

An aerial night view of the Singapore skyline, featuring numerous illuminated skyscrapers and a river in the foreground. The city lights are reflected in the water, and the overall scene is a vibrant display of urban architecture.

XXS–Health KIOSK

indicative design research into the smallest bit of institutional healthcare in Singapore

DR. RuZica BoZovic Stamenovic

Associate professor

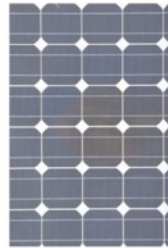
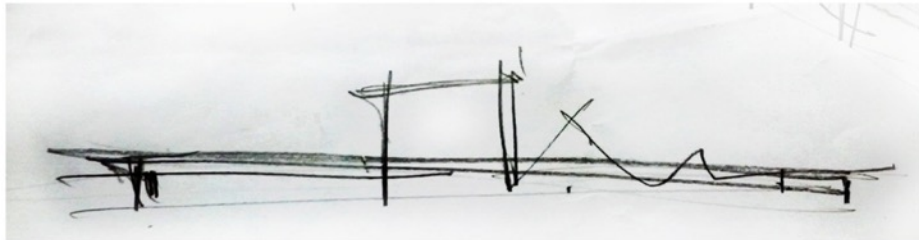
National University of Singapore

Faculty Fellow Center for Health Systems & Design | Texas A&M University



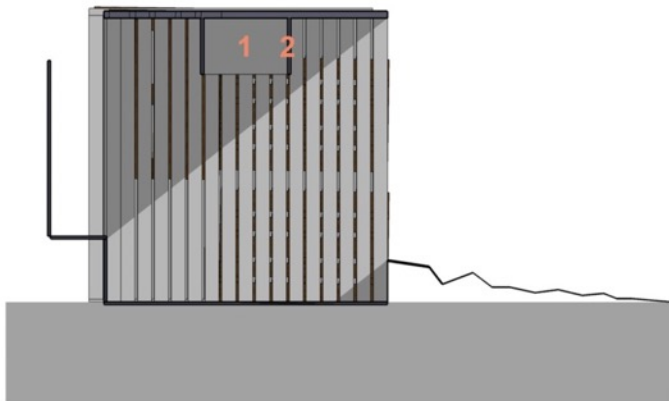
KIOSK

dr Ružica Božović Stamenović, Jelisaveta Arsenović, Sara Bastoni, Emilija Bjelić, Jovana Grilihes



solatni panel
kao gornja
strana kioska

- 1 - zvučna hologramska kutija
- 2 - LCD monitori sa dve naspramne strane ka spolja (TV, internet)





KIOSK?





Clinic DIY: By allowing patients to conduct pre-screening independently, the Health and Wellness Kiosks (Hawks) at Woodlands Polyclinic aim to better utilise limited clinical Resources and reduce patients' waiting time.

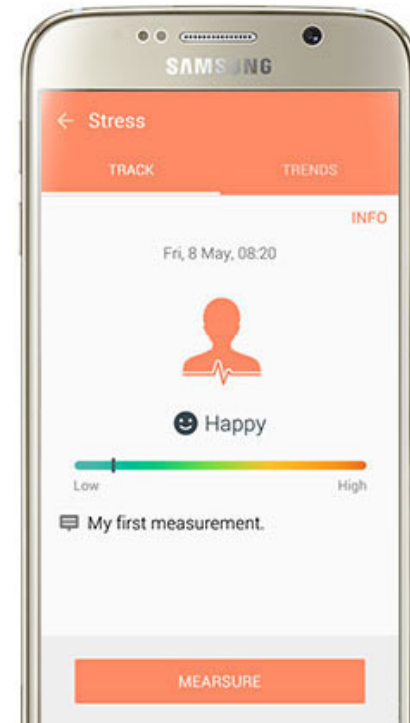
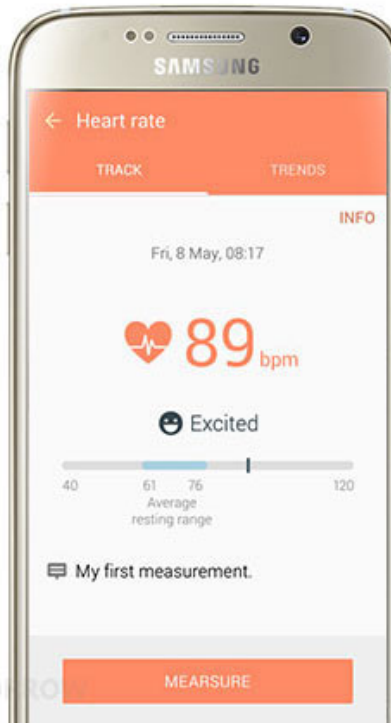
HAWK - Health and Wellness Kiosk

“Conducts pre-screening and allows the polyclinic to efficiently utilise its' limited resources and reduce patient waiting time”



Institutional healthcare?
NO

Personal &
 social group level?
YES



XXS

HEALTH

healthcare bit

KIOSK

institutional

of fractal nature, rooted in community

connected to higher ranking institutions

provide basic form of treatment,

care, and

counselling

○ 719 Sq km
5,5 million
7697/ Sq km
23 dr/10000



Average life expect. > 83, compared to the global average of 71.4 years

52962 GDP /capita

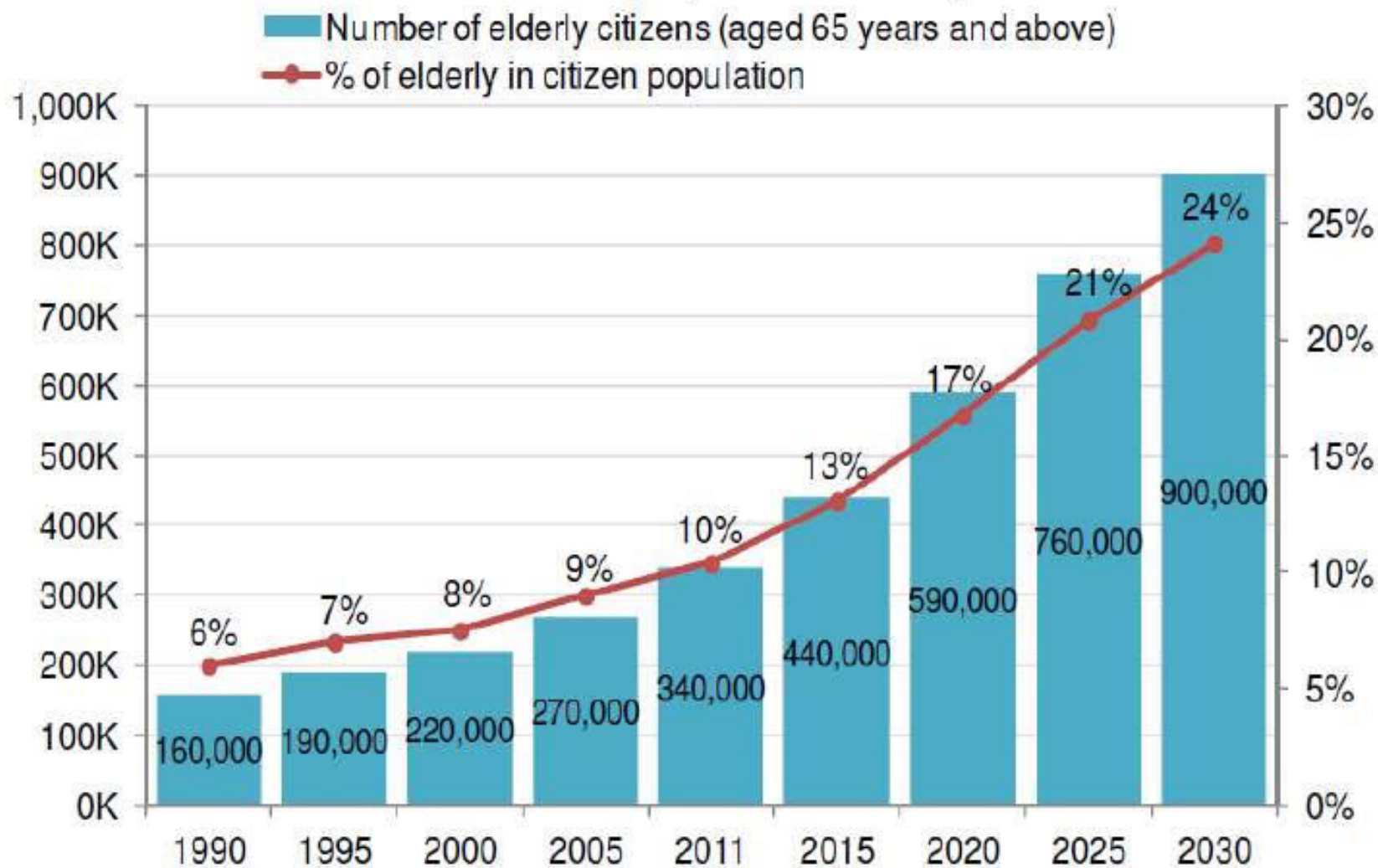


Photo Ryan McGuire

1

H Kiosk as the smallest institutional healthcare bit –
the issue of the inversely proportional relation of size and reach

Singapore is ageing



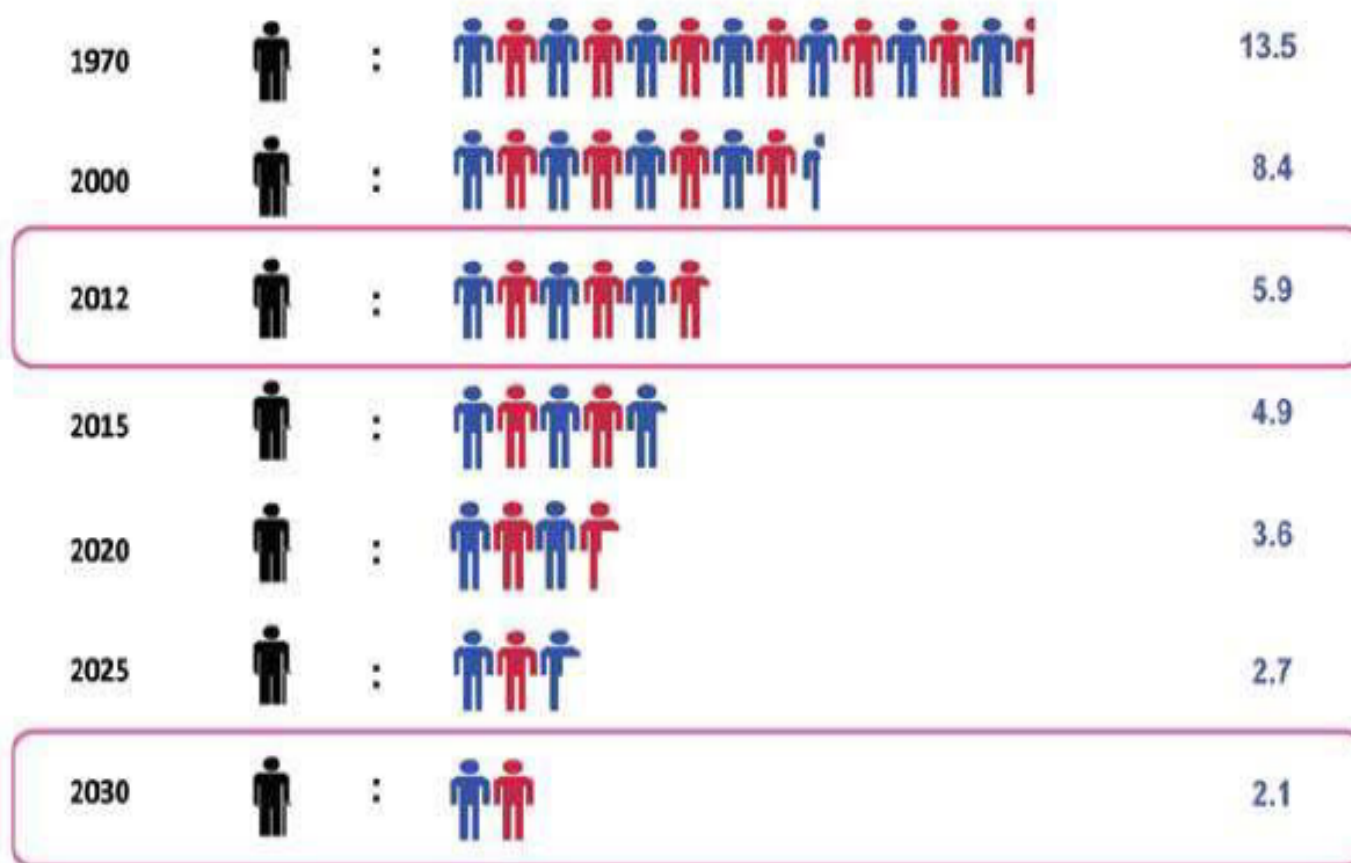
Source: DOS

By 2030, about one in five residents would be 65 years or older

Old Age Support Ratio is falling

Citizen aged ≥ 65 years :

Citizens in working-age band of 20-64 years



CARING FOR THE SILVER COMMUNITY

Here at the North West CDC, we take care of the senior residents in our midst.

They could be your neighbours, grandparents, parents, your friends or yourself. We have done much to ensure that our elderly lead happy and healthy lives and we plan to do much more.

We have set aside \$1 million per year for the North West Silver Care Fund to run programmes for the elderly so they can become fit and healthy, and will have opportunities to volunteer their time.

The fund will also be used to subsidise the cost of items like health screening, home care needs and elderly-friendly home fixtures for the vulnerable seniors.

Our focus is also on helping the elderly to get moving and stay healthy. I strongly believe that health is wealth. Although brisk walking has been featured prominently in the CDC's calendar of activities, we are going to bring it up a notch.

We have just held the North West Silver Brisk Walking Tour on 11 November where we ferried 3,000 seniors and their family members to the Gardens by the Bay. Residents can expect more of such walks to new and interesting venues such as the Punggol Waterway and the HortPark in the months to come. Each year we plan to encourage at least 50,000 seniors in the district to join us on these healthy lifestyle activities, which will also strengthen family and community bonds.

To keep their minds active, the CDC has set up the Senior Lifelong Learning Club @ North West where the elderly can pick up basic English and computer skills. This would go a long way in maintaining their mental faculties, and even help them bond with their grandchildren.

While we have grand plans, I would like to emphasise that this cannot be just a CDC effort. It needs to be a community effort. I sincerely hope more volunteers will come forward to contribute in these meaningful activities and help create a caring community.

We would all do well to remember that ageing is inevitable. By focusing our efforts on supporting active ageing and caring for our seniors, we aim to improve their quality of life. ■



out to seniors

Many elderly people might be averse to taking their medication, or they could be confused about what pills to take, and how often to do so.

That's where volunteers such as Ms Nithiyasree Nadeson, a third-year Pharmacy student at the National University of Singapore (NUS), come in. The bubbly 21-year-old is among 50 undergraduates from the NUS Pharmaceutical Society who regularly help out with the "Know Your Medicines, Get It Right! @ North West" programme, an initiative of the CDC.

Along with other volunteers from the Pharmaceutical Society of Singapore, they provide free talks and face-to-face consultations to the needy elderly and low-income families in the North West District to educate them and their caregivers on the proper use of medication.

"When it comes to healthcare, the elderly can get very agitated and afraid. I want to help them overcome

their fears and be a listening ear for them," says Ms Nithiyasree, who even goes the extra mile by organising the medication for some patients into small boxes labeled Monday through Sunday.

"It's quite a simple task, but it can help them understand what medicines they have and when to take them. I've met some people who take 10 to 15 different types of medication," she says.

Besides putting her healthcare knowledge to good use, Ms Nithiyasree also relishes the time spent with the elderly and has made many new friends along the way.

She says: "I get to learn how to interact with the residents and find out more about their problems. It may not always be about medication; it could be about their health in general. Sometimes they might feel more comfortable talking to a younger person, and I try to offer as much advice as I can."

STRENGTHENING ASSISTANCE TO VULNERABLE SENIORS — MS NITHIYASREE NADESON



"When it comes to healthcare, the elderly can get very agitated and afraid. I want to help them overcome their fears and be a listening ear for them."

NEW elderly

our new user group with new needs

in 2030

- **13.1% of all aged 65 -74 will be university educated** = 3 X more than in year 2010
- **62 % will have at least secondary education** /Research established a strong correlation between education level and disability



Changes in healthcare



SWISS ARMY KNIVES
2015

MAKERS OF THE ORIGINAL SWISS ARMY KNIFE | VICTORINOX.COM

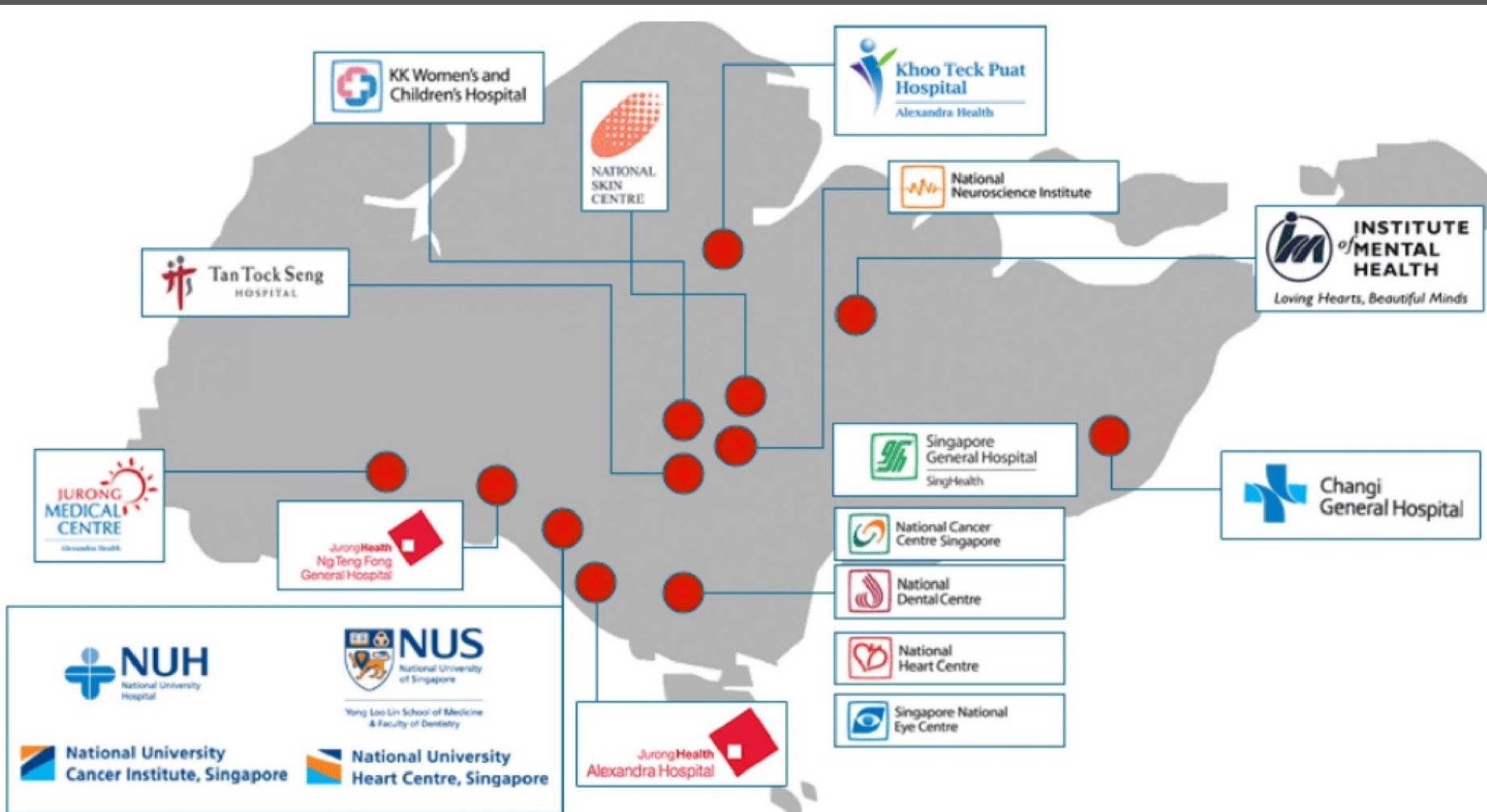
For the first time in recent history, the **healthcare marketplace** is catering to **4 different generations—**

**Silent Generation,
Baby Boomers,
Gen X,
Millennials**

**TRENDS
AFFECTING
HEALTHCARE**

**TECHNOLOGY
HEALTH & WELLNESS
SOCIO-CULTURAL
SCIENTIFIC
ADVANCEMENT/RESEARCH
ECONOMIC
GEO-POLITICAL**

The Agency for Care Effectiveness and The Agency for Integrated Care



3 NEW INTEGRATED CLUSTERS



more



Some of the planned facilities

- Number of new senior activity centres
- Number of new senior care centres
- Number of new nursing homes

Singapore is proclaimed in 2014 the

6th best healthcare system in the world (WHO)

Supported with **3.9% of GDP** (compared to UK 9,3% or USA 16,2%).

In the core of its success is the philosophy of

“individual responsibility” coupled with

“many helping hands” and state provided

“safety net”

There is constant emphasis on **self-awareness** and **responsibility** for health management, however, there is still **little space left for individual control and decision making for older adults = *new system changes!***

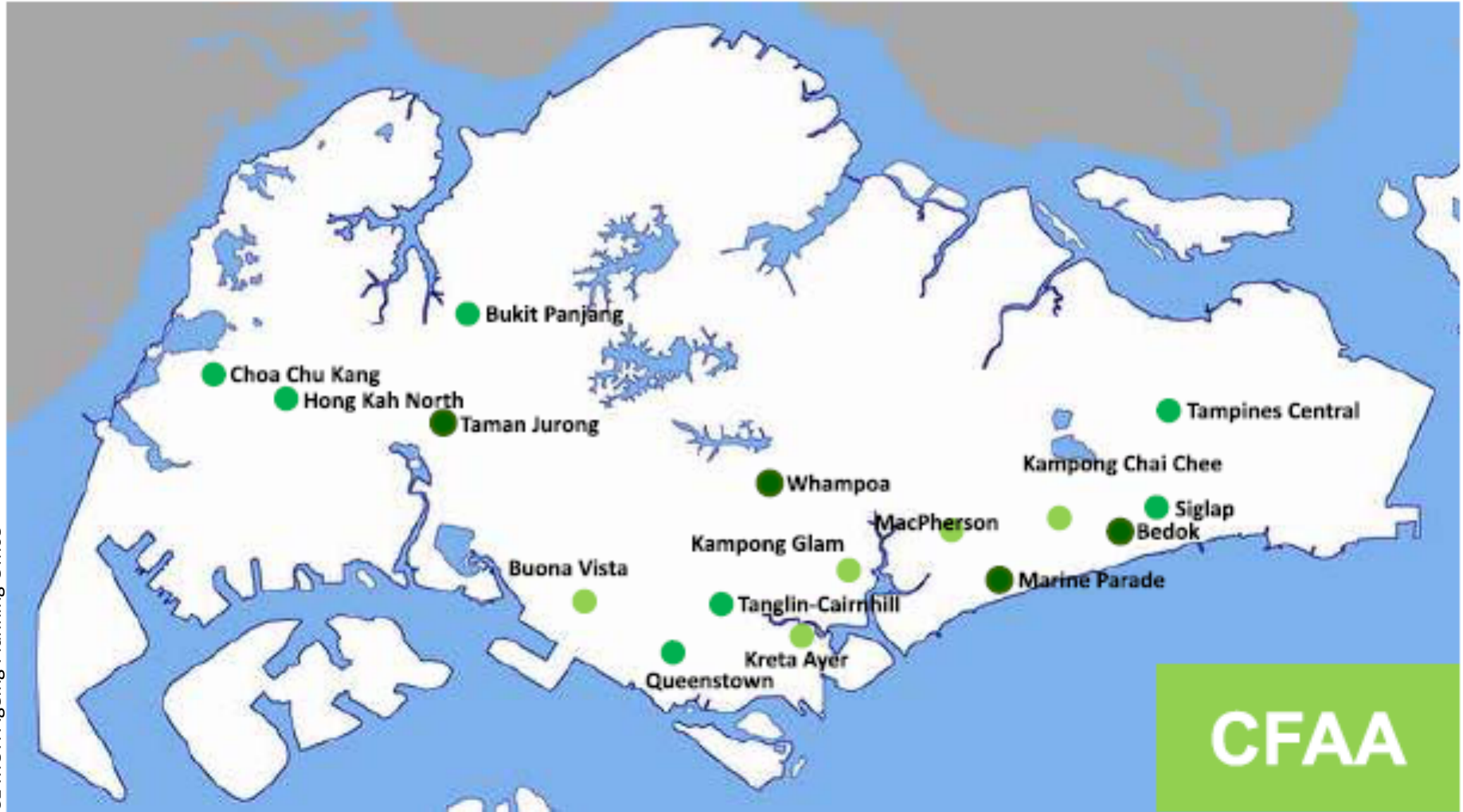
Integrating care to be more person-centric through our Regional Health Systems

We need to reorganise our system to deliver patient-centric care through the integration of services and processes



Moving away from acute, episodic care towards person-centric care. With primary, acute, intermediate & long term and home care working together to support Singaporeans

Building senior-friendly communities across Singapore through City For All Ages project



CFAA

Building senior-friendly communities across Singapore through City For All Ages project



Healthy and Active

- Get screened early
- Manage their conditions well
- Exercise and lead healthy lifestyles



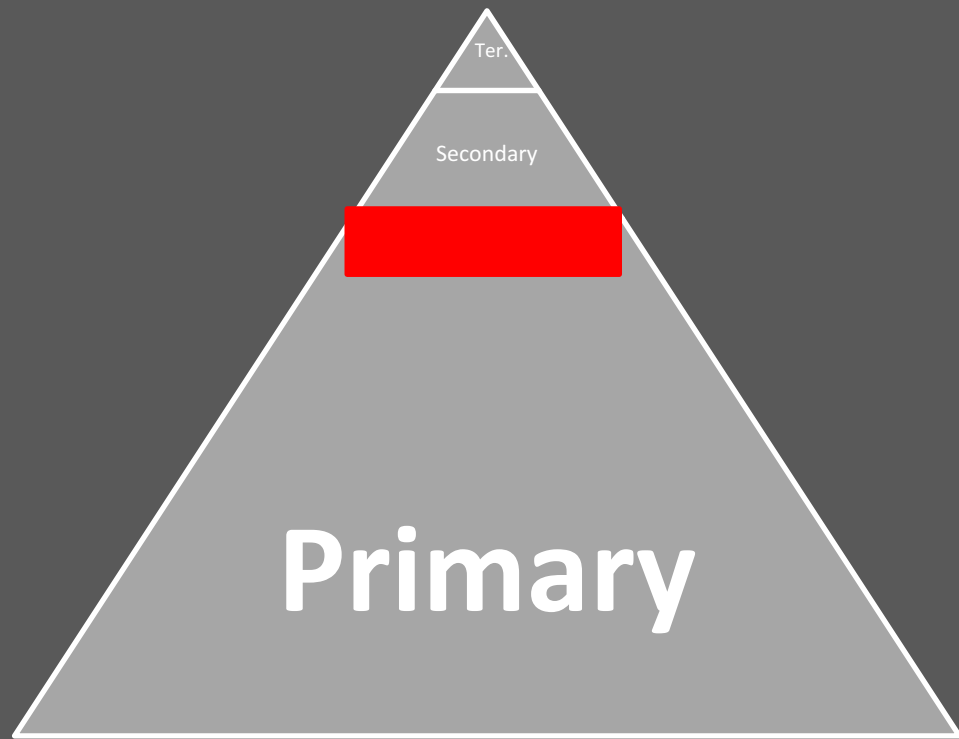
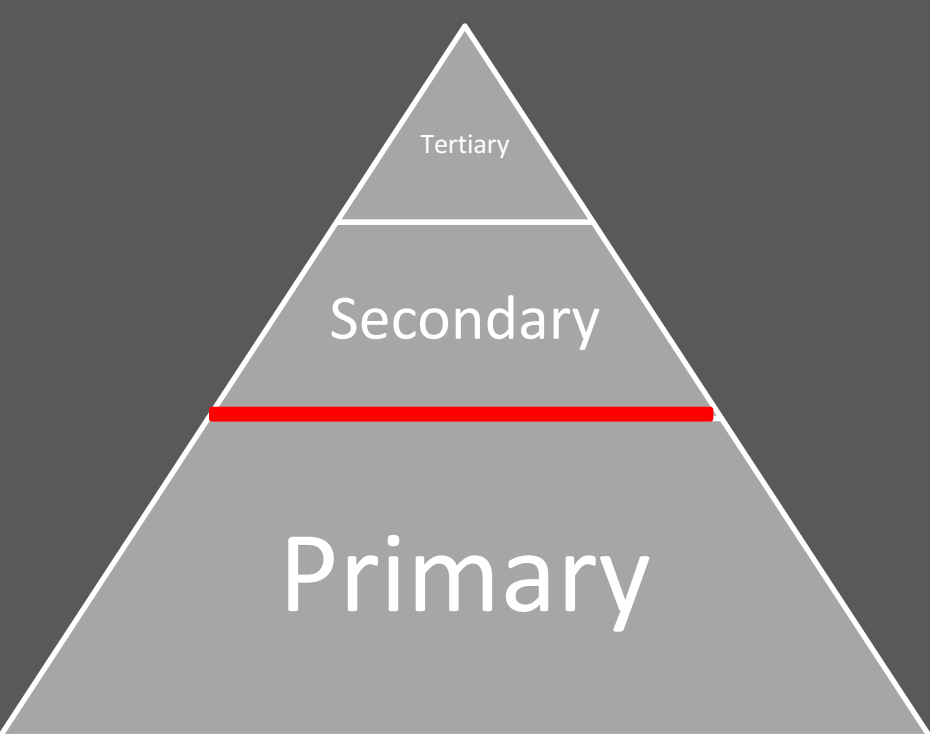
Part of a Closely Knit Community

- Have friends and know where to get help
- Those who live alone are not lonely, and engaged by the community



Able to Live Independently & Confidently

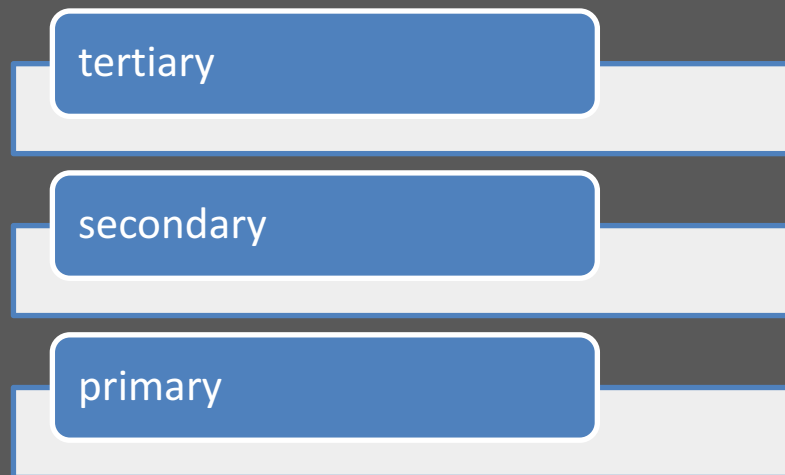
- Can get around their flat and town safely and confidently
- Those who need help will be cared for



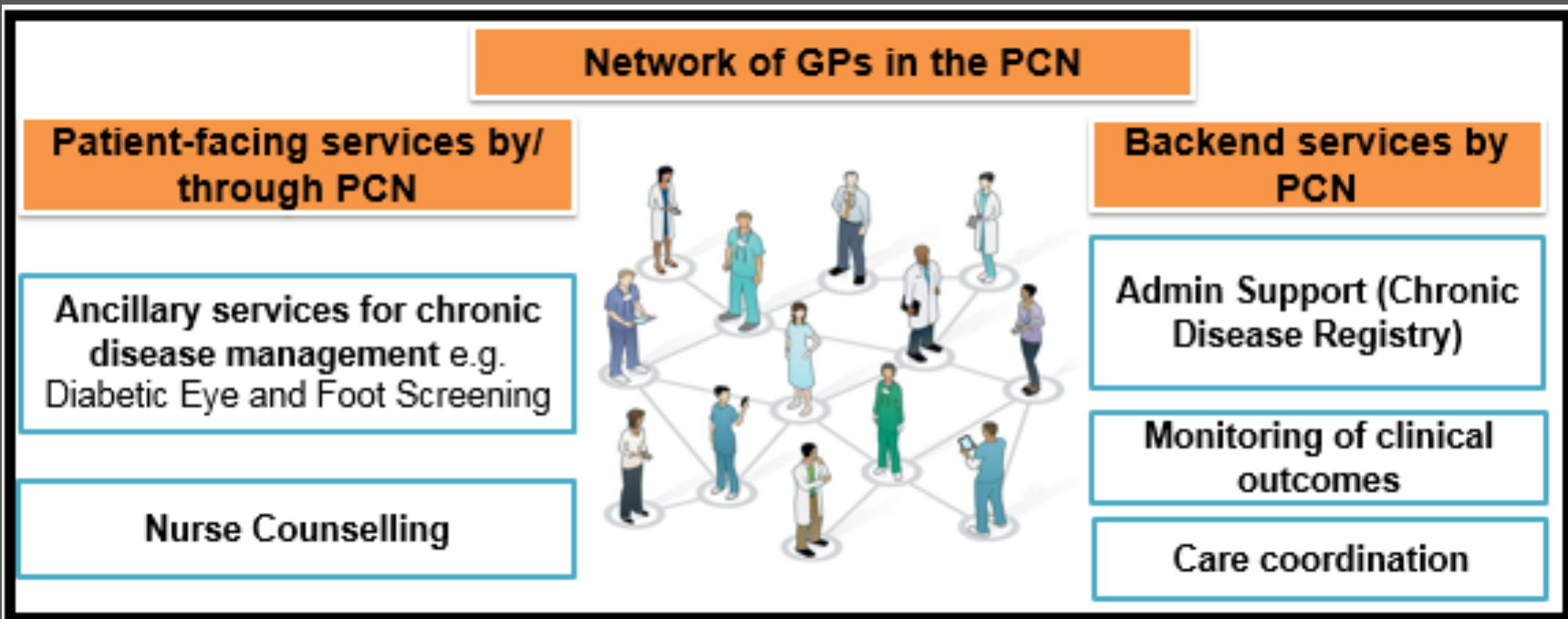
average occupancy rate 85%
 average length of stay - 5.8 days

16 public acute general hospitals and specialty centers
 10 private hospitals

polyclinics (18) + individual clinics - GPs (1500)
GPs network covers 81% of the primary care needs



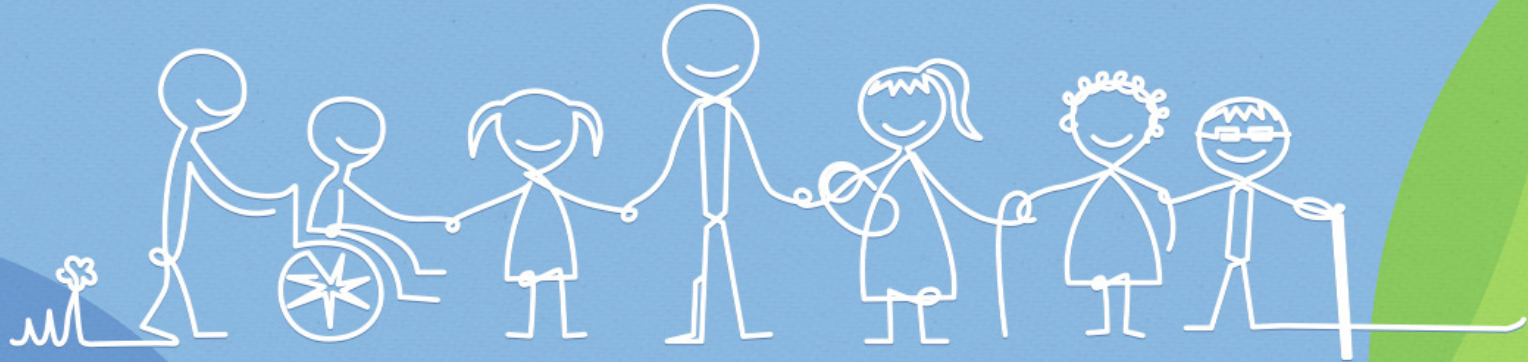




Primary Care Network (PCN) - a network of 10 or more GPs, resourced to provide holistic team-based care for their chronic disease patients in the community with the support of nurses and primary care coordinators.

Manpower Support:, Administrative Support Development Support:, **IT Funding:**

“IT Funding and support will also be provided to encourage **GPConnect sign-up**. Funding also includes digitalization costs of patient records for PCN GPs who adopted GPConnect. This level of support can also strengthen your clinic’s operations and increase productivity through seamless submission of claims for national schemes such as CHAS and CDMP.”

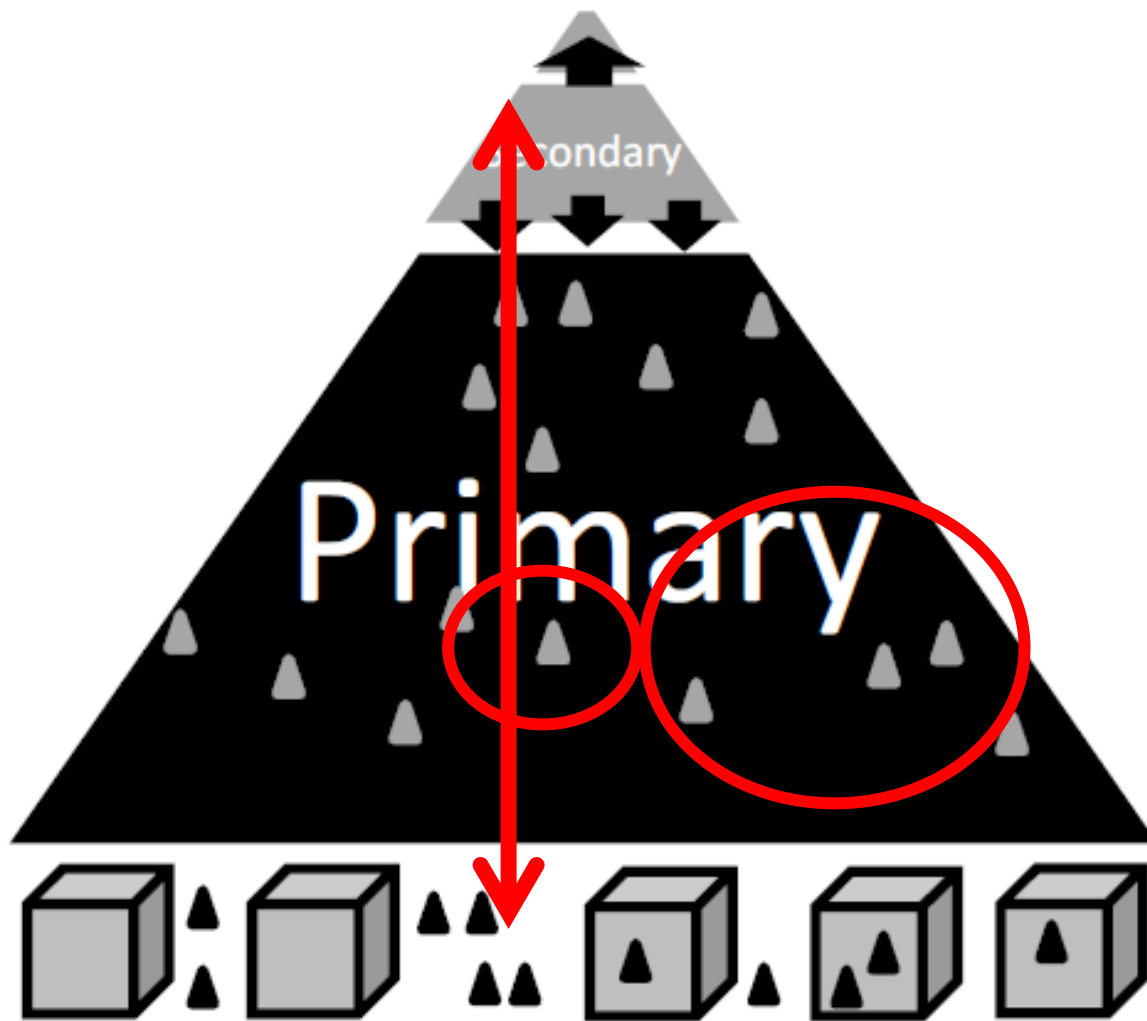


Inclusive Society. Enabled Lives.

SG Enable - agency dedicated to enabling persons with disabilities.

Assistive Technology Fund

The Assistive Technology Fund (ATF) provides subsidies for persons with disabilities (PWDs) to purchase assistive technology devices to enable independent living.



Permeable boundary between the healthcare pyramid tiers and living environment

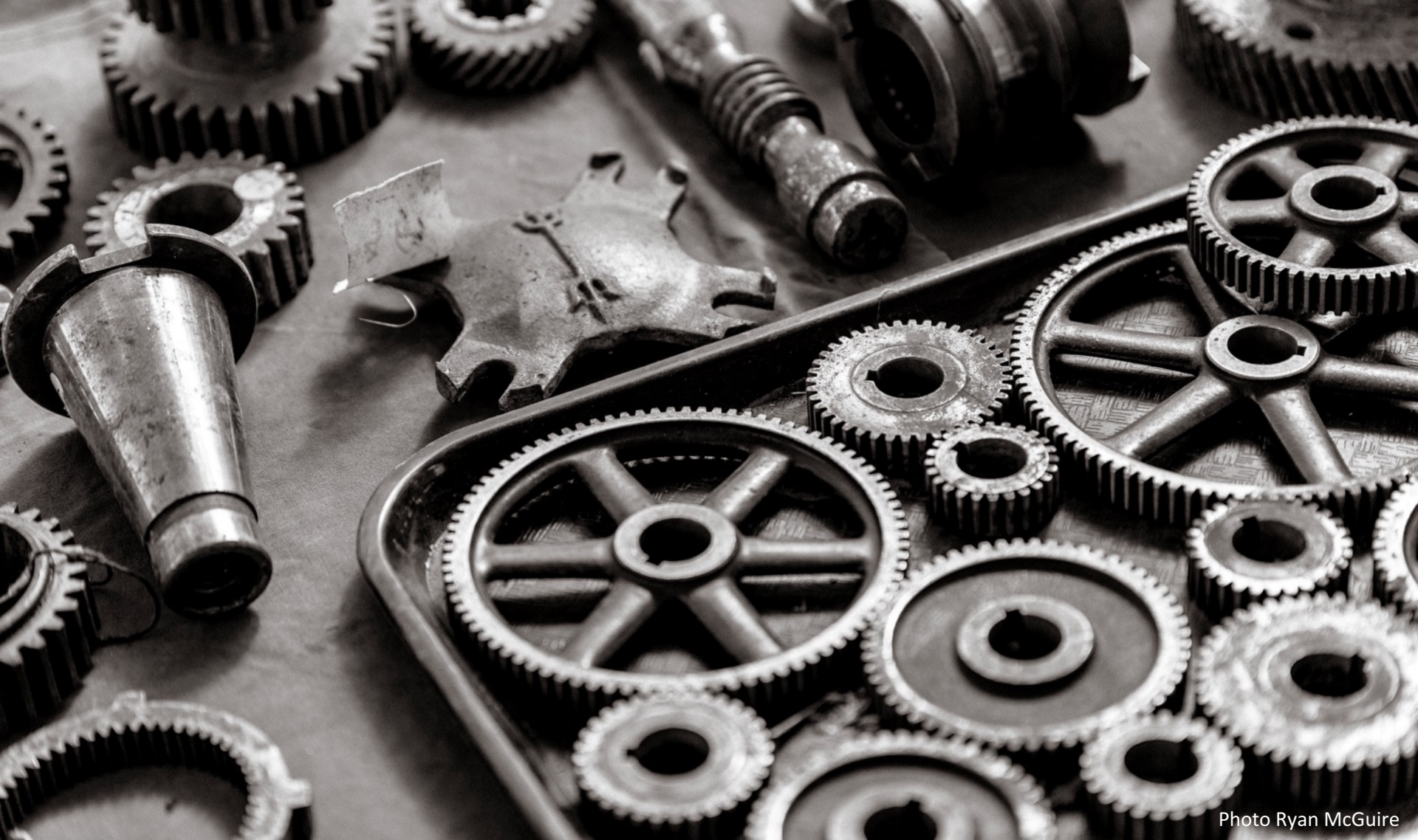


Photo Ryan McGuire

2

• **connected** care model – application of *digital technologies*

WHAT **MILLENNIALS EXPECT** WHEN IT COMES TO HEALTHCARE:

Choice

Energy Connections

Education, Relationships

Mindfulness Transparency

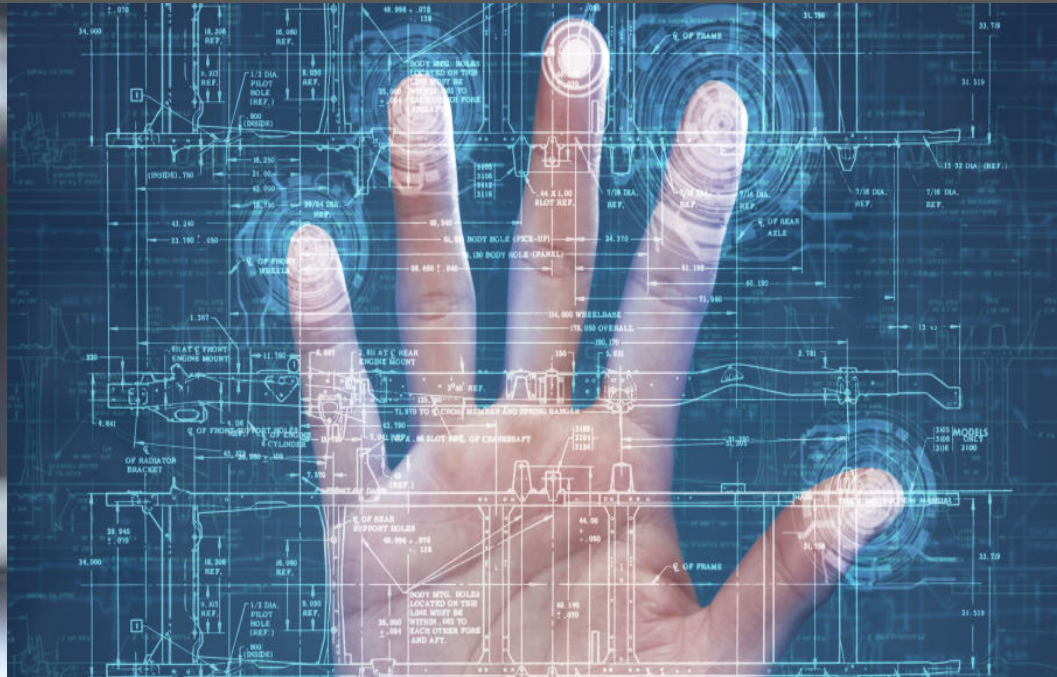
Speed Convenience Quality

Tech-enabled Independence

Efficiency Clarity Relatability

Accessibility

Millennials, who are enthusiastically embracing **wearables** and **health apps**, prefer **virtual communication** for **health interactions**.



Care delivery will begin to change



FUTURE OF AUGMENTED MEDICINE

Augmented reality is expected to reach a value of \$150 billion by 2020



Smart Nation and Digital Government Group

(SNDGG)

placed under the Prime Minister's Office

The Smart Nation and Digital Government Office (SNDGO),
The Government Technology Agency (GovTech)

The SNDGG's responsibilities include **driving digital transformation for the public service** to strengthen the Government's information and communications technology infrastructure and improve public service delivery.

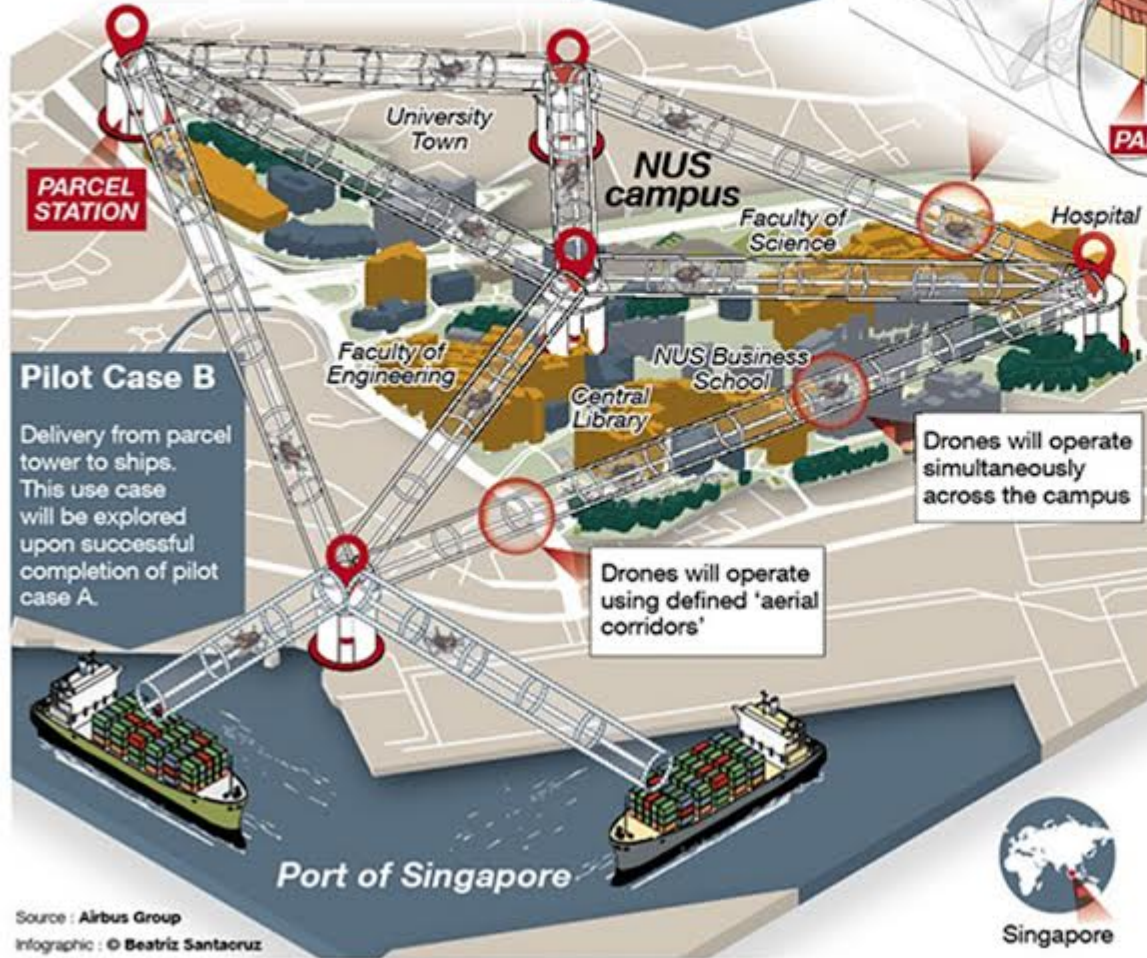
SKYWAYS

Urban last-mile delivery solution

Airbus' Skyways project aims to provide efficient, seamless delivery of small parcels to students and faculties via drones across the National University of Singapore's campus.

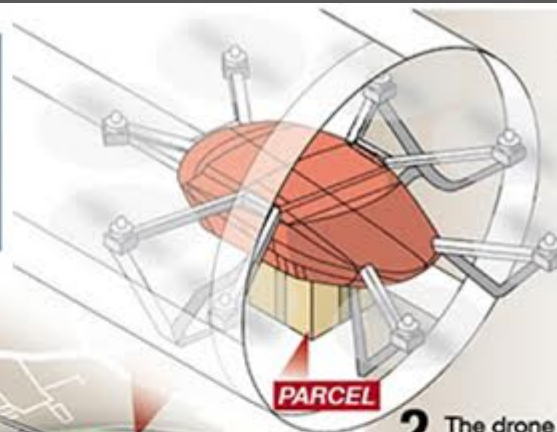
Pilot Case A

Delivery of parcels on the National University of Singapore's (NUS) campus through Skyways network.



1

The Skyways drone is an octocopter that carries air transport containers loaded on its underside.



2

The drone flies a fully automated route, landing on a designated landing pad.



3

Once landed, the drone is unloaded automatically.

4

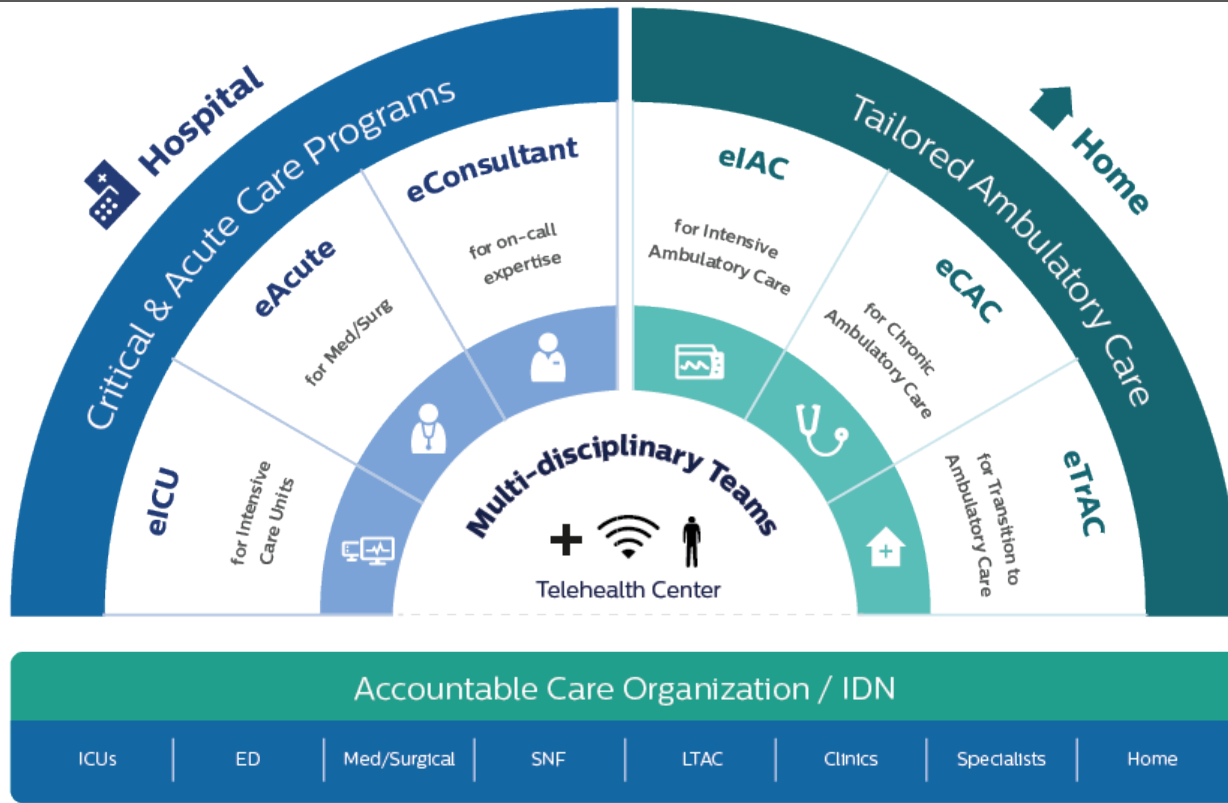
End customers receive a delivery notification on their mobile phone to come pick up the parcel at the parcel station.



An initial trial involving transporting small packages using a drone around the National University of Singapore (NUS) campus is expected by early 2018.

<http://www.channelnewsasia.com/news/singapore/airbus-helicopters-partners-singpost-for-drone-delivery-trials-8735504>

Philips enterprise telehealth services



Home Telehealth

Philips ambulatory telehealth programs provide daily connection between post-acute caregivers and patients, utilizing technology and clinical process to expand access, improve outcomes and provide a better experience for patients.

Complex care | Chronic disease management | Readmission management



The **HoloLens** utilizes augmented reality to create three dimensional objects within a real space
create holographic images



The **Kinect** uses a RGB camera, depth sensor, and microphone to capture motion and sound within its depth of view. –
Recognizes people and their gestures



Infinadeck is a better way to **walk around virtual and augmented reality models.**



The **Leap Motion Controller** is a motion-sensing device that allows users to see their hands in virtual reality and augmented reality. **Users are able to naturally interact with virtual objects, just as they would do in the real world.**



Olorama offers digital scent technology that incorporates smells into virtual reality and augmented reality experiences.



TOUCHABLE HOLOGRAMS- these holograms are touchable, they acquire an **interactive dimension**



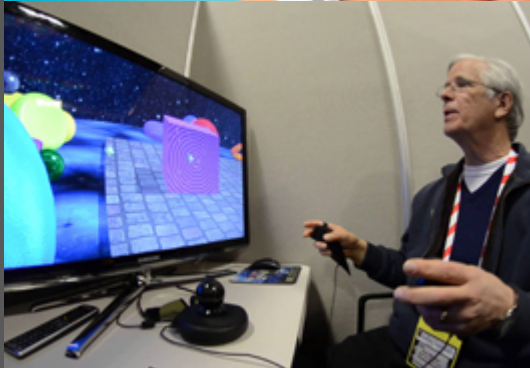
The **EON Icube** is a PC based augmented reality environment. It is a multi-walled system where the user is completely surrounded by images and sound.



Boogio - The bionic foot sensors - tracks movement from the ground to help improve physical performance and health.



CURV is the ideal tool for interactive research, **virtual walkthroughs**, or other applications that require wide fields of view.



Sixsense's MakeVR allows users to **use their hands to naturally interact with the virtual world**.



Magic Leap has ability to **blur the lines between the virtual and the real**



3

Principles for design , programming and placing of H Kiosk
as cutting edge hybrid of digital/analogue worlds

WHAT EFFICIENCY WHERE WHY HOW

program - care + social integration

does it work? Spatial + societal values + care

position in the living environment

H-KIOSK improves the site

design *vs or with* technology?

43 students
30 HDB sites
142 interviews

5 methods for site surveys





MOBILITY	Is walking aid needed?	NO	YES	SOMETIMES	YES
	Travel out of neighbourhood often?	SOMETIMES	NO	SOMETIMES	NO
	is helper needed?	NO	YES	NO	YES
	Do the joints hurts?	SOMETIMES	YES	SOMETIMES	YES
	Where do you spend most of free your time at?	COFFEESHOP/ VOID DECK	VOID DECK	HOME	HOME

INDEPENDENCE	Are you working?	NO	NO	NO	NO
	Staying alone or with family?	Family	FAMILY	FAMILY	FAMILY
	How many people are you staying with?	3	5	2	6
	Facing financial difficulties?	NO	NO	SOMETIMES	NO
	Need help with daily necessities?	NO	YES	SOMETIMES	YES

OBSERVATIONS

Most of the elderly face the problem to move freely because of the pain from their joints or muscles. They do not have the strength to support themselves and they are dependent on helper. This affects their daily activities as they only travel around the neighbourhood most of the time.

Therefore, facilities setup should be located at places that are convenience to them.

Although most of them do not like to be in controlled, help with daily necessities is still needed because of their physical ability. However, they do not like to feel as if they are a burden to the family so they will do whatever they can within their reach.



elderly environment HDB





Garage rooftop garden



Site : not space but a spatial experience

Allan Seah



12. Vista Park



11. Bus Stop



10. Mall Entrance



9. Vista Point
(Shopping Mall)



8. Walkway



7. School Entrance



6. Innova Primary
School



5. Open fields



4. Community Center



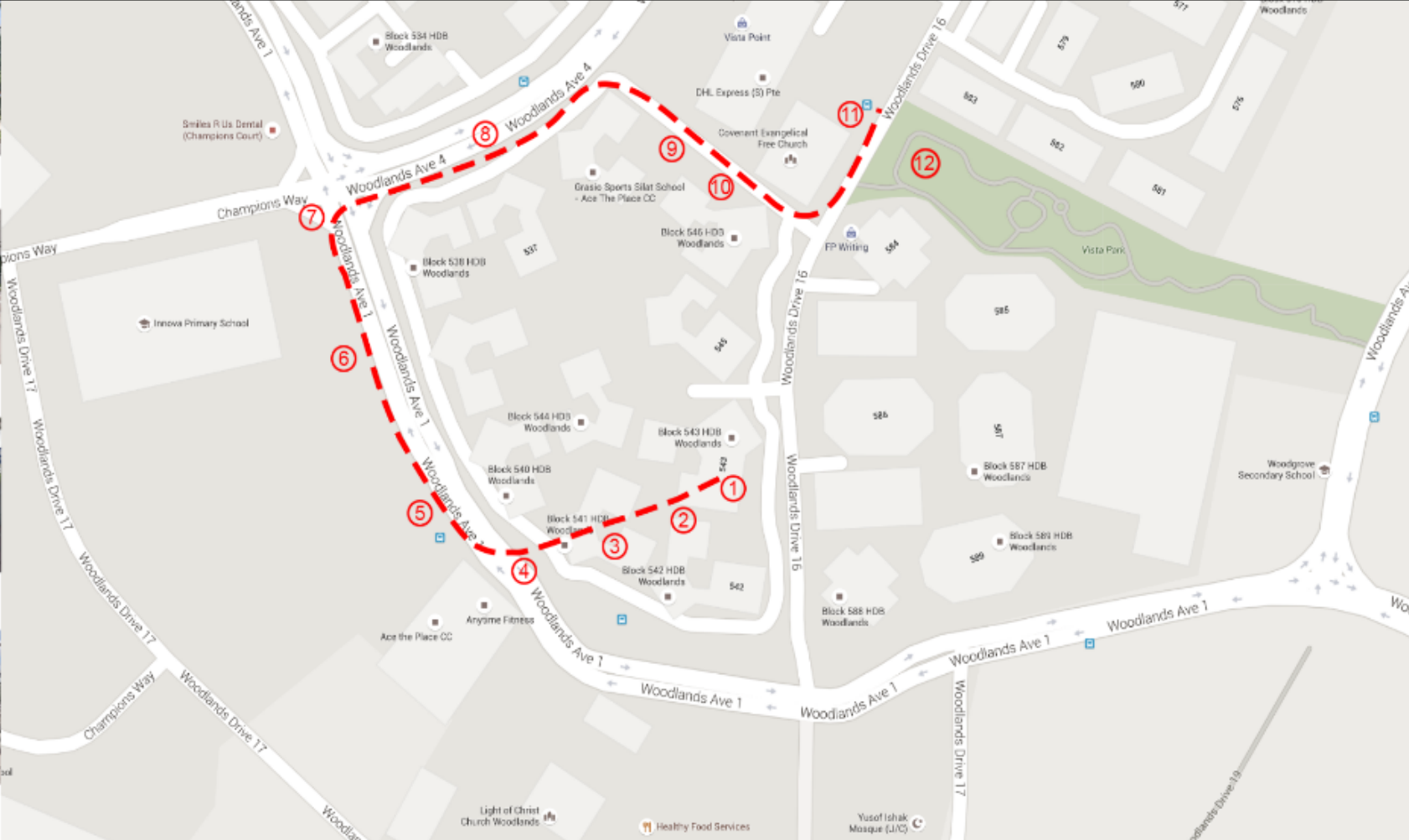
3. Playground



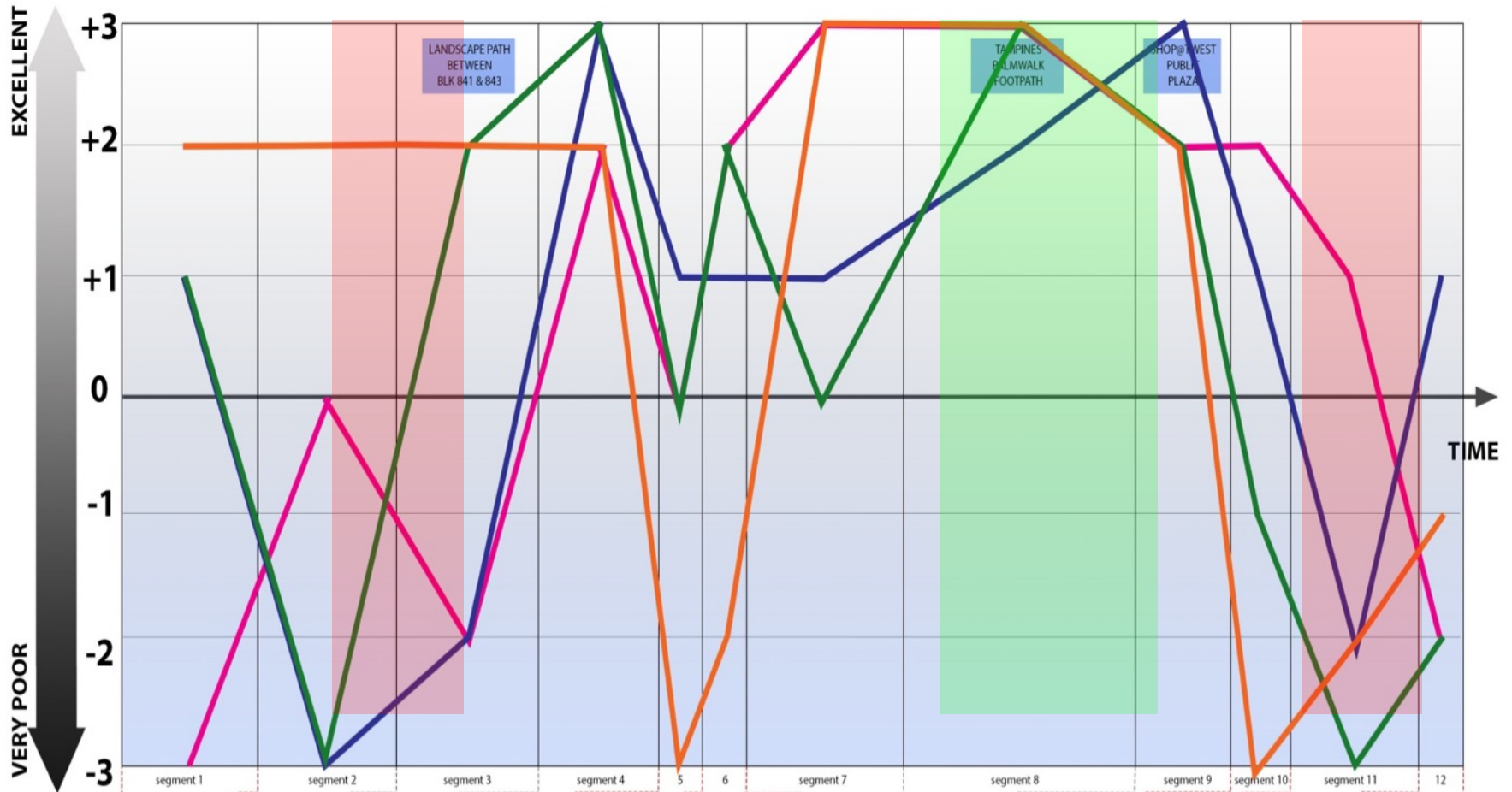
2. Walkway



1. Void Deck



4 MAIN ASPECTS OF HEALING ENVIRONMENT (GESLER)



■ NATURAL ENVIRONMENT
 ■ BUILT ENVIRONMENT
 ■ SYMBOLIC ENVIRONMENT
 ■ SOCIAL ENVIRONMENT

- Most healing environment – segment 8 (excellent results matches will with time spent)
- Least healing environment – segment 2 & 11 (design miss coordination – relative amount of time spent there and also most immediate environment to homes but produces worse results based on analysis)

Estate: Lorong Ah Soo

AR5952J Human Ecology Space & Health

4 Social Environment



Conclusion:
Overall greater social quality, relative to the other 3 aspects. Based on observation, it seems that the elderly are willing to forgo certain niceties such as nature in order to socialize along this route, as the other aspects don't affect the social quality adversely.

The elderly will make use of what's available to continue their social lives and not let poor conditions hamper them. It speaks to the resilience of the generation that they continue the "kampong spirit" in spite of poor urban conditions.

Time Likert Scale



Multiple seating areas oriented for different types of social functions. Open areas for families with kids, shaded areas for elderly who prefer not to get under the sun, and more private areas where seats face away from each other.



The void deck provides bare basic seats to facilitate spontaneous situations. However, the lighting and columns that block line-of-sight diminishes the quality of this space as a social setting.



Very noisy environment due to proximity to main road as well as lack of gathering spaces makes this a poor choice for social situations.



Communal areas around kindergarten and dialysis centre provide small enclaves of rest areas immediately outside. This provides relief for both facility users and pedestrians to spill over. Seats are also altered to suit the height of kindergarteners and elderly who usually use them.



Individual shops provide social situations contained within its own premises. However, the corridor as a whole does not have encourage gatherings or communications.



No possible social situation present.

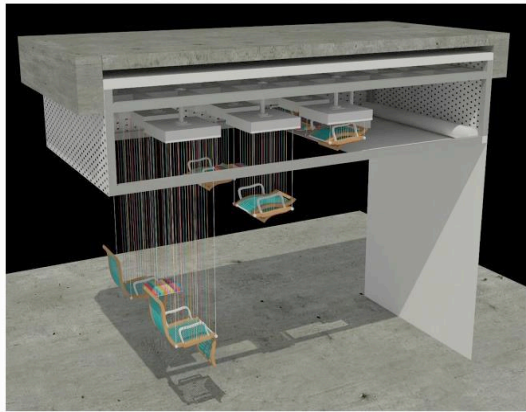


Stalls are oriented to provide easy communication between vendors and customers.



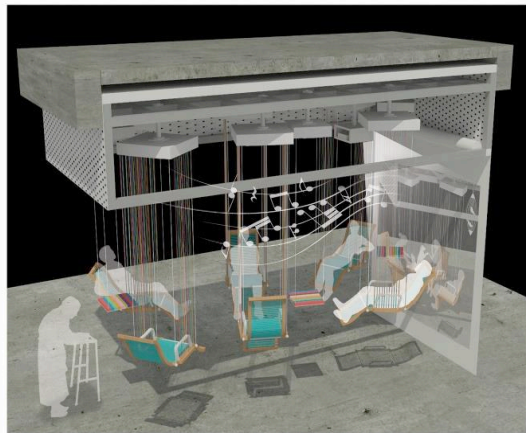
High roofs allow for noise to be dissipated, preventing excessively noisy environments that discourage communication. Smoking zones are also designated such that elderly who do not smoke can converse comfortably without 2nd hand smoke.





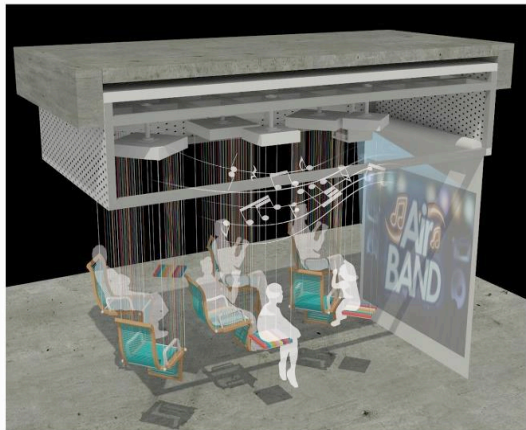
Hello & Farewell

The kiosk opens daily at 6am to cater to the early-bird community, and the suspended seats (Resonance chairs) would automatically be deployed to the ground level for use. By 10pm, motion sensors will ensure that the place is clear before retracting the seats to end the day's activities.



Music Therapy

The community can relax and enjoy the classical tunes or pre-recorded music made by others on the elderly-friendly seats, which will be secured to the ground temporarily by the leg-rest. The projector screens activities happening at other 'Oasis' kiosks, providing virtual social connection.

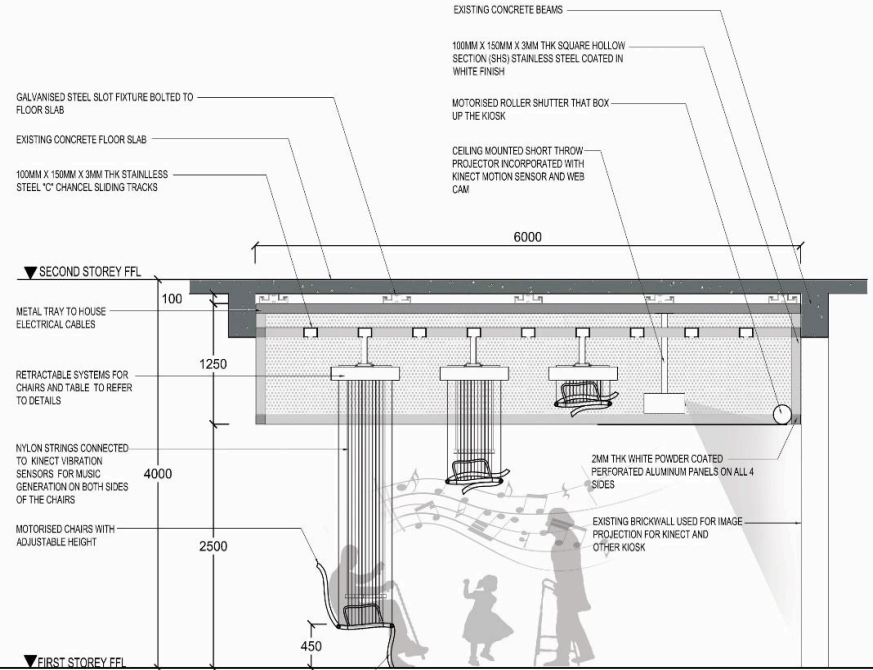


Community Symphony

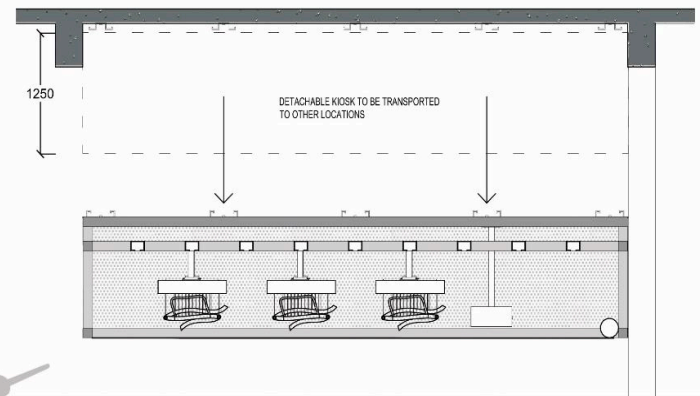
People of all ages can gather to share music tips and practice songs together, while recording and sharing their video clips online. Heartbeat sensors on the handles of the seats ensure that elderly do not over-exert themselves while playing with the rest.

DETACHABLE KIOSK SECTION

SCALE 1:50

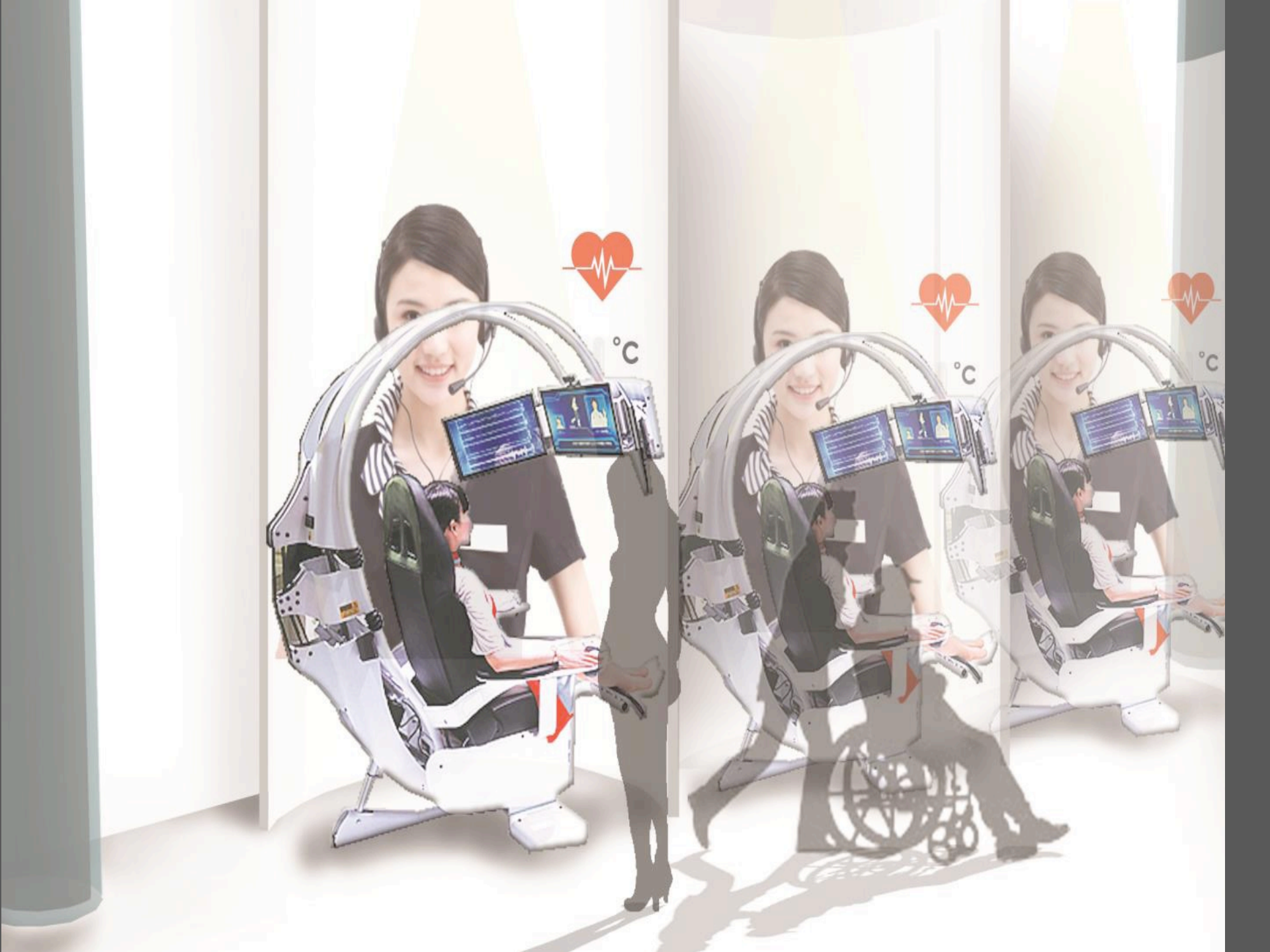


LEG REST USED TO STABILISE THE CHAIR ON THE GROUND FOR ELDERLY TO SIT DOWN/ GET UP

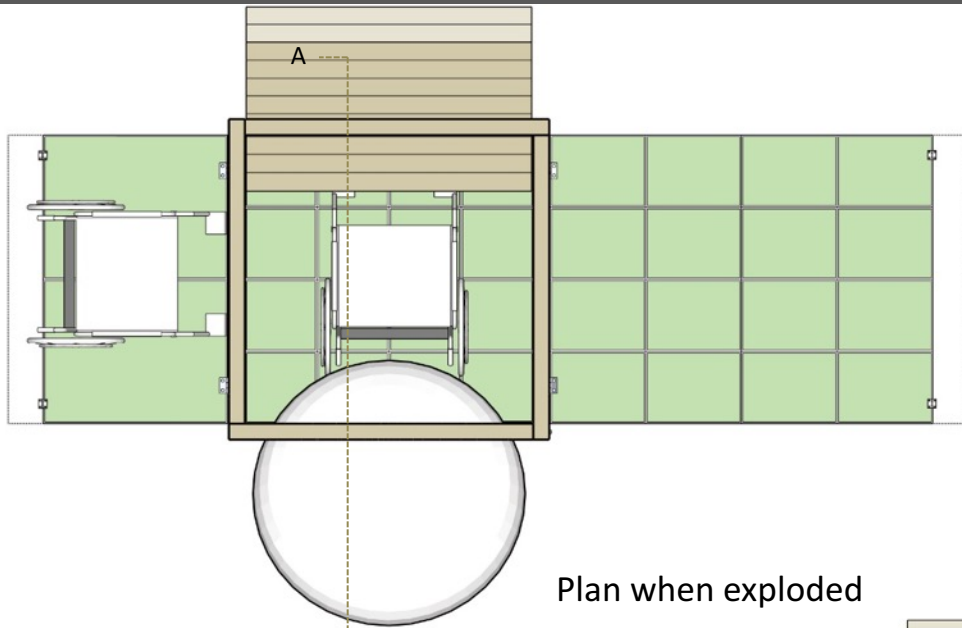


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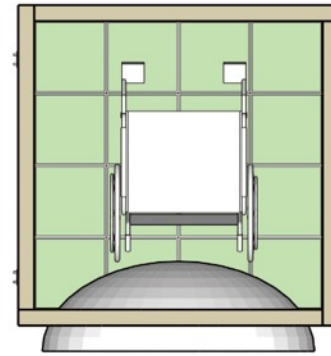




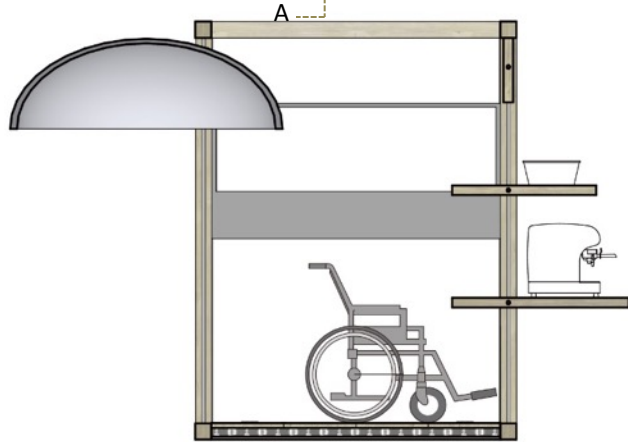
Plan & Section



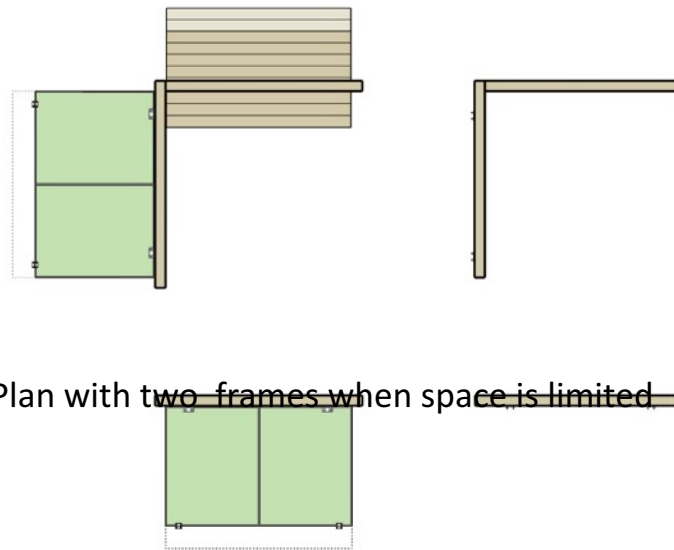
Plan when exploded



Plan when folded



Section A-A



Plan with two frames when space is limited

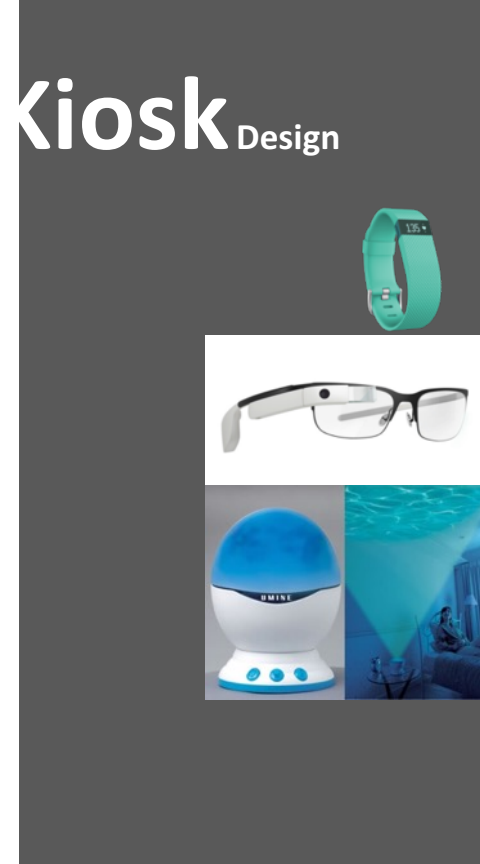
Plan with one frame in narrow corridor

The transformable cuboid is composed of 4 wood frames at each side while each frame support one program. When folded, the dancing floor side looks like an information wall, however, the wall can be rotated down and become dancing platform for the elderly to do exercise while kinetic energy can be collected. The café side has rotating panels which can become tables to hold food and coffee machine. The immersive dome can be pushed up and down and rotated 360 degrees. Putting on glasses, the elderly will feel they are in their imaginative world. Another side has the screen where the elderly can post information and monitor their health conditions.

Health Kiosk Design



SECTIONAL PERSPECTIVE OF HEALTH-KIOSK



An example of a HUD or heads up display of 'Google Glass' that allows elderly to monitor their health and grandchildren activities at the same time

Allan Seah







XXS

HEALTH

KIOSK

