Kang is an example of such a senior estate, both in terms of its infrastructure and residents. Residents aged 65 and above now form approximately 40% of the constituency's population. Hence, we announced in December 2021 that Yio Chu Kang will be the first dementia-friendly constituency by 2025, with estate-wide dementia-friendly infrastructure and services.

Dementia-friendly environmental features benefit many in navigating the neighbourhood safely and facilitate ageing-in-place. The dementia-friendly environment aids in wayfinding, improves accessibility and safety, and promotes community bonding.

Dementia-friendly environmental features benefit many in navigating the neighbourhood safely and facilitate ageing-in-place. The dementia-friendly environment aids in wayfinding, improves accessibility and safety, and promotes community bonding.

Yio Chu Kang, as an existing Dementia-Friendly Community, is the first pilot site in Singapore to participate in the Dementia-Friendly Neighbourhood Study. This local, ground-up and evidence-based initiative aims to develop design prototypes and guidebooks which can be used to create more dementia-friendly communities across Singapore, as part of the wider Dementia-Friendly Singapore (DFSG) movement. The initiative involves multiple community partners and agencies, i.e. the Agency for Integrated Care (AIC), Centre for Liveable Cities (CLC), the Singapore University of Technology and Design (SUTD), Ang Mo Kio Town Council, AWWA, Thye Hua Kwan (THK) Active Ageing Centre @ 645, the People's Association (PA), and schools. This whole-of-society effort facilitates the co-creation of solutions and ensures a holistic review to cater to seniors' needs.

We are committed to making Yio Chu Kang an inclusive place for all to live in. We continue to be open to feedback and co-creation opportunities with the residents to make Yio Chu Kang the best possible home for all.



PREFACE

Creating dementia-friendly neighbourhoods in Singapore

By Elaine Tan
Director, Centre for Liveable Cities (CLC)

In 2019, AIC and CLC set out on the AIC-CLC Dementia-Friendly Neighbourhood Study, with the aim of tackling the growing incidence of dementia in tandem with an ageing population. Whilst AIC had initiated the Dementia-Friendly Communities (DFCs) and Dementia Friends network initiatives since 2016 to raise awareness and provide a network of support through programmes and services, there was still a gap in the built environment that would complement AIC's efforts.

The study hence set forth to uncover what it would take to encourage and enable persons in the early to moderate stages of dementia to continue to navigate their daily lives in familiar neighbourhoods, where they had built their communities, support networks, and memories over the years. Understanding that dementia is a degenerative disease that can span several years, it was even more essential to support persons with dementia and their caregivers in familiar neighbourhoods and to delay the need for institutionalisation, i.e. nursing homes, for as long as possible.

Scouring overseas case studies and having met with local champions, academics and practitioners in the field of dementia, we uncovered two key gaps. Firstly, whilst there were literature on and examples of environmental design for dementia, these were mainly in the realm of the home, within institutions and in low to mid-density urban settings. Another gap was the need to have a localised understanding of the perceptions, cultural and behavioural differences affecting how persons living with dementia, caregivers and their communities

interact with one another. Hence, there was a need to commission a study on dementia that is contextualised to Singapore's predominantly high-rise, high-density urban environment, backed by localised insights.

Whilst the project was temporarily halted from 2020–2021, we resumed this journey with the support of a network of stakeholders in a joint commissioned study with the Singapore University of Technology and Design (SUTD).

The initial ethnographic study yielded important evidence-based design-thinking principles that are featured in this publication.

Another gap was the need to have a localised understanding of the perceptions, cultural and behavioural differences affecting how persons living with dementia, caregivers and their communities interact with one another.

Apart from validating new approaches to strengthening a person's mental map, our study gave us new insights on the importance of applying a minimalist design sensibility to reduce the cognitive load of residents, contrary to having more signages. Taking a practice-oriented approach, the prototypes from this project are proofs of concept that we hope will inspire the application of these principles in other contexts. Taken together, the lessons gleaned from this pilot study at Yio Chu Kang uplift our capability and knowledge regarding designing dementia-friendly neighbourhoods in Singapore.

We hope this publication offers guidance and not prescription on how we can design a dementia-friendly neighbourhood. Through good design, we can empower persons living with dementia and their caregivers to continue to lead secure, independent, and dignified lives in their neighbourhoods and amidst familiar surroundings.



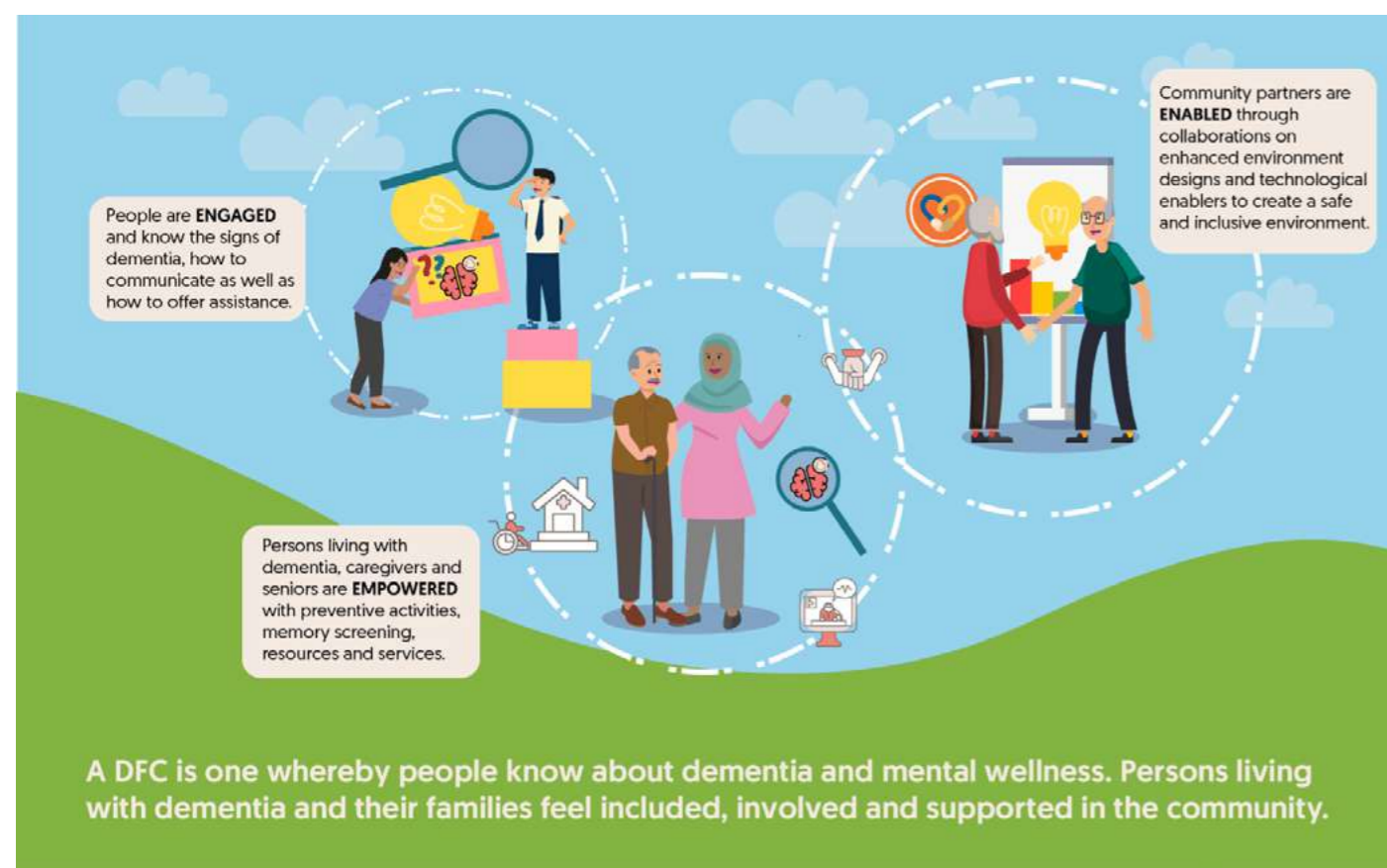
PREFACE

An integrated approach to dementia-friendly neighbourhoods

By See Yen Theng
Chief, Caregiving and Community Mental Health Division,
Agency for Integrated Care (AIC)

Singapore is facing an ageing population. By 2030, it is projected that locally, more than 150,000 persons would be living with dementia. With that, the Ministry of Health announced the launch of the Dementia-Friendly Singapore (DFSG) initiative, led by AIC to build dementia-friendly communities to support the needs of this growing group.

This requires a whole-of-community approach— involving grassroots organisations, government agencies, health and social care providers, residents, including persons living with dementia and caregivers, all coming together to create inclusive neighbourhoods where persons living with dementia and their families feel included, involved and supported in the community.



To complement the “Hardware”, AIC is building the “Heartware” through the DFSG movement to create the kampung spirit where the community plays a part in supporting those living with dementia in their neighbourhood.

We adopted a two-pronged approach: building the “Hardware” (environmental infrastructure) and creating the “Heartware” (building awareness, services and support). A well-designed built environment can enable persons living with dementia to navigate their neighbourhood safely, and confidently continue with their daily routines. While persons living with dementia benefit the most from the dementia-friendly environment design principles which focus on wayfinding and sensory stimulation, the general public will also find them useful.

To complement the “Hardware”, AIC is building the “Heartware” through the DFSG movement to create the kampung spirit where the community plays a part in supporting those living with dementia in their neighbourhood.

One key focus is increasing dementia awareness in the general community, businesses, transport operators, and schools. This is to build empathy, learn ways to communicate with persons living with dementia, and enable the general public to offer assistance when needed. Other local efforts include establishing Dementia Go-To Points (GTPs) which are accessible touch points in the community that assist those who are lost or wandering to reunite them with their families. Community Outreach Teams (CREST) facilitate early identification of dementia and identify those who need support, while Caregiver Support Networks focus on supporting caregivers.

These dementia-friendly neighbourhood designs create spaces where Active Ageing Centres, PA, National Parks Board (NParks) and Sport Singapore (SportSG) can create meaningful active ageing and cognitively stimulating programmes for seniors and persons living with dementia. These may include co-creation of activities with residents like co-planting in sensory gardens, community walks and mural painting. We hope that the synergy of targeted programming leveraging on environment designs will inject vibrancy and fun in the community.

AIC is glad to partner CLC and SUTD in this pilot project to develop localised resources with practical tips and recommendations on how to kickstart a dementia-friendly neighbourhood. We hope that this resource is able to inspire and guide more partners to develop more dementia-friendly neighbourhoods where persons living with dementia and their caregivers feel included, involved and supported in the community.

Let’s build a caring and dementia-friendly Singapore together.

Chapter 1

Creating a city for all

1.1 The need for dementia-friendly neighbourhoods

Singapore's population is ageing rapidly, with the city projected to be home to over 900,000 seniors by 2030. Although dementia is not a natural part of ageing, its incidence is expected to rise and become more prevalent in older adults. While one in 10 persons aged 60 and above in Singapore has dementia in 2023, this number is expected to double to approximately 152,000 by 2030.¹ It is against this backdrop that Singapore needs to build a more caring and inclusive society for persons living with dementia.

The National Dementia Strategy was developed to meet the evolving needs of persons living with dementia and their caregivers.² It guides ministries, agencies, health and community care providers in the development and implementation of services to care for persons living with dementia and their caregivers.

Today, there are various care services to support persons living with dementia and their caregivers. AIC launched the #DementiaFriendlySG movement in November 2022 to strengthen dementia-friendly networks and rally society to build a caring and dementia-friendly Singapore.

Creating a truly inclusive city for persons living with dementia must go beyond care services. The infrastructure (hardware) and programmes (software) of our city should work hand-in-hand so that persons living with dementia can continue to live independently and with dignity in their homes. We will need to expand our idea of age-friendly design in the built environment to go beyond addressing physical disability and include cognitive impairments (Figure 1).

¹ "Let's talk about vascular dementia", HealthHub, <https://www.healthhub.sg/programmes/186/MindSG/vascular-dementia>

² Written response by Ministry of Health to Parliamentary Question on 3 November 2020, <https://www.moh.gov.sg/news-highlights/details/dementia-plans-and-subsidy-support-for-dementia-care>

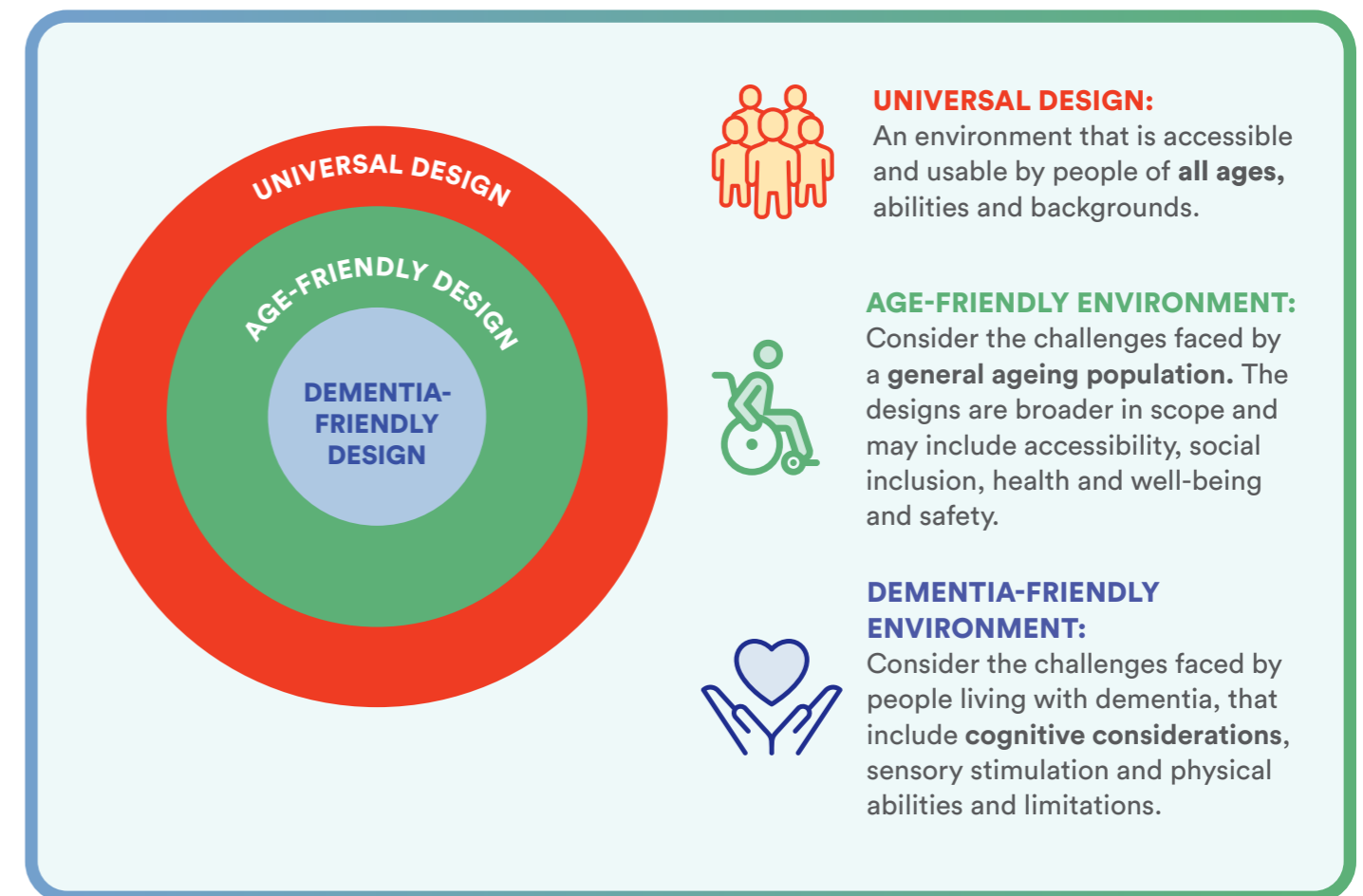


Figure 1: Dementia-friendly designs will support age-friendly and universal designs. Image: AIC

Based on the Housing and Development Board (HDB) sample household survey, senior residents in HDB flats indicated a strong preference to remain and grow old in their existing homes.³ It is important for us to future-proof our neighbourhoods and make them dementia-friendly. By doing so, we can empower persons living with dementia to age in community for as long as possible. In addition to age-friendly design, incorporating dementia-friendly design principles will be a significant step towards our shared vision of making Singapore an inclusive city.

³ HDB Sample Household Survey 2018, https://www.hdb.gov.sg/cs/infoweb/-/media/HDBContent/Images/CDG/Library/Library/SHS-2018-Monograph-1---2-Mar-2021_BLUE.pdf



ABCD SIGNS AND SYMPTOMS OF DEMENTIA

Dementia is a collection of different symptoms characterised by a progressive worsening of memory and intellect (cognitive abilities), orientation, or personality, that is caused by the diseases that affect the brain. It is not a natural part of ageing. Persons living with dementia may gradually find the following abilities challenging:

Thinking and reasoning

Remembering new information or recalling recent events

Learning new information and skills

Caring for oneself

Problem-solving and making judgements

Dementia occurs when several changes take place in the brain.

There are several stages of dementia, with the experience different for each person. In most types of dementia, memory problems may be early signs. The deterioration in cognitive skills is gradual and in later stages, daily activities will become increasingly challenging without assistance. Beyond normal ageing symptoms, the additional challenges posed by the onset of dementia might make navigating the built environment outside of one's home a herculean task.



	STAGES		
	Mild	Moderate	Advanced
A Activities of Daily Living	Still able to care for self in basic activities of daily living, i.e. personal hygiene, dressing	Requires assistance with dressing, personal hygiene, feeding, etc.	Unable to care for his/her own hygiene, feeding oneself, going to the toilet, taking a shower
	May have some difficulty with: <ul style="list-style-type: none"> • Taking public transportation • Money management • Preparing meals 	High risk of falling	Likely to have mobility issues, could be bedbound
B Behaviour	Apathy, lack of interest in activities they used to engage in	Wandering	Crying, shouting or repetitive vocalisation as a means to communicate needs
	Rapid mood changes	<ul style="list-style-type: none"> • Repetitive actions/questions • Sleep reversal • Frustration at not being able to communicate well • May appear depressed, easily agitated, suspicious 	Refusing care due to confusion
C Cognitive Decline	Forgetfulness (short-term memory loss)	Vague long-term memory	Unable to recognise current self
	Reduced judgement	Unable to recognise certain family members	Unable to communicate through language, may also be uncommunicative
	Difficulty in following storylines and conversations	Difficulty in communication due to one's repetitive speech or inability to understand contexts	Sometimes unresponsive
	<ul style="list-style-type: none"> • Impaired abstract thinking • Difficulty finding the right words • Misplacing things 	Unable to remember own address or phone number	Unable to recognise common objects
D Disorientation	Occasionally feeling disoriented, but able to navigate between frequently visited places	<ul style="list-style-type: none"> • Gets confused with concept of time • Gets lost in familiar places 	Unable to differentiate day and night

For more, read **“Living with Dementia: A Resource Kit for Caregivers”** at <https://www.dementiahub.sg/living-with-dementia-a-resource-kit-for-caregivers/>

1.2 Co-creating our inclusive neighbourhoods



Creating a dementia-friendly neighbourhood is a collaborative effort that requires different abilities, capacities, and perspectives.

Bridging different domains such as healthcare, social services, urban planning and design will lead to more holistic solutions that make a difference and positively impact the lives of others. There is also much to gain

when professionals with different domain expertise partner community stakeholders who are deeply aware of the local needs, aspirations, opportunities, and challenges that the neighbourhood faces. It is by leveraging the combined experiences and assets of various stakeholders that a neighbourhood for all—which includes persons living with dementia and their caregivers—can be created.

A MAPPING OUT THE STAKEHOLDERS IN OUR COMMUNITY

The first step to co-creating a dementia-friendly neighbourhood is to identify the members of the community ecosystem who we need to design with. This may include:

1. Community stakeholders:

- Persons living with dementia;
- Caregivers;
- Shopkeepers;
- Other residents;
- Schools; and
- Local grassroots leaders and advisers.

2. Health and social care stakeholders:

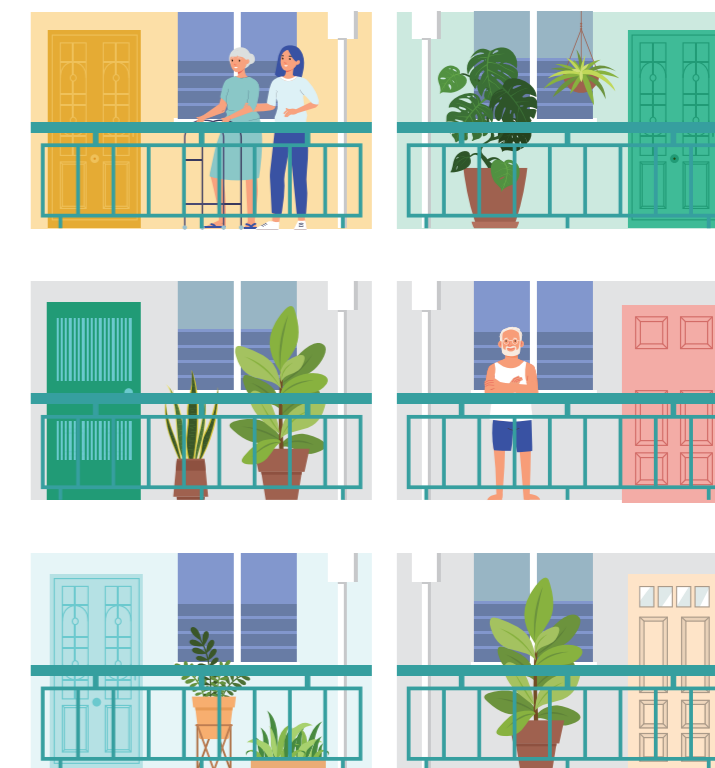
- Healthcare professionals and organisations; and
- Social service organisations.

3. Building stakeholders:

- Design professionals; and
- Town Council or Estate Management.

4. Other key stakeholders:

- Relevant government agencies.



At the same time, a simple mapping exercise to acknowledge their level of interest and influence on the project (Figure 2) could also identify how these stakeholders could be engaged along the journey of the project.

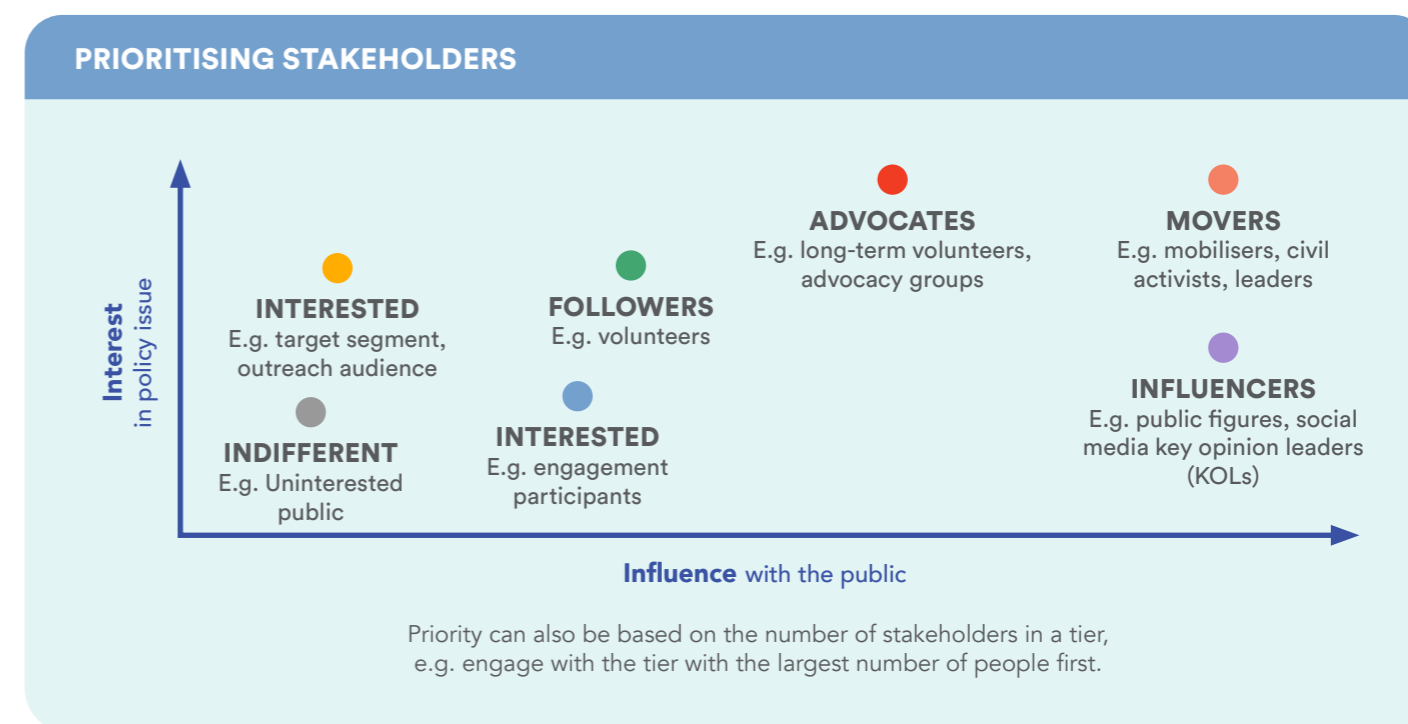


Figure 2: Interest-Influence stakeholder map. Image: CLC

B JOURNEYING WITH STAKEHOLDERS

A successful co-creation journey is only possible when community stakeholders are consulted on a regular basis to align everyone's goals and objectives. This approach also harnesses the strength of each stakeholder and is aimed at building their capacity to make change.

Often, this journey spans a few key stages with various stakeholders involved in various capacities at each stage. But remember, every community is unique and will undertake its own co-creation journey!



01

SENSE & UNDERSTAND

This involves **engaging** and getting to know the various stakeholders in the project. It also includes walking the ground (often literally) with them to **understand** the gaps and opportunities that can be worked on together. This stage also includes acknowledging the unique capabilities and capacities that everyone brings to the table.

02

REVIEW & PROCESS

This is a critical stage where we **digest and make sense** of all the data that has been collected and formulate **insights** from this data that guide the rest of the co-creation journey.



03

IDEATE & REFINE

Translating **insights into ideas** is an act of creative synthesis best done together. This is often an iterative process which includes **crowdsourcing ideas and comments** from the wider group of stakeholders to refine and validate the initial concepts. This is then followed by **prioritising, refining, and planning** with real-life considerations in place!



05

EQUIP & BUILD

Turn the ideas into reality together and make the building process a **community effort**. Don't forget to **build capabilities and capacities** by equipping stakeholders with resources and knowledge! Also, share with others the new possibilities and experiences that now exist in the community.



04

MONITOR & SUSTAIN

What is working for us? What can be done better? How can we keep this going? Having a **reflective mindset** enables the project to evolve and meet the changing needs of the community. With the capabilities developed in the previous stage, this sets up the project to have strong **community stewardship** to sustain it for the long run.



Check out CLC's **Building Community Resilience** publication to learn more about this journey.



For a guide on mapping out design-friendly neighbourhoods, go to [Annex: CLC's journey map for a community-owned project](#).

Ready to see this framework in action? Go to [Chapter 2: A local study at Yio Chu Kang](#).



Chapter 2




A local study at Yio Chu Kang



2.1 Scoping and designing the research

Many dementia-friendly guidelines in Singapore today are meant for indoor, regulated settings such as nursing homes. Similarly, recent work such as “Hack Care” by Lien Foundation, Lekker Architects, and Lanzavecchia + Wai Design Studio, and AIC’s “360° Virtual Reality Dementia-Friendly HDB Home Design Guide” also focus on the domestic home. While guidelines for creating dementia-friendly neighbourhoods are readily available overseas, these are based on lower-density neighbourhoods in Australia and the United Kingdom.⁴ Existing locally driven efforts, such as the Six Principles of Dementia-Friendly Neighbourhoods, and the development of local neighbourhoods with dementia-friendly features, such as at Nee Soon South, are also based on overseas references. This establishes the need to develop design principles and guidelines that are relevant and validated to our local context.

Specifically, a few questions need investigation:

-  **How do persons living with dementia relate to Singapore’s high-rise, high-density urban environments?**
-  **How do local context and behaviours (e.g. caregiving, community awareness) contribute to the neighbourhood experience of persons living with dementia?**
-  **In a city which needs to be rejuvenated and redeveloped, how do we balance our desire to improve with the need to enhance the familiar?**

⁴ Many references for the UK exist, such as: Burton & Mitchell (2006), Inclusive Urban Design: Streets for Life; Alzheimer’s Australia (2011), Building Dementia and Age-Friendly Neighbourhoods; and Royal Town Planning Institute (2017), Dementia and Town Planning. Burton & Mitchell’s dementia-friendly guidelines were conceptualised within the context of Oxfordshire and Berkshire, areas in the UK characterised by a predominance of low-rise buildings and lower population densities.

A RESEARCH METHODOLOGY

To arrive at answers that can guide the development of dementia-friendly neighbourhoods in Singapore, the CLC and AIC partnered with SUTD to conduct a pilot research study between 2019-2023 (with a pause during the COVID-19 circuit breaker period) utilising CLC’s multi-stakeholder participatory research framework (Figure 3).

At the same time, the methodology outlined in Chapter 1.2 provided the foundation for this pilot study.⁵ 10 hypothesised characteristics⁵ of a dementia-friendly neighbourhood in Singapore derived through a literature review and a pilot workshop were also used as the starting point of the study.

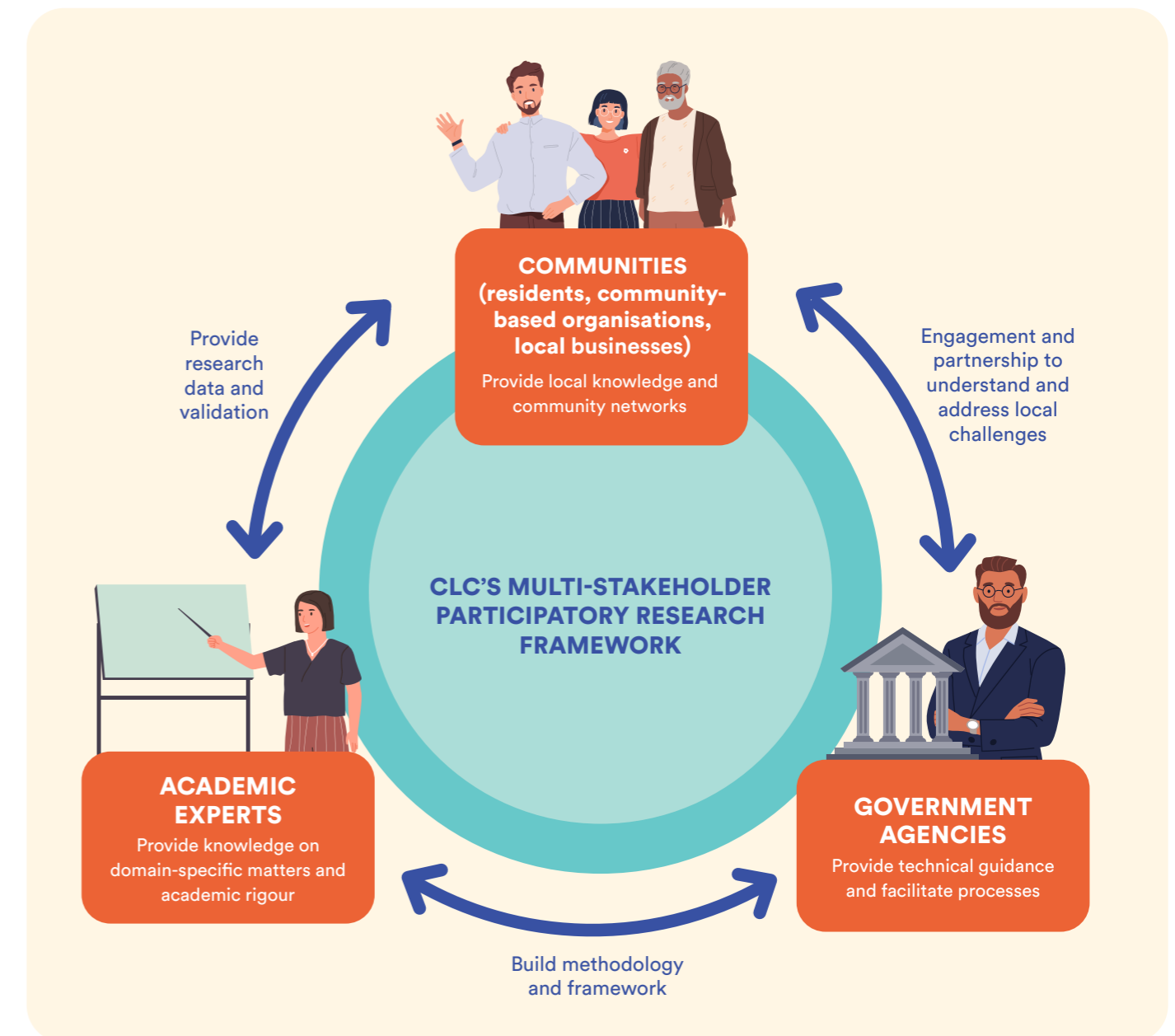


Figure 3: CLC’s multi-stakeholder participatory research framework. Image: CLC

⁵ The 10 original hypothesised characteristics are: Safe, Comfortable, Accessible, Legible, Familiar, Choice, Continuity, Engaging, Delightful, and Purposeful.



Figure 4: Overview of stages in the AIC-CLC Dementia-Friendly Neighbourhood Study.

⁶ Sample sizes: 10 persons living with dementia, 10 caregivers, 80 residents and 20 local stakeholders.

⁷ Proposed sample size for PIR: 150 residents.

B SITE SELECTION

The neighbourhood of Yio Chu Kang was selected for this study as it is an existing Dementia-Friendly Community with a notable number of seniors and persons living with dementia, as well as the strong presence of social service providers based in the neighbourhood such as the AWWA and Thye Hua Kwan Active Ageing Centre @ AMK 645. To further scope the study, three precincts within the neighbourhood were selected for detailed study and engagement: Zones 2, 3, and 9.

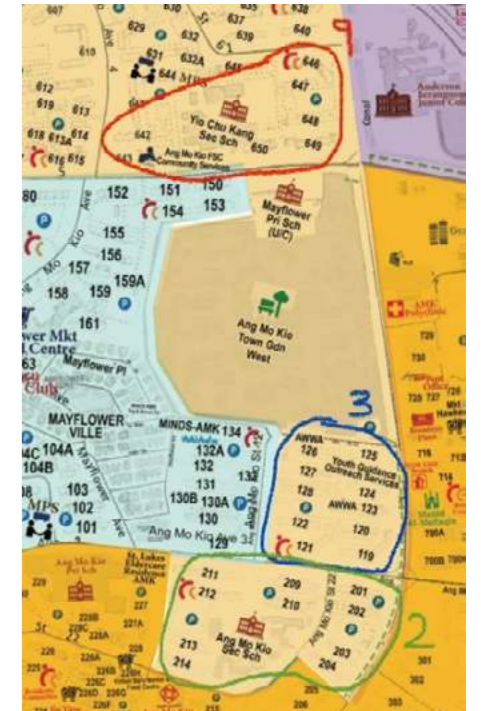


Figure 5: Site map of areas of study, and logos of local stakeholders involved in the study. Image: CLC

2.2 Sense & Understand: Talking to, walking with, and observing the community

Individuals with cognitive disabilities may have difficulty expressing themselves or may struggle with memory recall. Researchers or stakeholders who would like to engage persons living with dementia should adapt their methodologies and communication strategies accordingly. There is also a need to exercise flexibility, patience, and empathy to allow time for responses.

With that, a range of methods were utilised in the AIC-CLC Dementia-Friendly Neighbourhood Study to develop a deeper understanding of the needs, experiences, and considerations of persons living with dementia and their caregivers. Visual aids, sensory stimulation, and simplified language were used in the engagements. Researchers also paid attention to non-verbal cues from the person living with dementia, including their facial expressions, body language, and any signs of discomfort or agitation. Through using the appropriate methodologies, “thick data” with over 1,000 data points was collected to understand the stakeholders, so as to review the initial hypothesis regarding the characteristics of a dementia-friendly neighbourhood.



Visual aids, sensory stimulation, and simplified language were used in the engagements. Researchers also paid attention to non-verbal cues from the person living with dementia, including their facial expressions, body language, and any signs of discomfort or agitation.



A JIGSAW MOODBOARD

As traditional interview methods might be too demanding for a person living with dementia to comprehend, the jigsaw moodboard technique which uses picture pieces as a form of communication was utilised for them to express their responses in a non-verbal way.⁸

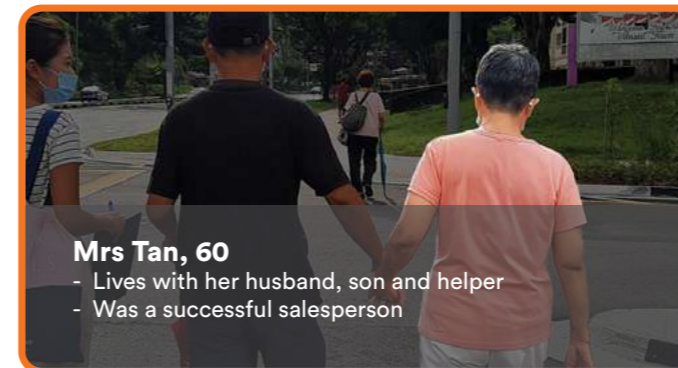
To understand their preferred daily routines, each person living with dementia was given a set of picture pieces, each showing a different feature in their neighbourhood. They were then asked to select pictures that would constitute an ideal day in their neighbourhood. This was followed by an interview with their caregivers to understand the “why” behind the selected pieces and understand their lifestyles, habits, and aspirations.



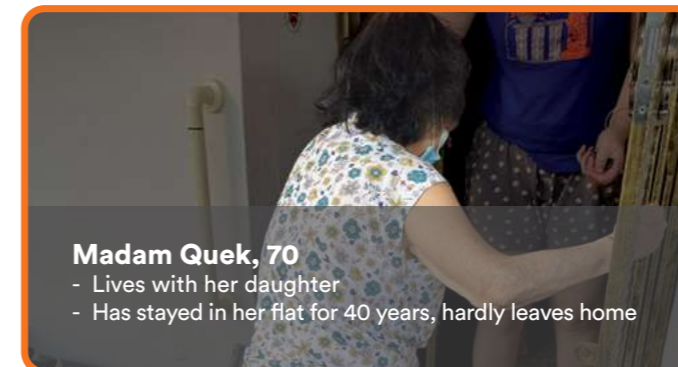
Figure 6: Example of a jigsaw moodboard created by some participants in the study. Image: SUTD Social Urban Lab
This pictorial interactive tool Jigsaw Moodboard is developed by design practice COLOURS.

⁸ Alzheimer's Society. *Non-verbal communication and dementia*. <https://www.alzheimers.org.uk/about-dementia/symptoms-and-diagnosis/symptoms/non-verbal-communication-and-dementia>

B WALKING INTERVIEW AND PARTICIPANT OBSERVATION



Mrs Tan, 60
- Lives with her husband, son and helper
- Was a successful salesperson



Madam Quek, 70
- Lives with her daughter
- Has stayed in her flat for 40 years, hardly leaves home



Madam Lee, 76
- Lives with her husband
- Downsized to current flat five years ago



Madam Tay, 83
- Lives with two helpers and children will rotate staying over daily
- Fluent in Malay

Figure 7: Range of participant profiles who participated in the study. Images: SUTD Social Urban Lab
Names have been changed to protect the privacy of the interviewees.

To develop a better understanding of the needs of a person living with dementia, the study devised an approach to observe and document their behaviour and interaction in their natural environment.

A pair of researchers accompanied a person living with dementia and their caregiver on a walk, with one asking questions along the journey and the other observing and taking notes. Through this approach, the researchers could note reactions and responses to the environment, in particular, wayfinding techniques, and spaces which they gravitated towards or avoided.⁹

During breaks on the walk, researchers would also ask caregivers to reflect on how comfortable, intuitive, or legible navigating the neighbourhood was. This process was facilitated through the use of the Walking Interview Guide (Annex). The Walking Interview Guide builds on the framework of the Dementia-Friendly Environmental Assessment Tool (DFC-EAT) by Fleming and Bennett (2015), and is a design ethnographic tool to collect first-hand data from persons living with dementia and their caregivers. The Walking Interview Guide is a helpful tool for design professionals doing ethnographic research, to understand the needs of persons living with dementia and their caregivers in a specific locality.

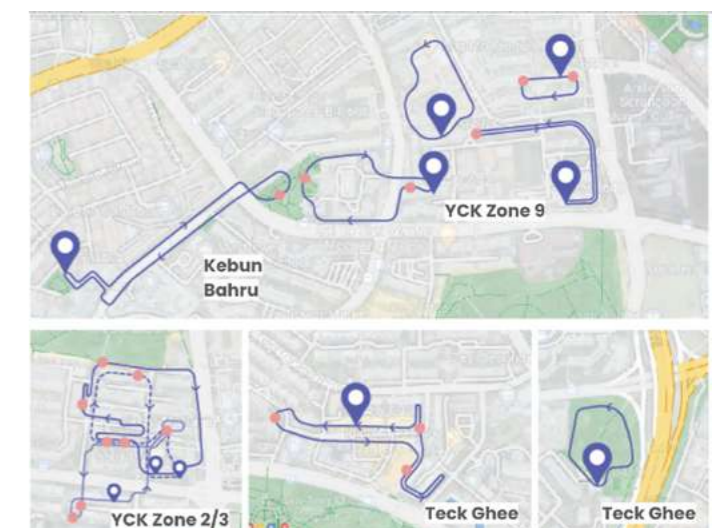


Figure 8: Routes taken by persons living with dementia and their caregivers in their respective neighbourhoods.

⁹ Mitchell, Lynne, and Elizabeth Burton. (2010). *Designing Dementia-friendly Neighbourhoods: helping people with dementia to get out and about*. *Journal of Integrated Care*, 18(6), 11-18.

C COMMUNITY WORKSHOPS

To engage the other stakeholders in the Yio Chu Kang community, community workshops were held with residents and other local partners from the three zones. This was with the intent of drawing insights and perspectives from those who are intimately familiar with the neighbourhood, having lived, visited or worked there for many years. Other than using their input to supplement what was gathered from engagements with persons living with dementia and their caregivers, this workshop also offered an opportunity for the participants to appreciate the needs of others in the built environment. Taken together, this led to a fuller grasp of the needs and aspirations of the wider community, so that proposed design principles, guidelines, and prototypes would be beneficial and inclusive.

Two activities were conducted at these workshops. The first activity prompted participants to choose examples of dementia-friendly public spaces that they liked and elaborated on the specific qualities

that resonated with them and the reasoning behind their choices (Figure 10). The second activity prompted participants to share a route in the neighbourhood that they frequented and then give their opinion on which of the examples selected in the first activity should be placed along these routes (Figure 11).

Through these two activities, the team learned of assets that can be leveraged on, common pain points, and certain local preferences such as shortcuts or routes favoured by the community. But more importantly, the activities brought to light environmental qualities the community felt were important in a dementia-friendly neighbourhood, such as those that would offer cognitive respite or physical rest. The workshop also surfaced the community's ideas and preferences regarding possible interventions that could be prototyped around the neighbourhood (Figure 12).



Figure 9: Engaging residents at the community workshop in May 2022.

MY FAVOURITE DEMENTIA-FRIENDLY PLACES | ACTIVITY #1



Figure 10: Snapshot of the first activity which tasked residents to identify and evaluate the benefits of potential dementia-friendly designs.

OBJECTIVE

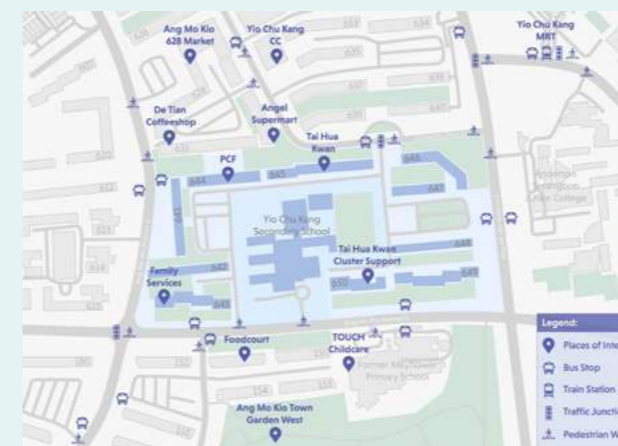
Have participants choose mood images that they like, to inspire them regarding potential new designs. Facilitators can prompt participants by asking about what they like to do in their free time or what places they like to visit in the neighbourhood.

NOTES

Assign post-it notes in different colours to each resident. Take note of who uses which colour. Facilitator can take one colour for his/her own ideas/note-taking.

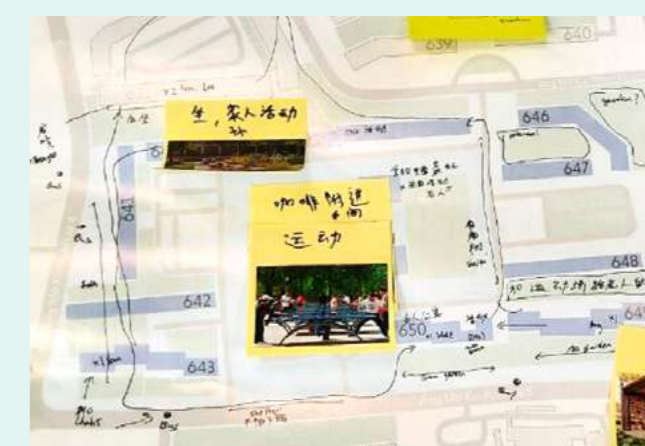
Participants can choose from any of the 20 mood images and paste the one that they like most on the board.

MY FAVOURITE DEMENTIA-FRIENDLY PLACES | ACTIVITY #2



OBJECTIVE

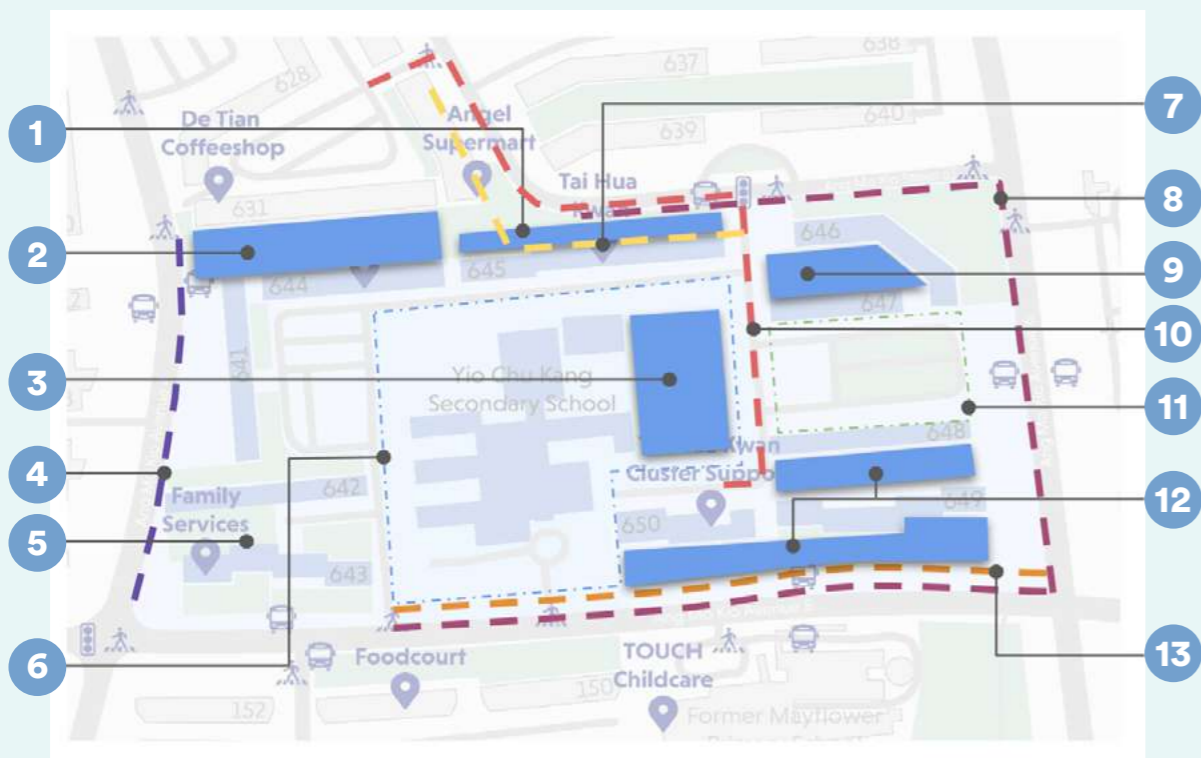
To understand residents' routes and places better and how they live and move around Zone 9. By using the shortlisted images as inspiration, they are then able to suggest design ideas for these areas.



NOTES

Assign post-it notes in different colours to each resident to identify his/her respective contributions. Facilitator should also choose one colour for his/her own ideas/note-taking.

KEY TAKEAWAYS



- 1 Wishes for more facilities, a community garden or seats and pavilions outside THK.
- 2 Plaza could have more planned programmes or sports/play amenities.
- 3 Large field can be used for pop-up events, maybe in collaboration with students.
- 4 Would like to see more shelter along this walkway.
- 5 Fitness corners like these are targeted for older people, but they find it hard to start using them without guidance.
- 6 Wondering if the school can be used by the public outside school hours as it is very centralised.
- 7 This route to the market is sheltered but it is more cumbersome to climb up the stairs, weave around and maneuver through shops and crowds.
- 8 Wishes there were more seats along the circulation route for rest.
- 9 Underutilised space due to lack of shelter and programming.
- 10 Very hot when walking to the market, especially in the afternoon. Wishes there was more shelter.
- 11 Finds that the carpark takes up so much space, is unsheltered and has no amenities especially for the many residents who do not drive.
- 12 Underutilised grass spaces that residents hope can be activated as Blocks 648 and 649 are far from activities.
- 13 Large open drain restricts circulation to certain areas.

Figure 11: Summary of residents' input from Activity 1 of community workshop.

KEY TAKEAWAYS



- 1 Big open space can be used for outdoor sports, water features, pop-up street markets, interactive street art and play spaces for kids.
- 2 Outdoor garden seating at exercise corners (pocket park).
- 3 Covering up the drain will free up space for walking.
- 4 Proposed pop-up markets and carnivals in the school field.
- 5 Interactive water feature can be located here as there is no space in the zone.
- 6 Landscape plaza along the main road.
- 7 Wishes there was a sheltered trellis/community garden in the grassy plot.
- 8 Carpark can be converted into a landscape plaza.
- 9 Shaded walkway to Block 645 and main road.
- 10 Seating along the main roads for resting and people watching.
- 11 Community gardens and sheltered seatings to activate outdoor spaces.
- 12 Open space at the junction can be used for markets.

Figure 12: Summary of residents' input from Activity 2 of community workshop.

2.3 Review & Process: Analysing the data for insights

Through engaging with persons living with dementia, their caregivers, and the wider community, large amounts of rich qualitative data in the form of transcripts and notes were gathered. These needed a rigorous and structured process to surface recurring narratives, themes, patterns, and needs.

To accomplish this, the research team from SUTD devised an analysis process that involved a few key stages (Figure 13). Data was first categorised into different themes to facilitate a comprehensive understanding of the various dimensions of a dementia-friendly neighbourhood. The data was

also used to review, validate, and categorise the hypothesised 10 characteristics of a dementia-friendly neighbourhood (Chapter 2.3a).

Following this validation process, another level of analysis was conducted to land on key insights (Chapter 2.3b) which would offer a concise summary of the experiences that would support a person living with dementia. This would become the evidence-based design-thinking principles, and form the foundation for the design prototypes that would be created at the next stage.

Design Ethnographic Study Analysis Methodology

1 Data Collection

JIGSAW MOODBOARD + WALKING INTERVIEW

Data collection and observations during the two activities with persons living with dementia and caregivers

2 Data Processing

SORTING BY THEMES/BEHAVIOUR

Habits	Routines	Destinations
Background	Mobility	Routes, Provisions
Preferences	Community	Wayfinding

SORTING BY HYPOTHESES

Continuity	Safe	Engaging	Delightful
Familiar	Legible	Choice	Purposeful
Accessible	Comfortable		

3 Gathering Insights

DERIVING INSIGHTS THROUGH A BOTTOM-UP PROCESS

- Initial insights for each theme
- Initial insights for each hypothesis
- Complex insights for each hypothesis
- Reframe original hypothesis

4 Design Recommendations

DEVELOPING DESIGNS FROM INSIGHTS

- For each hypothesis, develop guiding principles and design recommendations with respect to environmental design
- Co-create design ideas based on recommendations for selected prototypes

Figure 13: Overview of data analysis methodology. Image: SUTD

ANALYSIS EXCERPT FROM DESIGN ETHNOGRAPHIC STUDY

Data source: Jigsaw moodboard activity

FAMILIAR

EXAMPLE 1

POSITIVE ASSOCIATIONS TO HER DAILY ROUTINE, HOBBIES, SOCIAL INTERACTIONS AND PROGRAMMES

- Person living with dementia picked out all the elements that are also in the park she goes to daily for taichi and to meet friends
- Used to go to the events organised by the Residents' Committee (RC) or service providers

APPEARS TO RECOGNISE, BUT NOT MUCH LINK AS TO WHY SHE CHOSE THESE

Typical paths and void decks in neighbourhood that she recognised, but did not seem tied to any particular reaction



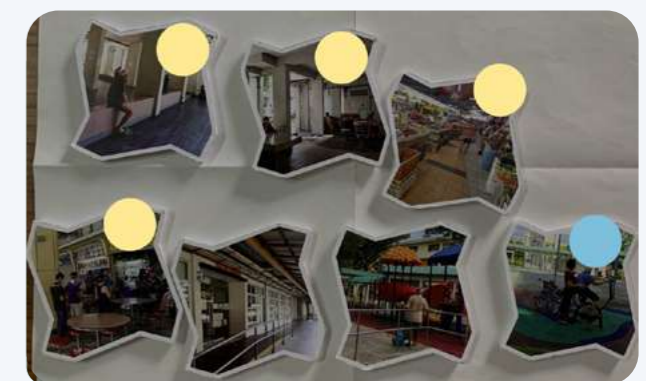
EXAMPLE 2

PLACES SHE USED TO AND STILL GOES DAILY

- Identified the void deck that she frequents
- Used to be a hawker selling vegetarian food at a hawker centre. Still retains the habit of going to the market at 5am with the spouse

RECOGNISE BUT DOES NOT USE

Eagerly repeated that this was for cycling, but was informed that she herself did not engage in that activity



● Positive ● Neutral

Figure 14: Examples of analysis and clustering conducted on the collected data.

ANALYSIS EXCERPT FROM DESIGN ETHNOGRAPHIC STUDY

Data source: Accompanied walk

0 - DISAGREE 1 - PARTIALLY AGREE 2 - AGREE	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block	Comments	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block	Comments
My care recipient has taken a walk along this same route before (by themselves/ accompanied)	2						Took this route everyday to do <i>tai chi</i> during pre-COVID times.	2						Goes down to the void deck every day, but accompanied by helper.
My care recipient knows the people in the neighbourhood	2						Knows people in the same landed estate, the security guard, friends at the <i>tai chi</i> session.	2						One that passes him newspaper, another dog owner that person living with dementia likes playing with.
My care recipient walks with confidence and without hesitation		2	2	2	2	2	Person living with dementia walks briskly and confidently.	NA	NA	NA	NA	NA	NA	Person living with dementia can remember people by their block numbers, "637" is the neighbour with the dog.
My care recipient would say the neighbourhood has not changed much		2	2	2					1	1	1			There were alot of upgrading works in the neighbourhood. Many hoarded, taped areas.
0 - DISAGREE 1 - PARTIALLY AGREE 2 - AGREE	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block	Comments	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block	Comments
My care recipient has taken a walk along this same route before (by themselves/ accompanied)	2						Used to go out often to do groceries, walk, buy food, exercise, used to walk to the market half an hour away.	2						Yes, but not frequently.
My care recipient knows the people in the neighbourhood	1						Had friends/ neighbours who would call her along to partake in activities, hairdresser also recognises her.	1						Not really, but did not meet many people on the way.
My care recipient walks with confidence and without hesitation		NA	NA	NA	NA	NA	Wheelchair-bound, when at home, walks slowly holding on to things.	NA	NA	NA	NA	NA	NA	In wheelchair but navigates with gestures, appears confident and does not require assistance.
My care recipient would say the neighbourhood has not changed much		2	2	2			Some light upgrading that the person living with dementia can recall, floor re-screeding, painting works.		1	1	1			A lot of items were being hoarded. The person living with dementia did not know why the items were kept.

Figure 15: Examples of analysis and clustering conducted on the collected data.

ANALYSIS EXCERPT FROM DESIGN ETHNOGRAPHIC STUDY

Data source: Familiarity out of over 1,000 data points

Themes	Data Points	Familiar	Legible	Accessible	Comfortable	Safe	Choice
Community	Has also been to the RC hardcourt and sports areas for activities when old neighbours (who have moved away) called her.	Positive association to memories of social interaction.		No longer accessible to her.			
Routine	The person living with dementia does some light and simple housework.	Neutral					Accepts simple chores over doing nothing (family does not mandate that the person living with dementia does these chores).
Mobility	Park and park bench: used to climb up and down the stairs for exercise daily when she was still mobile. Unable to do so anymore due to the water retention in her legs.	+ Familiarity, reminiscent		No longer accessible to her, mobility issues.			No more choice in the matter.
Preference	Wet market. Simply likes the photo.	+ The person living with dementia used to go to the wet market before her mobility took a turn for the worse.					
Preference	The route taken there goes past the supermarket and hawker centre, both of which are quite crowded.	- Knows the people and place but finds them undesirable company.			Uncomfortable with social situation.		Chooses not to participate.
Route	The route taken there goes past the supermarket and hawker centre, both of which are quite crowded.	+ Familiar sight, familiar crowd, familiar sense of bustling activity even though it has been many years since the person living with dementia was independently moving around.			The person living with dementia was comfortable with taking this route. However, the caregiver found it difficult to navigate as she has to push and weave through a crowd while not holding others up.		
Preference	Person living with dementia used to prefer instructor-led classes with many people, and does not like exercising alone.	+ Familiarity with a specific social context.					Innately prefers social contexts, and also prefers receiving instructions to having to decide.

Figure 16: Examples of analysis and clustering conducted on the collected data.

Notes

- Many things are familiar to persons living with dementia, since most of them have lived in their homes for decades.
- When queried, persons living with dementia are able to identify many things. However, the response is generally apathetic, and the persons living with dementia show no interest or preference to engage further.
- When persons living with dementia engage in further conversation after the initial prompt, their interest in things is more evident.
- Things that are familiar to them and that they have a positive reaction to include activities they have taken part in, places they go or things they do routinely, recollection of past events with family or friends, etc.

A 10 CHARACTERISTICS OF A DEMENTIA-FRIENDLY NEIGHBOURHOOD

The initial list of characteristics which were derived through a literature review and a pilot workshop were then validated alongside the evidence that was gathered through the multi-modal methodology outlined in Chapter 2.2.

From that process, it was found that while most of the broad characteristics were valid, their definitions needed refinement and elaboration to capture the caregivers' realisations and acceptance that they need to adapt to a new way of life rather than insisting on continuing past habits, and to better reflect Singapore's strong desire to improve its neighbourhoods with frequent rejuvenation efforts.

The analysis also surfaced recurring key themes related to *Mobility, Route, Wayfinding, Destination, Provisions, Community, Preferences, Background, Behaviour and Habits*. When cross-referenced with the 10 revised characteristics and viewed through the lens of a person living with dementia and their caregiver, it was also found that their motivations and barriers in perceiving, navigating, and using neighbourhood spaces could be categorised into five stages.

The validated 10 characteristics, including their updated characteristics, are summarised below and on the following pages.

Five stages of perceiving, navigating, and using neighbourhood spaces by persons living with dementia and caregivers

1 SAFE ACCESSIBLE

Essential prerequisite of neighbourhood perception

Safety and accessibility are the most common and primary perceptual needs for all residents, more so for caregivers of persons living with dementia, as they take on extra responsibility and thus tend to be more cautious. Any additional efforts to overcome safety would add more challenges and anxiety to the person living with dementia when he or she moves around in the neighbourhood. This may deter the person and their caregivers from leaving their house and using the neighbourhood facilities.

2 LEGIBLE FAMILIAR

Mental map of paths of least resistance

Once outside the house, legibility and familiarity are essential guiding characteristics. Persons living with dementia, caregivers and residents usually do not rely on external information to navigate. The reason is that when they have lived in the neighbourhood for decades, they move on autopilot based on their mental map and familiar spatial cues, sometimes using shortcuts that are more convenient or accessible. These are what we call "paths of least resistance".

3 DELIGHTFUL PURPOSEFUL

Impetuses to leave the house

Living with dementia can be very taxing on both persons living with dementia and their caregivers. Very often, after rudimentary care, they have little energy or attention left to spare. A strong attraction is needed to give them a clear reason why they would want to come out to the neighbourhood. The final destination hence should be perceived to be purposeful and delightful, and serve as a "lighthouse" that draws them throughout their journey.

4 CHOICE ADAPTABILITY

Enabling them to live in the moment

Acknowledging that some things may weigh differently for persons living with dementia, simple choices in seating, views and types of activities allow them to exercise control and express their preferences. These allow them to live in the moment and validate their experiences. In this manner, they are encouraged to learn, adapt to changes, and try out new activities.

5 ENGAGING COMFORTABLE

Reasons to carry on

At times persons living with dementia may experience disorientation and struggle with uncertainty and confusion. For them, a comfortable place for them is one where they can relax and hide away for a moment without having to think about whether they might fumble publicly or make a mistake. An engaging place is one where they know their role, what to do and where their presence is welcomed and appreciated. These forms of psychological security encourage them to carry on with their activities and stay longer at a place.

SAFE

It is important to address the psychological perception of security beyond objective environmental safety, especially for persons living with dementia and caregivers who have heightened perceptions of risk.

1

RETAIN TYPICAL FOCUS ON:

PROVIDING A SAFE PHYSICAL ENVIRONMENT FOR PERSON LIVING WITH DEMENTIA

- Compliant to universal design
- Railings/barriers
- Ramps/stairs

BUT ALSO ENHANCE FOCUS ON:

CAREGIVER

- HEIGHTENED RISK PERCEPTION ON BEHALF OF PERSON LIVING WITH DEMENTIA
- Vehicular traffic
 - Fall-risk places
 - Helper's capability

PERSON LIVING WITH DEMENTIA

- LOWER RISK ASSESSMENT, HIGHER RISK PERCEPTION
- Loitering
 - Untidy and dirty spaces

ACCESSIBLE

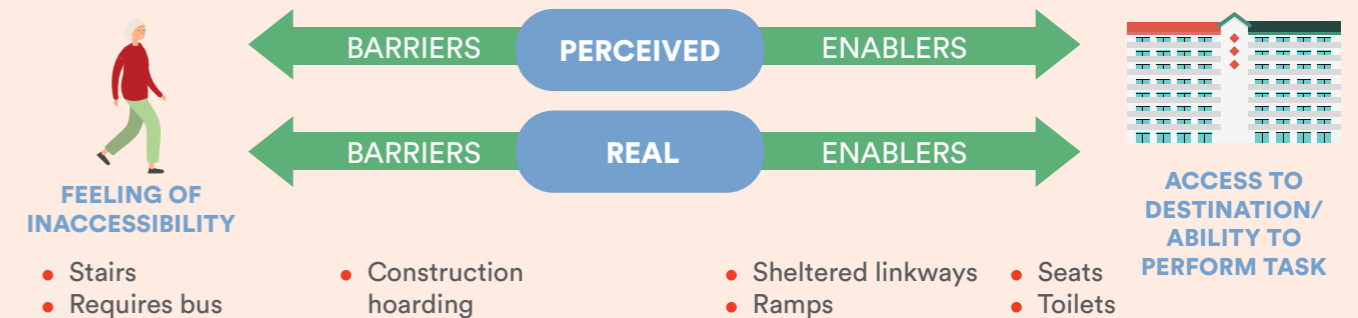
Improve the real and perceived accessibility of a destination or ability to perform a task by reducing barriers and improving access beyond physical provisions.

- Dangerous junctions
- Unfamiliar place/people/activity

- Complicated
- Caregiver stress

- Simple route
- Routine

- Activity they go often
- Interest of the person living with dementia

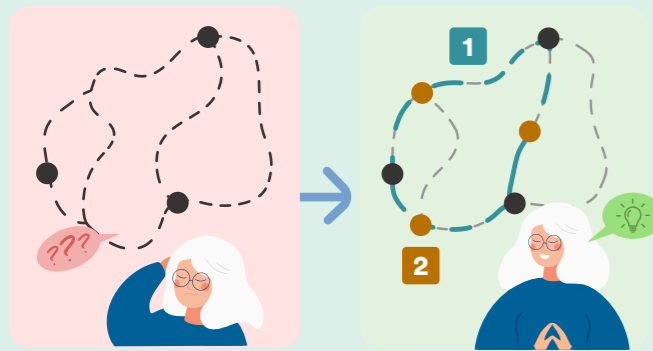


LEGIBLE

Enhance mental map of paths of least resistance beyond visual cues.

2

ENHANCE MENTAL MAP



- 1**
 - Enhance the paths of least resistance to key destinations by making the main path more distinct, comfortable, cleaner, safer, convenient
- 2**
 - Facilitate passive wayfinding at decision points
 - Provide functional landmarks to make tedious routes more manageable and enjoyable

FAMILIAR

Familiarity goes beyond the recognition of particular artifacts or environments. It includes the psychological associations these stimuli present to persons living with dementia, which can be positive, neutral or negative.



FAMILIAR

Reactions to places, amenities, objects, things in the environment

POSITIVE

- Responsive** and shows comparatively more **enthusiasm** and **interest**
- Confident** about things, spaces, places, tasks or with people that are positively familiar

NEUTRAL

- Recognise when prompted but does not really notice or care: **most things observed and queried fall into this category**
- Neutral familiarity is useful as it **enables wayfinding**

NEGATIVE

- Some association to prior bad experiences
- Confused by it
- Comparatively **stronger reactions**

DELIGHTFUL

Sources of delight for persons living with dementia can be derived from social, programmatic, nature or psychological aspects. The environment should include suitable points of intervention to facilitate these.

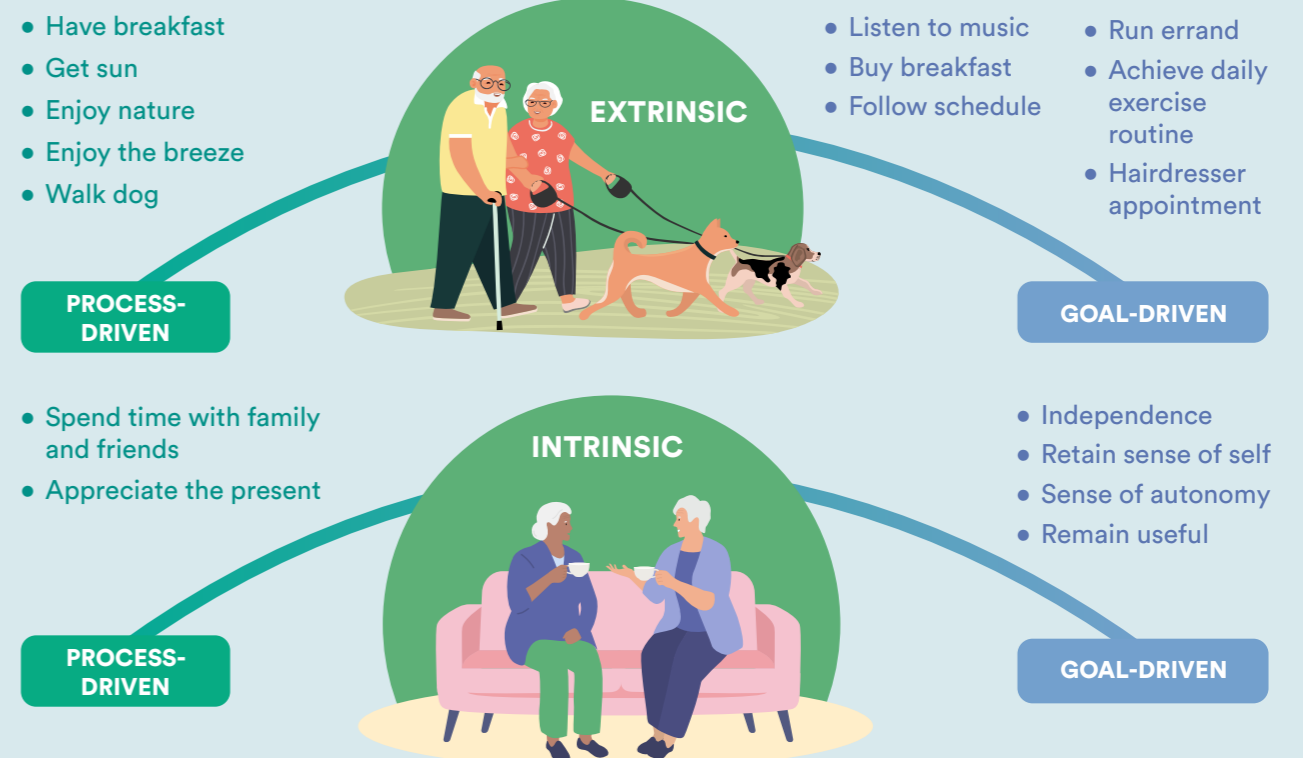
3

OBSERVED TO BE DELIGHTFUL



PURPOSEFUL

Provide environments and programmes that can facilitate the experience of a variety of goal-driven and process-driven activities and tasks.



CHOICE

Narrow down and simplify choices, provide persons living with dementia and caregivers curated and distinct options that each offer an obvious and different benefit.

4

DIFFERENT SCALES OF CHOICES	HOW TO OFFER CHOICES	WHY OFFER CHOICES
<p>Day to day: the general choices available in order to plan their daily life, e.g. which park to go to on that day.</p> <p>In a given moment: the minute choices they make on the spot that require less assessment and more intuition, e.g. choosing which spot at the void deck to park their wheelchair to have a nice view.</p>	<p>This can be achieved through fewer, simpler and more distinct choices, with clear benefits and trade-offs to the lives, interests or comforts of persons living with dementia.</p> <p>Such choices should also be presented to the caregivers, so that they can make easy decisions.</p>	<p>When persons living with dementia are able to make these decisions, they will be more engaged in activities and in their own lives, promoting real autonomy, confidence, and security. This improves their overall well-being.</p>

ADAPTABILITY

Introduce inevitable change at an incremental rate so that persons living with dementia and their caregivers can adapt easily.

Smaller changes to existing lifestyle, routine, habits and hobbies before and after diagnosis are much easier to manage for both persons living with dementia and caregivers, in terms of resources and psychology.



Sufficient time needs to be given to prepare for the changes, such that their impact can be more manageable for the persons living with dementia and their caregivers.



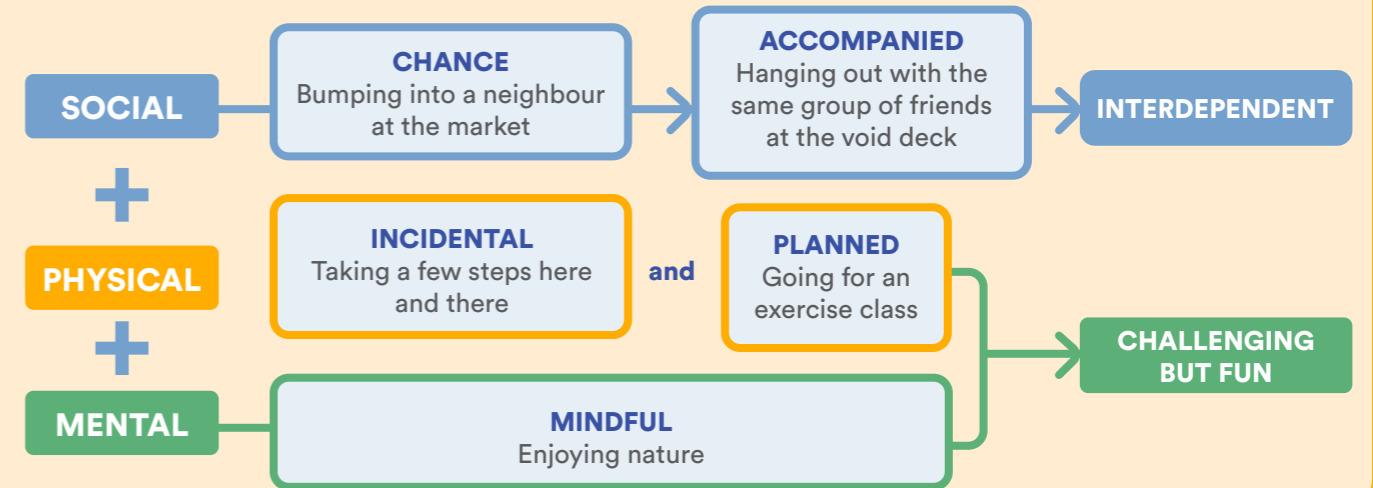
Facilitating caregiver adaptation in proxy facilitates the adaptation by persons living with dementia.

ENGAGING

Multisensory experience is not as effective in the Singaporean context due to the already-saturated urban environment. Instead, meaningful stimulation should be created through the combination of the physical, mental and social aspects within one's journey.

5

MEANINGFUL AND STIMULATING ENGAGEMENT OCCURS WHEN THERE IS A MIX OF:



COMFORTABLE

Persons living with dementia and their caregivers are more often able to highlight what makes them uncomfortable, than they are able to identify what comfort means to them. Reduce undesirable sensorial and physical stimuli, ensure that persons living with dementia feel at ease and avoid putting them in stressful situations.

CAREGIVER		PERSON LIVING WITH DEMENTIA
	SENSORIAL To reduce undesirable stimuli	<ul style="list-style-type: none"> Noisy Light glare Dirty/Poorly-maintained environment Overstimulation Crowd Greenery Pleasant weather
<ul style="list-style-type: none"> Hot weather Physical exertion Struggles with wheelchair Narrow or uneven paths 	PHYSICAL	<ul style="list-style-type: none"> Irritation of eyes Cool breeze Hot weather Physically weary Sweat/General discomfort
<ul style="list-style-type: none"> Prior stressful experiences being out with the person living with dementia Prior problematic locations Navigating crowds 	PSYCHOLOGICAL	<ul style="list-style-type: none"> Unfamiliar people Crowd Interrupted routine/routes Daunting tasks Mental weariness from prolonged engagement

B KEY INSIGHTS

While the 10 characteristics are useful in evaluating the inclusiveness and friendliness of a neighbourhood space, they needed to be further distilled for simplicity and applicability. The research team then embarked on another bottom-up process of framing these evidence-based characteristics and their subsets according to user perspectives and designer thought processes. This led to insights that can provide guidance during the design process. The key design-thinking principles arising from these are elaborated on the next page in the essay, “Translating Research to Design”.



KEY INSIGHTS

Persons living with dementia and their caregivers rely on their mental maps to choose a “path of least resistance” based on safety and convenience.

A “less is more” approach will help persons living with dementia navigate their high density, highly stimulated urban context, especially in Singapore.

Understanding caregivers’ considerations is equally important in determining outdoor activities, as they shoulder much of the stress of processing and decision-making.

The environment should retain its existing positive familiarity yet welcome small changes to help persons living with dementia and caregivers adapt to gradual changes.



WHAT DO THEY MEAN FOR THESE POINTS OF INTERVENTION?

Urban design plans, vehicular and pedestrian routes, locations of amenities, etc.

Detailed design of urban furnitures and facilities including selection of finishes, materials, colours, lighting, etc.

Implementation process, operation protocols and maintenance considerations.

Planning

Detail Design & Selection

Implementation & Maintenance

Design Strategy

Programming

Design concept and intent including overall design language such as form, approaches to light and space, etc.

Selection and curation of programmes, activities, engagement methodology.

Figure 17: Summary of four key insights and their policy implications in the creation of dementia-friendly neighbourhoods.

Translating Research to Design: Principles of Plus, Minus, Multiply & Divide

By Dr. Chong Keng Hua & Lim Aunn Ning
Social Urban Laboratory (SOULab),
Singapore University of Technology and Design

As researchers and designers, we believe that it is our duty to create a neighbourhood environment that seamlessly accommodates residents with diverse physical and cognitive abilities, enabling them to navigate their daily lives with ease and minimal challenges. Our extensive design ethnography studies and community workshops have sought to achieve this especially for persons living with dementia.

Our findings reveal that beyond the physical aspects, the psychological and social facets of the environment play a crucial role—embracing simplicity in choices, recognising the necessity for adaptation, fostering delight and purpose. This localised comprehension has led us to redefine the “dementia-friendly” approach to highlight the inclusiveness of spatial design and programming, as evidenced in the refined 10 characteristics we now advocate (Chapter 2.3a).

Although these characteristics serve as valuable tools for assessing a neighbourhood’s inclusivity and friendliness, we soon realised that their direct application during the design phase is ineffective. The design process is inherently dynamic and open-ended, in contrast to a rigid checklist approach. To navigate this complexity and foster creativity, we recognised the need for overarching design-thinking principles that are more generative than prescriptive. Thus, we amalgamated the evidence-based characteristics with insights from both users and designers, culminating in the formulation of our proposed set of four design-thinking principles—Plus, Minus, Multiply and Divide—to guide the design journey toward achieving dementia inclusivity.

+	-	x	÷
Design to strengthen mental maps	Design with a minimalist approach	Design to include the wider community	Design for incremental change
Environment design should go beyond visuospatial enhancement, prioritise their psychosocial considerations and build on their cognitive abilities to navigate their neighbourhoods.	A “less is more” approach to reduce and simplify environmental stimulations in the high density urban context, and to provide simple, intuitive and yet non-abstract information and choices.	To place equal emphasis on designing for caregivers by providing them with respite opportunities and introducing engaging intergenerational activities to motivate them to come out regularly.	Instead of insisting on past activities, to acknowledge the need to adapt to changes, without sacrificing their quality of life . To offer new purposes and opportunities partially and incrementally .
Familiar	Comfortable	Delightful	Adaptable
Safe	Accessible	Purposeful	Engaging
Legible	Choice		Familiar

+ Design to strengthen mental maps

Mental mapping is how people perceive and navigate a space in their minds. While navigating the built environment can pose challenges for persons living with dementia, our research indicates that those who are fit to walk independently or with support can still establish a “path of least resistance” by recalling “anchor nodes”—distinct locations within the neighbourhood linked to strong functions, routines, or meaningful memories (positive familiarity). For instance, a participant cited a void deck table where grandmothers gathered, the senior centre for her Friday Bingo, and a bustling market where people would greet her. This path often takes a circuitous route, bypassing obstacles like steep stairs or unsafe crossings (physical safety) and often forming a loop that connects multiple anchor nodes (clear legibility).

Hence, our prototype proposal (see Chapter 3) aims to bolster residents’ mental maps by accentuating and reinforcing anchor nodes in the neighbourhood, clarifying the linear connections between nodes to create key routes (direct or looped), and integrating wayfinding landmarks with resting and social spots to enhance outdoor experiences between nodes.

Conversely, our findings show that some persons living with dementia habitually linger at simple, calm, and quiet spaces with minimal sensory input (mental comfort), such as a seat along a walkway, or a pavilion in the corner of a park.

- Design with a minimalist approach

In Singapore’s high-density, highly stimulated, and multi-layered urban context, we subconsciously process a barrage of sensory stimuli, continuously assessing and making swift decisions. Yet, for persons living with dementia, these cognitive demands can prove overwhelming and distressing. Even seemingly well-intentioned features like vibrant, repetitive wayfinding columns can inadvertently exacerbate sensory overload. Ornamental murals and signages are also less effective and contribute to visual clutter, while those featuring abstract symbols or “traditional” images may cause confusion or lack relevance (psychological accessibility). Conversely, our findings show that some persons living with dementia habitually linger at simple, calm, and quiet spaces with minimal sensory input (mental comfort), such as a seat along a walkway, or a pavilion in the corner of a park.

Consequently, designers should embrace a “less is more” ethos. Streamlining the environment by eliminating unnecessary clutter and refraining from adding extraneous details can yield a more legible setting, simplifying reading and decision-making for persons living with dementia while fostering sensory ease. The use of abstract elements like icons or imagery should be carefully considered, introduced only if they help persons living with dementia to stay focused and calm.

While choices empower a sense of autonomy, an excess of options can lead to confusion and indecision. This can be addressed through curated, clear choices—like offering dual seating options or alternative views towards indoors or outdoors—to strike a balance between control and clarity.

Streamlined linear mapping using the MRT line graphic style to facilitate the cognitive processes of persons living with dementia and to strengthen their mental maps.



X Design to include the wider community, especially caregivers

Creating an inclusive dementia-friendly neighbourhood involves extending consideration to caregivers of persons living with dementia and the wider community. Particularly, our studies found that while caregivers hold an important decision-making role in the day-to-day life of persons living with dementia, their needs have not been actively addressed in the design of outdoor spaces. Caregivers often juggle numerous tasks, such as navigating with a wheelchair, seeking sheltered paths, managing belongings, and manoeuvring through crowds, all while ensuring their care recipients’ comfort and safety (perceived safety). Recognising the caregivers’ challenges and addressing their personal needs beyond their caregiving role is essential.

Intentional designs can provide respite and bolster caregiver mental and social well-being. Simultaneously, they can offer complementary, engaging spaces where persons living with dementia can experience purpose and delight, alongside their caregivers if desired. Active participation may involve games with other seniors or children, while passive engagement could encompass enjoying nature or nurturing a shared garden. By cultivating spaces that cater to diverse interests and fostering opportunities for shared moments together, such designs and programmes not only forge more synergistic outcomes for persons living with dementia and caregivers, but also enhance the well-being of everyone in the community.



Our design prototyping process in the following chapter shows how the Plus, Minus, Multiply and Divide design-thinking principles can help to drive innovative designs that are grounded in empirical evidence and local context, beyond referencing theories and overseas examples. We strongly advise designers to conduct their own ethnographic studies and community engagement before applying these design-thinking principles at new sites to ensure contextual relevance.

Lastly, it is imperative for designers to maintain a discerning outlook—no single intervention can fully address the diverse needs of all persons living with dementia and caregivers. Instead, focus on accommodating their varied perspectives, and providing for the things that truly matter to them, like connecting with loved ones and finding the simple joys in life.

÷ Design for incremental change

In contrast to many studies, our findings show that “adaptability” holds greater relevance than “continuity”. Rather than rigidly adhering to past routines, it is vital for both persons living with dementia and caregivers to recognise and embrace inevitable changes, understanding that these shifts could even enhance their quality of life. Nonetheless, abrupt and radical environmental transformations may lead to confusion, discomfort, and disorientation, challenging their capacity to adapt. Some might desire change but lack the mental bandwidth or disposition.

Therefore, a gradual approach to change is essential, assisting them in adapting to a new environment. This entails designs that build on familiar elements and experiences, emphasising evolution over revolution. Introducing a few fresh activities (choice) aids bite-size learning, and helps them maintain cognitive and physical capability. Such an incremental, minor-change approach fosters gradual adjustment of habits and a sense of familiarity within the community. Furthermore, it facilitates ongoing refinement of the built environment to align with emerging needs and opportunities stemming from initial changes.

Therefore, a gradual approach to change is essential, assisting them in adapting to a new environment. This entails designs that build on familiar elements and experiences, emphasising evolution over revolution.

Chapter 3

Prototyping a proof of concept

3.1 Ideate & Refine: Continuing the journey with stakeholders

A LIGHTHOUSES AND BUOYS

With the community insights on potential locations and ideas for on-site interventions (Chapter 2.2) and initial design-thinking principles developed (See “Translating Research to Design” in the earlier section), the study shifted its focus to implementing a proof of concept with SUTD SOULab leading the design and development of various prototypes.

A planning strategy for these prototypes was developed in line with the intent of one of the design principles—(+) Design to strengthen mental maps. To mark key locations along this popular community route, a series of prototypes were imagined using the analogy of “lighthouses” and “buoys” (Figure 19).

Key anchoring nodes were imagined as “lighthouses” to serve as delightful and purposeful destinations that would attract persons living with dementia, their caregivers, and the wider community to engage in positive experiences. Between the “lighthouses”, smaller interventions were planted at strategic locations—guided by the stakeholders’ input during the community workshops—to become “buoys” that provide intermediate respite, wayfinding, and engagement to the residents.

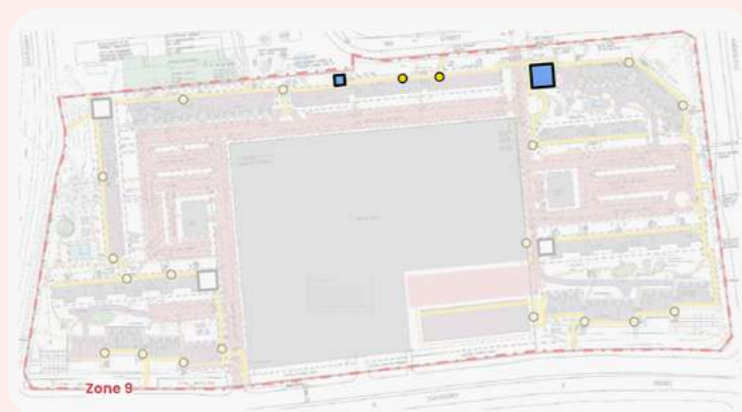


Figure 18: Sitemap of prototypes in the study area.

- **Lighthouse**
 Identify purposeful and familiar community spaces that have the potential to become landmarks that are even more engaging, delightful and adaptable.
- **Buoy**
 Strengthen mental maps by implementing distinct and accessible pockets of comfort along a suitably identified main circulation route (-----) to mentally cue paths and distance to key destinations, especially at decision-points where the path branches off or visibility is poor.



Figure 19: Overview of key design strategies employed for the prototypes.

The under-utilised hardcourt near Block 646 was re-imagined as a multi-purpose “lighthouse” featuring an activity wheel, a mobility game, gardening social tables and swings as alternate seating options. A new floor pattern design was also imagined for the space by taking inspiration from the nostalgic “aeroplane” board game that many older residents might have been familiar with.

At the same time, another “lighthouse” was created at the open space near the childcare centre at Block 645 to mark the junction that leads to the nearby market. Here, the space featured a swing and a floor mural which added vibrancy through its patterns, an oversized tic-tac-toe game board co-created with the childcare centre, and integrated wayfinding signages.

In between these two “lighthouses” were “buoys” that offered wayfinding guidance with their location markers and directional signage. Visually striking, they were also designed to offer respite while functioning as a social node where residents could sit facing each other to have conversations on the custom-designed furniture.

All the design prototypes manifested the various design-thinking principles that were derived through the research. The interventions layered on new options and experiences for persons living with dementia, their caregivers, social service

providers, and the wider community to engage with the space and with each other—demonstrating the Multiply principle, (x) Design to include the wider community, especially caregivers, in action. These interventions also utilised simple design forms, clear symbols, and colours to manifest the Minus principle, (-) Design with a minimalist approach. At the same time, the design team refrained from over-provisioning or introducing too many changes to help with cognition and hold space for future community-led improvements. This was the Divide principle, (÷) Design for incremental change, manifesting in the space. Taken collectively, these prototypes were a proof-of-concept that the design principles could be utilised in

not just greenfield developments but also in the adaptation of brownfield developments, e.g. mature HDB housing estates, to create dementia-friendly neighbourhoods.

In the spirit of journeying with the community, these initial designs (Figures 20 and 21) then became conversation catalysts for further engagement with the residents and other stakeholders of Yio Chu Kang. This took the form of pop-up engagements to gather feedback from residents (Chapter 3.1b), detailed design discussions with local partners to refine feasibility and prepare for execution (Chapter 3.1c), and a multi-stakeholder workshop to discuss future adoption and scaling up of the design principles (Chapter 3.1d).



All the design prototypes manifested the various design-thinking principles that were derived through the research.



Figure 20: Photo of original space and initial designs of the Blue Court.



Figure 21: Initial design of the other “lighthouse” at a chess corner and various design iterations of the “buoys”.

Timeline of milestones



March 2022

Engagement with local service providers and residents

May 2022

Workshop with multiple stakeholders and agencies

February 2023

Resident pop-up engagements

B POP-UP COMMUNITY ENGAGEMENT

The co-creation journey continued with a series of pop-up community engagements in February 2023. This was with the intention of bringing the initial prototype designs to the community and empowering them to participate in the decision-making process. It was also an opportunity to get their feedback for further refinement of the design, build early awareness, and get buy-in to the improvements that were being considered for the neighbourhood.

Other than a feedback channel with residents, these pop-up engagements were also an opportunity for many stakeholders to work on something together and saw architecture students from the National University of Singapore (NUS), College of Design and Engineering led by Associate Professor Tan Beng Kiang, students from SUTD, the Ang Mo Kio Town Council, and Thye Hua Kwan Family Service Centre coming together to engage the residents.



The majority of the residents responded positively to the proposed designs. They highlighted their appreciation for the proposed revamp of underutilised spaces in the neighbourhood, and the design approach that kept many familiar features in place even as new experiences are introduced. The manifestation of the design principles in tangible design proposals were also well-received. At the same time, the pop-up engagements also surfaced areas for further refinement such as concerns regarding maintenance and ergonomics. All of these proved the value of bringing residents with rich local knowledge into the process of creating a dementia-friendly neighbourhood.

Figure 22: Pop-up engagement sessions in the neighbourhood where residents gave their input on the proposed designs.

C DESIGN DEVELOPMENT WITH LOCAL IMPLEMENTATION PARTNERS



The implementation of features and facilities for a dementia-friendly neighbourhood is also an opportunity for partnering with stakeholders. Having committed implementation partners on the ground who are involved in the development process ensures that the ideas and proposals are practical, executable, and do not end up as “white elephants” unused by the community.

Building on the feedback gathered from the community engagement, the team of CLC, AIC, and SUTD worked closely with Ang Mo Kio Town Council to refine the design while ensuring regulatory compliance, constructability, and long-term maintainability. The multi-stakeholder design development and refinement process also ensured that any design refinements continue to be backed by the ethnographic research-based evidence (Chapter 2), a clinical rationale from AIC and its local service providers, and remained true to the design-thinking principles.

This process saw the designs for the prototypes evolve. Details of the “lighthouses” and “buoys” were refined to address the needs of various community stakeholders. At the same time, it teed up opportunities for co-creation (Chapter 3.2) that would deepen the relationship between the community and the interventions (Figure 24).

Figure 23: Refinement process of the initial designs with implementation partners.



Figure 24: The refined prototypes that were then planned for final implementation.

D ENGAGEMENT WITH KEY STAKEHOLDERS

Apart from the community stakeholders, engagement was also conducted with professional and agency stakeholders on the insights and design principles arising from the study (Chapter 2.3). This saw AIC and CLC convening a Stakeholder Working Session involving various government agencies to share these findings and discuss how new planning and design guidelines could help create more dementia-friendly neighbourhoods for residents. This session was attended by representatives from agencies such as Building and Construction Authority (BCA), HDB, Urban Redevelopment Authority (URA), NParks, SportSG, Ministry of Culture, Community, and Youth (MCCY), and Land Transport Authority (LTA).

There was a common goal—the need to create inclusive neighbourhoods—and this led to a convergence on strategies such as designing for safety, accessibility and legibility. Beyond the hardware interventions, the agencies at the session also agreed on the need for programming and placemaking (i.e. using software to make a place better) to keep residents meaningfully engaged. Adequate competency building and a need for deeper multi-stakeholder collaboration were also brought up as the discussion shifted towards ways of sustaining the momentum of the study and scaling up the adoption of the recommendations.

There was a common goal—the need to create inclusive neighbourhoods—and this led to a convergence on strategies such as designing for safety, accessibility and legibility.

Figure 25: A group of participants, consisting of agency representatives, at the Stakeholder Working Session.



3.2 Equip and Build: Building capacities and prototypes together

The design interventions were always meant for not just persons living with dementia, but also their caregivers and the wider community. With its proximity to key facilities run by community-based organisations, the team then utilised this opportunity to create and sustain these interventions together.

The sensorial garden which was part of the “lighthouse” at the hardcourt offered a space for nature-based activities for the community. When the RC expressed interest in adopting the garden and Thye Hua Kwan Moral Charities wished to participate in related activities, the team worked closely with NParks to offer them support.

Leveraging on NParks’ Therapeutic Horticulture Programme, volunteers, caregivers, and interested members of the community were empowered with the skillsets and resources to kickstart their sensorial garden. They were given guidance on growing new plants from seeds and bulbs, and also taught the basics of plant maintenance such as pruning, watering, and weeding. This enabled them to not just play a part in building the prototype, but also have the capacity to sustain the effort.



Figure 26: Photos of co-creation sessions and their outcomes.



Another prototype that was co-created with the community was the “lighthouse” intervention in front of the childcare centre. Designed to be a wayfinding landmark, it was also a waiting area for family members. A tic-tac-toe component was created as an activity feature and the team started a conversation with the childcare centre’s educators to involve them and the children in its creation.

A co-painting session was then organised where the children could express themselves and leave their creative mark on the nine-circle structure of the game. It is hoped that this will instill pride in the children and their family members as they look at their contribution to the neighbourhood. At the same time, this was about more than co-building the intervention, but also about building people-to-people and people-to-place relationships.

Figure 27: Photos of co-painting sessions and their outcomes.

The Blue Court

A place for persons living with dementia, caregivers, and the community to come together to work both body and brain muscles. Each of the four corners has an interactive activity designed to encourage users to move around, relax the mind or bond with neighbours, sprinkled with a dash of fun.



THE BLUE COURT



As you "Wheel"



Step Count



Swing Along



Signboard



NeighbourING



Seating area



"Pot" Luck Tables



PLAY CORNER



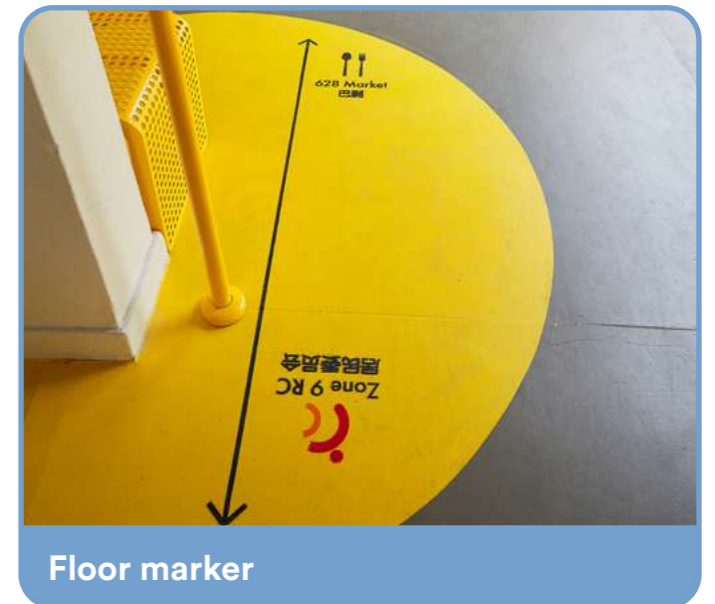
Swing



Tic Tac Toe



BUOY AT CHESS CORNER



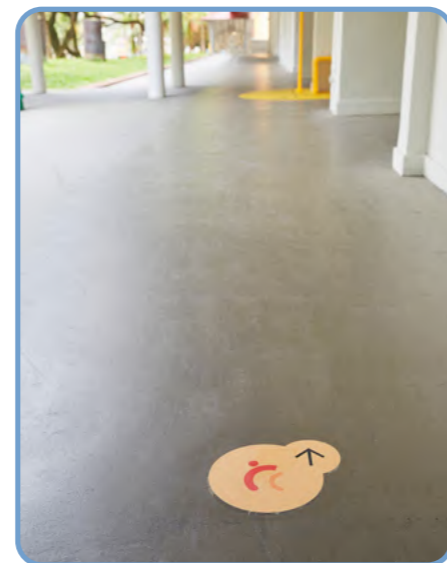
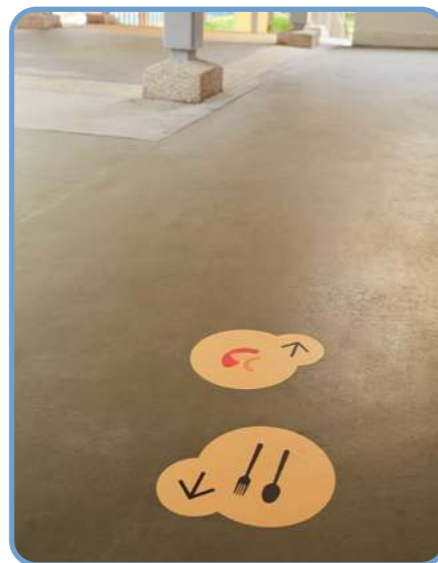
Floor marker

BUOY AT THK



Floor marker

FLOOR MARKERS



Chapter 4 Conclusion

This AIC-CLC Dementia-Friendly Neighbourhood Study was grounded on a conviction that the built environment is a critical enabler for persons living with dementia to lead fulfilling and dignified lives in their neighbourhood. With the right hardware in place working in tandem with the suite of community software (e.g. social services, community-led programmes), it is possible to maximise a person's independence, avoid early institutionalisation for as long as possible, and ultimately enable them to age-in-place.

Creating inclusive neighbourhoods also means that both the process and the product are as much about the person living with dementia, as they are about their caregivers whom they primarily rely on to experience the neighbourhood. It is also about engaging community partners, academics, and many other stakeholders from the urban, healthcare, social, and public sectors to formulate a richer understanding of what the neighbourhood needs to be. And as we have seen in this pilot project, there is also a role for co-creation to foster bonds between people living with dementia, the wider community, and their built environment.

This project has led us to evidence-based design thinking principles which have been piloted as proofs-of-concept in a series of design interventions.

It has also expanded our appreciation of the physical and cognitive dimensions of age-friendly design. The next step is to scale up dementia-friendly neighbourhood design across Singapore. It will take multiple stakeholders, from those involved in upstream planning to downstream operations, to make this a reality. They will need tools to support them in creating dementia-friendly neighbourhoods. These can include guidance on design approaches and strategies to employ, audit tools that can drive change from the ground up, and other useful tools and references, all of which will be covered in the publication: the **Dementia-Friendly Neighbourhood Design Guide**.

We might not be able to avoid the silver wave and its increase in incidences of dementia,¹⁰ but we can equip ourselves to ride it by future-proofing our built environment through design. The design-thinking principles and ideas this project offers have added to the body of knowledge about dementia-friendly design in Singapore, and through this, we hope to see a proliferation of dementia-friendly neighbourhoods in both brownfield and greenfield developments in Singapore.

¹⁰ Nanda, Askshita; Chua, Charlene; Pazos, Rebecca. 21 Sept 2022. "How Singapore builds its dementia-friendly neighbourhoods", The Straits Times. <https://www.straitstimes.com/multimedia/graphics/2022/09/dementia-neighbourhoods-singapore/index.html>

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First and foremost, we express our deepest appreciation to the persons living with dementia and their caregivers, who allowed our researchers into their worlds and routines, so that we could have a glimpse into the highs and lows of navigating one's neighbourhood. They showed us that our neighbourhoods can and must be more inclusive for all.

To the local stakeholders of Yio Chu Kang, thank you for trusting us with your neighbourhood, and for supporting the study's progress: Mr. Yip Hon Weng, Adviser to Yio Chu Kang Grassroots Organisations; Mr. Alvin Koh Lam Kia, Constituency Director, Yio Chu Kang Constituency Office; Mr. Vincent Chua, Chairman, Yio Chu Kang Zone 9 Residents' Committee; Ms. Lindy Goh Xiu Ting and Mr. Cheong Yong Quan from the Ang Mo Kio Town Council; Thye Hua Kwan (THK) Moral Charities; Asian Women's Welfare Association (AWWA); Tote Board. We would also like to extend our gratitude to the residents of Yio Chu Kang, who brought their enthusiasm and ideas to the two community workshops conducted, and who were ever willing to co-create ideas for a more dementia-friendly neighbourhood.

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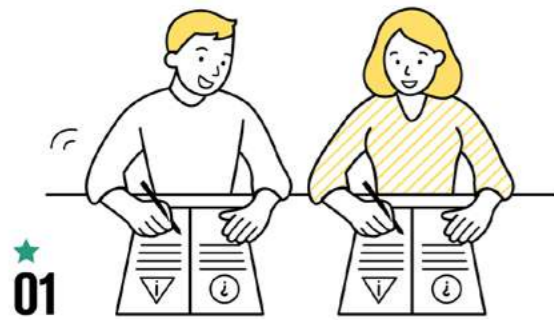
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Annex

A CLC'S JOURNEY MAP FOR A COMMUNITY-OWNED PROJECT

BUILDING INTERVENTIONS, BUILDING COMMUNITY RESILIENCE

Every community and every challenge is different but this journey will help to give you a general idea of the various stages that may be required.



★
01

Understand your community's resilience by using the assessment tool. Do it with your peers and neighbours.



02

Review your community's report card and identify key shocks and stressors that your neighbourhood is facing.



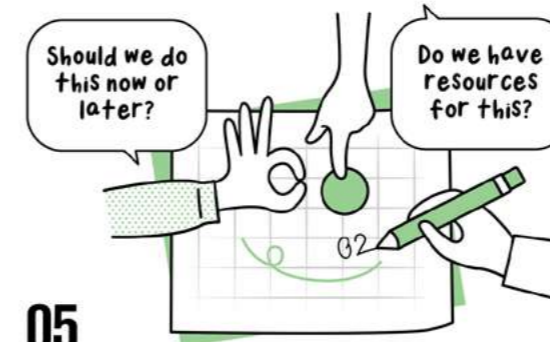
03

Rally your neighbours, grassroots leaders, public service officers, knowledge experts, and local businesses together. Get them on board to do something about these local issues and build a shared vision together. This will be your community champions.



★
04

Crowdsource ideas with your team and other residents. Be creative about how to achieve your vision. Also think about how these ideas can be mutually sustainable.



05

Prioritise your ideas. There are limited resources and some may take too long to realise while some are just too urgent to ignore.



06

Planning is the stage where detailed discussions happen, and approvals and buy-ins are sought. Things get real here, but persevere as a team.



★
07

Equip the community with resources and knowledge. Secure sponsors, attend webinars, get hands on training, and buy tools. Use information from the planning phase to help decide what is needed.



08

Co-building! Time to get the entire community to come and turn ideas into reality. Make it a community gathering.



★
09

Monitor what you have built together. Did it help address the issue? Did it bring the community together? What worked and what can be done better?



10

Sustain all the good work that has been done. Come up with a roster, have a regular maintenance plan, find resources to keep it going and improve it over time.

B WALKING INTERVIEW GUIDE

	0 - DISAGREE 1 - PARTIALLY AGREE 2 - AGREE	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block
Familiar	My care recipient has taken a walk along this same route before. (By themselves / Accompanied).						
	My care recipient knows the people in the neighbourhood.						
	My care recipient walks with confident and without hesitation.						
	My care recipient would say the neighbourhood has not changed much.						
	Remarks:						
Legible	My care recipient is able to see signage along the way that provides simple and essential information.						
	My care recipient is able to follow the intended path without detour.						
	My care recipient is not confused by floor and wall patterns.						
	Remarks:						
Accessible	Public restrooms are available along the way.						
	My care recipient need to use the public restroom and can easily find it on his/her own . Number of times public restroom is needed by my care recipient throughout the walk is _____.						
	My care recipient can easily find seating areas.						
	My care recipient can easily find quiet spaces in the area to calm down.						
	My care recipient can easily access emergency services in the neighbourhood (eg. police post, clinics).						
	Remarks:						
Comfortable	The route is sufficiently shaded.						
	The route is quiet.						
	The route is not crowded.						
	The seating areas are shaded and comfortable.						
	Remarks:						

	0 - DISAGREE 1 - PARTIALLY AGREE 2 - AGREE	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block
Safe	The area is well lit.						
	The area is accessible for my care recipient, without the need to negotiate steps / stairs / other barriers.						
	The area has clear marking of level changes for my care recipient.						
	Gradient of ramped areas are safe for people using a wheelchair or walking aid.						
	It is easy for my care recipient to walk in the area without crossing any roads.						
	Remarks:						
Choice	My care recipient can find private corners with seats where they can rest comfortably and at ease by themselves.						
	My care recipient can find small garden with seats where they can find respite.						
	My care recipient can find many types of amenities along the way (e.g. variety of shops, supermarket).						
	My care recipient can find food or drinks along the way if hungry or thirsty (e.g. coffeeshop, provision shop).						
	Remarks:						
Continuity	My care recipient is able to continue their outdoor routines as they were before diagnosis. The outdoor routine is _____.						
	My care recipient is able to continue spending time in the community as they were before diagnosis.						
	My care recipient is able to continue having interaction with others in the community as they were before diagnosis.						
	Remarks:						
Engaging	My care recipient have eye contact with others along the way.						
	My care recipient pauses to observe others along the way.						
	My care recipient greets friends or neighbours along the way.						
	My care recipient can find outdoor seating that promotes easy and comfortable interaction with people of different ages and interest.						
	Remarks:						

	0 - DISAGREE 1 - PARTIALLY AGREE 2 - AGREE	General	Exit from home / block	Route to destination	Destination	Route back to home	Entry into home / block
Delightful	My care recipient smiles or laugh along the way.						
	My care recipient can find and talk about materials or objects along the way that creates an interesting and anticipated journey (e.g. mural, sculpture, sensory wall, garden).						
	My care recipient can find and talk about pleasant sights, smells or sound along the way. (e.g. artwork, colourful flowers, outdoor furniture) (e.g. of scents from bakery, cafe, or garden) (e.g. children laughing and playing, coffee cups clinking at coffee shops, wind chimes, water fountain or stream, leaves or grass rustling in the wind, birds chirping)						
	Remarks:						
Purposeful	My care recipient engages in an activity along the way (e.g. gardening, feeding birds or cats, helping others, volunteering).						
	My care recipient goes out for appointment (e.g. hair salon, to buy something, to have a meal or tea, meeting friends, run errands).						
	My care recipient goes out for group activity with others (e.g. dancing, music, exercise, learning new skills).						
	My care recipient visits friends or family's houses on other blocks or levels.						
Remarks:							

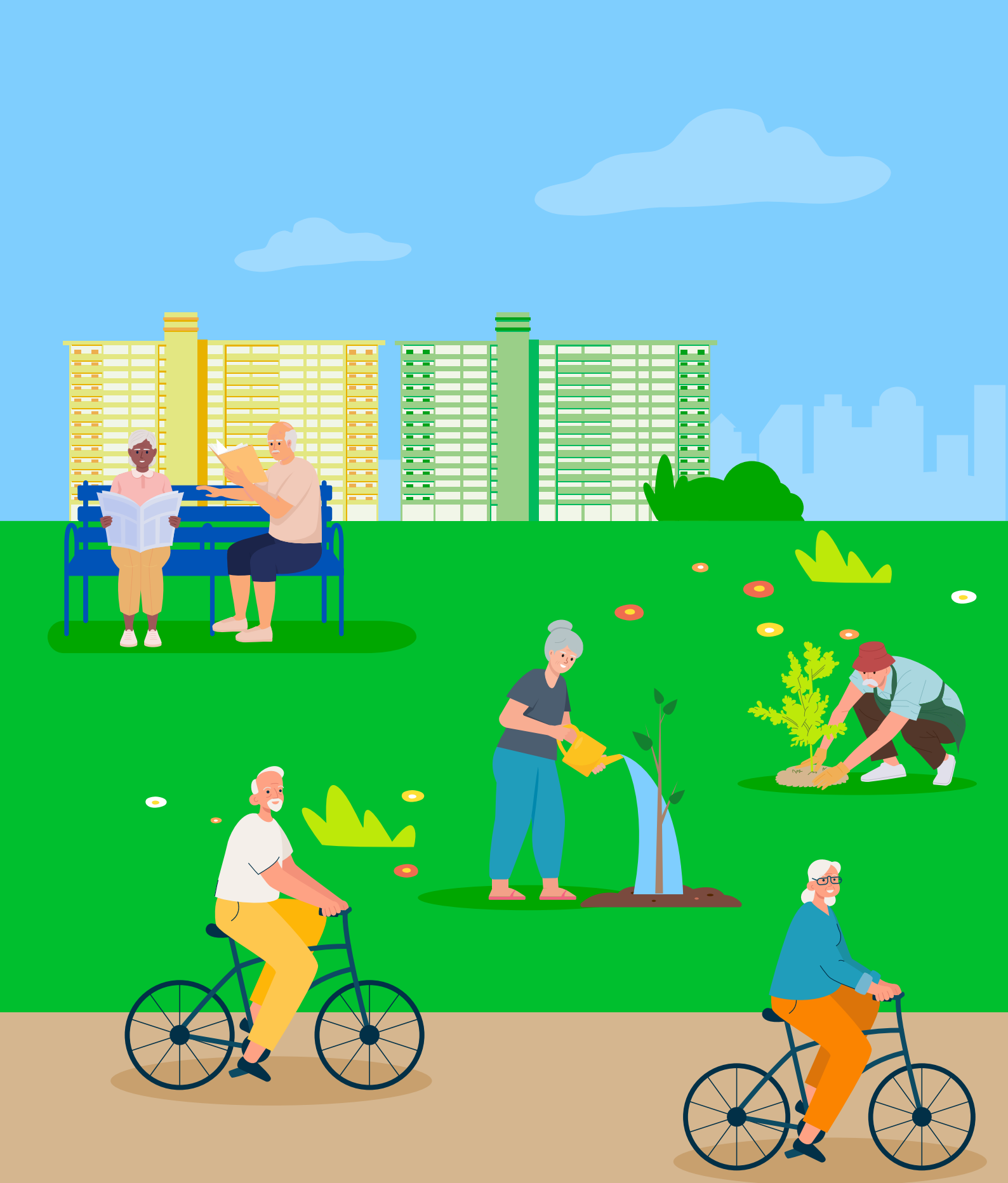


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Creating a Dementia-Friendly Neighbourhood

A YIO CHU KANG PILOT PROJECT

Accurate as of December 2023.