SINGAPORE | SMART COMMUNITY DESIGN

New Urban Kampung Research Programme

With the increasing demographic shifts in Singapore, we propose looking beyond conventional stratification, which is no longer adequate for assessing urban planning and people's diverse needs and perceptions.

🔍 **SINGAPORE**

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First- level Clustering

Second- level Clustering

Socio-economic Variables   ✚   Lifestyle Variables

Socio-economic Variables
Age
No. of years lived in the house
% of time spent on Chinese
% of time spent on Tamil
% of time spent on Chinese dialect
% of time spent on Malay
Household Income Levels
Highest education
Tenure status
Employment status
Household type

Lifestyle Variables
Job time
No. of people living in the house
Relatives/ family living within 10 mins walk

Cross Reference

Perception & Behaviour Variables

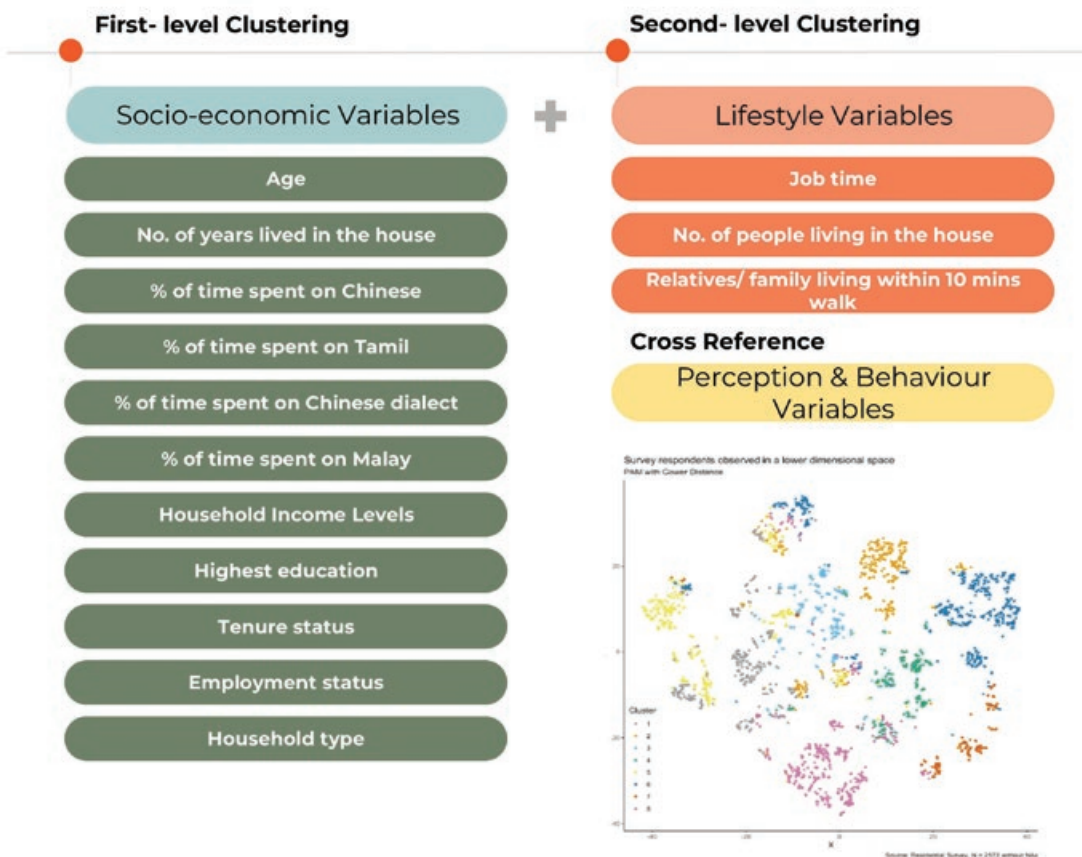Survey respondents observed in a lower dimensional space

Figure 1. Resident segmentation based on multi-variable two-level clustering approach, drawing survey data from Toa Payoh, Jurong East and Punggol, each representing a different life stage of the town, demographic profile, and town planning concept.
Image: Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore

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The Challenge

Housing development in Singapore has come a long way from providing a home to enabling sustainable living. Yet, as society matures, social sustainability, which covers the aspects of sustainability relating to people, has become one of the major challenges for public housing.

According to Census 2020, the average household size decreased over the past decade from 3.5 persons to 3.2 persons across most housing types. There was an increase of about 4% in the number of singles while the percentage of couples with children decreased from 56.0% to 47.7%.

An ageing population adds to the challenge. About a third of households had at least one senior citizen (aged 65 years and above), while seniors-only households also doubled from 4.6% to 9.3% in the past decade.

Against this backdrop exist widening inequalities and increasingly diverse communities, with their different perspectives and priorities. Traditionally, residents have been profiled based on demographic markers such as age, gender or ethnicity. But such stratifications have become inadequate for the understanding of their circumstances and choices, or for assessing their quality of life, let alone for deriving targeted approaches to support their complex needs.

Figure 2. The eight emerging resident archetypes.
Image: Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore

> **We developed a comprehensive set of tools and platforms to help planners generate evidence-based neighbourhood designs and promote community bonding.**

The Solution

This led to the formulation of the New Urban Kampung (meaning "village" in Malay) research programme at the Singapore University of Technology and Design (SUTD), led together with the Housing & Development Board (HDB). The initiative is supported by the Ministry of National Development and the National Research Foundation, under the Prime Minister's Office for the Land and Liveability National Innovation Challenge (L2 NIC) Research Programme.

The interdisciplinary research couples data analytics with social behavioural studies to derive better insights and thereby more targeted interventions. Our research also developed a comprehensive set of participatory toolkits and digital platforms to help planners generate evidence-based neighbourhood designs and promote community bonding. The programme resulted in four key interlinked outcomes:

1. **Redefined Resident Archetypes**

   Our analysis simultaneously considers multiple variables, i.e., 14 socio-economic and lifestyle variables in a two-level segmentation analysis, to achieve a more complex profile of the population segments (fig. 1). Drawing data from 5,155 door-to-door and street-intercept

surveys conducted in three residential towns (Toa Payoh, Jurong East and Punggol), we identified eight emerging resident archetypes (and 20 sub-segments), with a detailed understanding of their diverse perceptions and needs (fig. 2).

2. **New Quality of Life Framework**

Based on surveys and 241 additional in-depth interviews with residents, we developed

a new Quality of Life (QOL) framework that features seven life domains, 19 sub-domains, and 67 indicators specifically catered to Singapore's public housing context (fig. 3). The bottom-up data analytic process reveals the various factors affecting the residents' QOL, which can be measured through objective and subjective indicators. This new framework gives us a more localised yet comprehensive way of understanding QOL in

public housing and enables analytics comparing different towns, neighbourhoods and resident archetypes.

3. **New Tools for Socio-Environmental Data-driven Planning**

By consolidating survey, interview, behavioural and sensor data, we created four urban analytics tools that can aid the planning process, by uncovering

Figure 3. New Urban Kampung Quality of Life (QOL) Framework for HDB Public Housing. The indicators are further distinguished between objective and subjective measures, and between QOL (relating to an individual or family) and QOP (Quality of Place—relating to the relationship with the neighbourhood).
Image: Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore

Figure 4. All four urban analytics tools are integrated in the EDF Lab's City Application Visualisation Interface (CAVI), a web platform with geospatial simulation and visualisation capabilities.
Image: EDF, Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore

the interdependencies between urban systems and social factors (fig. 4):

- **QOL Data Visualisation** enables planners to compare QOL indicators between towns and neighbourhoods, and between resident archetypes, which helps identify areas of opportunities and target archetypes for interventions.

- **Accessibility Analysis** uses agent-based modelling to understand how residents navigate and manoeuvre within housing precincts, and the proximity and accessibility of amenities in relation to the resident archetype of interest.

- **Social Centrality Analysis** is a data-light model that identifies places where there is high potential for social interactions, which is useful for site selection. (In light of COVID-19, the same model could also be used to identify places where people would likely congregate and where

safe distancing enforcement would be needed.)

- **Virtual Population Model** provides agent-based predictive analysis to simulate dynamically how the town population, resident archetypes and household composition will evolve with time, thus anticipating emerging needs.

4. **A Community Enablement Playbook and Prototypes**

With such data-driven capability, our proposed community design process departs from conventional development through understanding resident archetypes, their QOL, needs and assets in different neighbourhoods, and employing urban analytics tools to identify gaps and suitable sites for intervention.

An online community platform and two placemaking (a design process to strengthen connections between people

and the places they share) prototypes have been developed and piloted in Jurong East and Punggol towns:

- The **nukampung app** is a one-stop online community platform that brings together all events and activities run by different organisations within a neighbourhood. Through gamification, it also encourages residents to form interest groups with like-minded neighbours and champion community initiatives.

- **Social Deck** is a placemaking enablement kit that transforms the ordinary void deck, an empty space on the ground floor of public housing blocks, into a social space for "resident champions" (residents who lead community initiatives) to temporarily "own" a space to run their initiatives (fig. 5). This is the result of a six-month champion incubation process called **Project Zero**, piloted in collaboration with local

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social enterprise Bold At Work. Since its launch in the Yuhua residential estate in western Singapore in early 2021, Social Deck has kickstarted a neighbourhood-wide item exchange initiative and a weekly rescued food-sharing programme.

- **Cascadia Our Secret Yard (COSY)** is a community space co-designed with resident champions from Waterway

Cascadia, a residential compound in northeast Singapore. The design activates an unused third-storey "white space" facing the environmental deck, and transforms it into meaningful social spaces for residents (fig. 6).

This participatory action research has led to the development of the online-to-offline/offline-to-online **O2O Community Enablement Playbook**. It lets community designers employ different co-creation strategies with residents from different neighbourhoods (fig. 7). The O2O engagement also presents a new opportunity that may adapt well in a COVID-19 endemic world.

Figure 5. nukampung, a one-stop online community platform developed by the SUTD (left), now merged with GoodHood; Social Deck, an adaptable, modular system that enables resident champions to run their initiatives (right). Social Deck and nukampung function as complementing O2O community enablement tools.
Images: Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore / Denise Nicole Lim & Natasha Yeo

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Figure 6. COSY, for Cascadia Our Secret Yard, is a new typology of community space that includes a flexible live-streaming event zone, COMMUNE; a co-working space, COLLAB; and an explorative hobby area, CREATE.
Images: Singapore University of Technology and Design, Cascadia Connect & Housing & Development Board (HDB), Singapore / Neo Sze Min & Natasha Yeo

Yuhua (Matured Estate) — Cascadia (Young Precinct)

Champion Activation & Participatory Placekeeping

Scouting
Identifying Champions & Community Assets

Incubating
Project Zero
Building Digi-Literacy, Guiding Initiatives Development

Resetting
Social Deck
Empower Champions to Run Own Initiatives at Their Void Deck

Matchmaking
Connecting Champions with Grassroots & Local Stakeholders

Advocating
Partnership Governance for Placekeeping

Resetting
Reimagining White Space

Matchmaking
Connecting Grassroots & Volunteers with Community Designer

Incubating
Building Design Competency, Guiding Authority Submission

Scouting
Enrolling other community assets

Advocating
Partnership Governance for Placekeeping
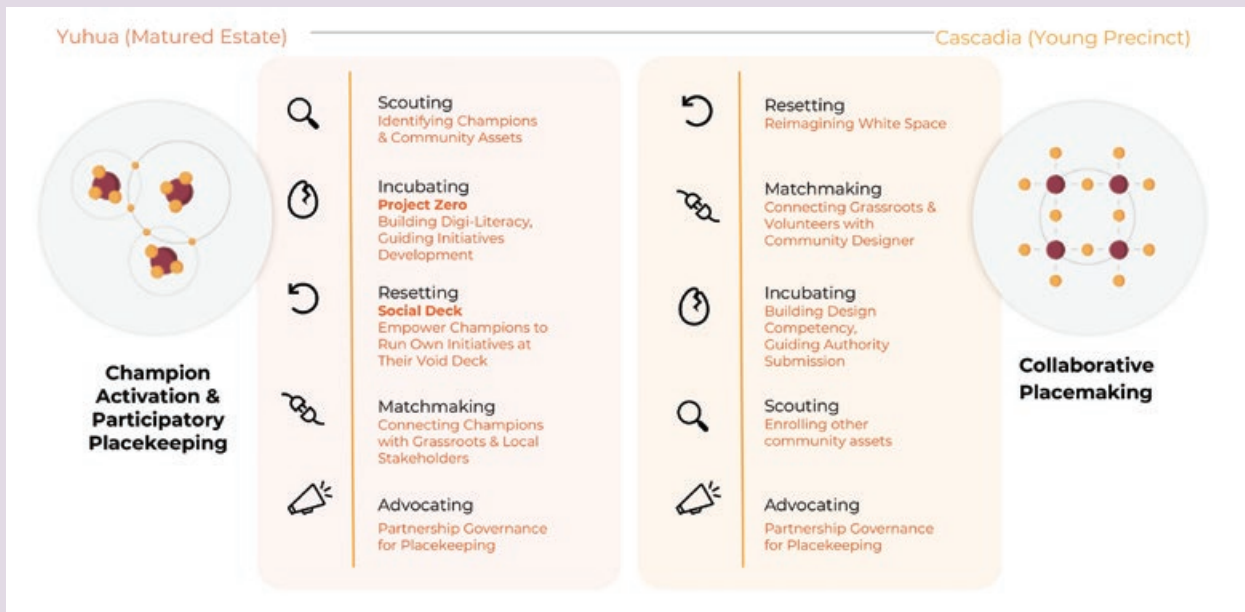
Collaborative Placemaking

Figure 7. The O2O Community Enablement Playbook consists of five action plans: Scouting, Incubating, Resetting, Matchmaking, and Advocating, all interchangeable in sequence depending on the strategies employed in different neighbourhoods. For example, we can employ an asset-based participatory placekeeping approach building on social capital in mature neighbourhoods like Yuhua (left); the need-driven collaborative placemaking approach is more suitable for younger neighbourhoods like Cascadia (right).
Image: Singapore University of Technology and Design & Housing & Development Board (HDB), Singapore

The Outcome

The comprehensive studies and prototyping have brought forth several design and policy implications.

For example, 26.1% of emerging resident archetypes consist of seniors living alone or those living with other seniors. These senior citizens are at risk of lacking robust social support. For this reason, we need to shift our paradigm from "ageing-in-place" (yet being lonely) to "ageing-in-community". To do this, we need to provide a more diverse and affordable assisted living typology, coupled with a healthy environment and creative programmes to enable outdoor mobility, socialisation and mutual support for this demographic.

More housing options are also needed to cater to a growing diversity of unconventional living arrangements, while promoting a child-friendly environment to reverse the ageing trend. A prototypical housing concept of co-living could be further explored.

Our prototypes show that placekeeping—the active care of popular spaces and their social fabric for the longer term—is crucial in sustaining community spaces and programmes. Participatory placekeeping could be introduced by empowering community groups to manage "white spaces", formalising an ownership contract, and allowing a higher level of autonomy and responsibility. This would lead to a higher sense of ownership and community participation.

Finally, we learned that the success of community development in Singapore lies not only in the activation of individual champions and strong support from grassroots networks, but also in the facilitation by community designers. Their expertise is genuinely needed in building residents' capacity, guiding them through complex administration, linking local stakeholders, translating ideas into designs, and bridging community spaces and programmes.

Powered by the tools and knowledge gained from this research, we believe the future of public housing living in Singapore will be enhanced by diverse offerings, as well as sustain more vibrant, cohesive and resilient communities.