



Designing for inclusive and engaged communities

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Abstract

Budding designers participated in the inaugural Codesign Week 2022, organised by the National University of Singapore. This pilot health district design innovation programme aimed to empower them with skills to reimagine through ideation and prototyping and to articulate their value-driven solutions for an inclusive and engaged Queenstown community. Aligned to the reform effort of Singapore's Healthier SG, six teams unravelled barriers to elderly and persons with physical or cognitive impairment to live more active and healthy lives. Students co-created ideas around functional living, disease prevention and healthcare delivery together with residents and stakeholders. From pre-/post-survey responses, there was an increase in students' perceived understanding of inclusive design. Students also felt more confident in critically analysing problems related to persons with reduced cognitive ability and their carers and this resulted in impactful solution ideas enabled by empathetic technology.

Keywords: co-creation; critical inquiry; empathy; design thinking; public health; Singapore.

A design challenge in the health district community

The College of Design and Engineering (CDE) from the National University of Singapore (NUS) organised the first-of-its-kind Codesign Week between 27th June and 1st July, 2022. The goal of the Codesign Week was to ideate solutions enabled by transformative empathetic technology for a healthy, engaged, active and inclusive community of all ages in a pilot health district precinct. The focus of the week was residents' health in the area of functional living, disease prevention and healthcare delivery, and barriers to the elderly living more active and healthy lives. The challenges faced by service providers in supporting this population

were discussed extensively via a three-pronged approach.

- **Places:** How might we design an inclusive and vibrant physical environment in the pilot health district, taking into account the distinct resident population profiles living in the Queenstown community of Singapore, while dealing with their specific needs?
- **People:** How might we define an engaged citizen and shared identity in places where the elderly feel familiar and comfortable while leveraging technology as an enabler?
- **Programmes:** How might we promote design programmes led by higher education institutions that encourage co-creation activities amongst students, volunteers, partners, and residents?

Participants consisted of undergraduate students from CDE (NUS), community partner Lion Befrienders, industry partners SmartRx and Huawei, and residents from the Queenstown community in Singapore. Participants were grouped into six teams and were guided through a five-day Design Thinking programme. They were provided with problem statements from a needs analysis conducted by NUS through informal interviews with community partners. With this data, teams were tasked to identify the design gaps and opportunities for Queenstown. They then brainstormed solutions that revolved around the themes of (Theme 1) day-care centre-based support, (Theme 2) community centre initiatives, (Theme 3) community-led ideas, and (Theme 4) inclusive transport. The programme was implemented using physical and virtual settings. Digital tools and communication platforms were utilised, e.g., Zoom consultations and team discussions via breakout rooms, broadcasted announcements and updates via a Telegram channel. The learning objectives of the Codesign week from the perspective of NUS were:

1. To engage residents and care partners to exchange lived experience and care perspectives on formal/informal support and current healthcare challenges.
2. To empower student participants with current design methodology and tools for collaborative team-based learning and stakeholder engagement.
3. To enable students to approach problems from a position of empathy, in order to achieve well-aligned, community-based solutions.

On-site engagement between students and stakeholders from the Queenstown community

Participants gathered at the Lions Befrienders Training Centre on Day 1. It was crucial for the students to come to the actual site where their solutions will be eventually implemented. This inspired them to empathise better with the needs of local residents. Students were first introduced to Singapore's healthcare systems, transformational efforts, and key challenges in moving from hospital to community care, including current community initiatives that support residents. Design-centric approaches that are creative, human-centred, and inclusive were emphasized and reinforced using design thinking methods, and toolkits. Representatives from the institutional (NUS), social (Lion Befrienders) and private sectors (SmartRX and Huawei) shared their perspectives in reimagining healthcare support programmes, interventions and solutions for the community (Figure 1).



Figure 1: "Thinking by perspectives" – Students Healthier SG. Top left is Ms Irina Barbolina (NUS), top right is Ms Natasha Idrus (Lions Befrienders), bottom left is Mr Tong Chen Hao (SmartRx) and bottom right is Ms Genevieve Lee (Huawei).

The Codesign activities involved the use of collaborative methods involving stakeholder interviews (Bunn et al., 2018), observations (Halsall & MacDonald, 2015), and information gathering (Shah & Leeder, 2015). The emphasis is focused on conversations with stakeholders and peer learning through critical inquiry for meaningful engagement (Denzin, 2017) (Figure 2). Teams carried out discussions virtually and adopt active dialogues and reflective practice (Suppiah, 2020). In their conceptual and technical investigations, they

developed the narratives around the proposed solution through value scenarios (Nathan et al., 2008).



Figure 2: The Essence of Codesign" – students having a brainstorming session with senior residents and community care partners at the Lion Befrienders Training Centre on Day 1 of the Codesign week.

Engagement between students and technology partner

There was a sharing session by Huawei on the technology and contextual knowledge of health solutions and systems on Day 2 through a virtual sharing session on cloud solutions and smart healthcare, coordinated by Ms Genevieve Lee, Public Relations Manager, and delivered by Ms Tang Xiaoyue, Cloud Solution Architect from Huawei Singapore. This is designed to inspire teams to select a technological solution that is well-aligned to the needs of the stakeholders and implementable.

Equipping students with design thinking toolkits

To equip participants with a framework to address real-world problems in community health for the design challenge. Students participated in 60-minute crash course sessions about community care and design thinking fundamentals (or "Micro-DT for Health") delivered by Mr. William Siew, Founder of Spark-a-life (Figure 3). They were taught how to adopt and apply design thinking toolkits. The methodologies included Hierarchy of Purpose, Personas, User Journey Mapping, Real-Win-Worth it, Care Circle, See and Shoot, and Restorative Cities design methods and framework. All of the above formed the various stages of the enhanced Ideate-Prototype-Realise design innovation framework (Figure 4) and facilitated the progression from contextualisation to empathy phase.

Preparing for the perfect pitch

On Day 3, students were taught by Associate Professor R Brian Stone (NUS), through a three-hour Service Stage Planning workshop on communication in design. He shared about strategies to reimagine problems and through the use of co-created, low fidelity prototypes, how best to articulate innovative ideas effectively to the target audience (Figure



Figure 3: “Micro-DT for Health” – A sharing on design methods and toolkits by Mr. William Siew (Spark-a-life).

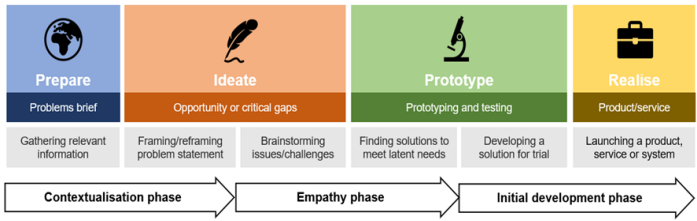


Figure 4: Enhanced Ideate-Prototype-Realise design innovation framework.

5). Consultations with instructors were also an integral part of their planned schedule, as the eventual goal was to seek clarifications and provide them with timely guidance, especially crucial in early-stage ideation. The guided approach helped students to proactively look for ways to innovate value-driven solutions for Queenstown residents, especially those with physical or cognitive impairment.

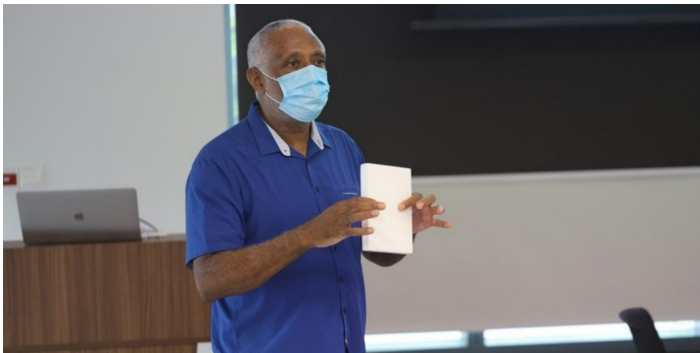


Figure 5: “Service Stage Planning” by Associate Professor R Brian Stone (NUS).

Team deliverables

Over the course of five days, each team was designated a shared folder in Google Drive that contained speakers’ slides, design method cards, programme itineraries, and design templates to help them work on their deliverables. Teams were able to apply their knowledge and experience gained from the programme, and successfully completed the three deliverables below within the stipulated time.

1. **Compilation Report:** to capture the salient points of team discussions, secondary research findings and key observations using design templates and toolkits.
2. **Solution Poster:** to highlight the key problem, proposed solution ideas, pre-and post-user journeys, and solution strategy.
3. **Pitch:** to effectively communicate about the proposed solution design, technology selection, and implementation based on evidence.

At the end of the design challenge, the six teams successfully engaged stakeholders to Codesign digital care interventions and solutions that better support the needs of residents. The teams presented their final solutions to a diverse panel of esteemed judges, comprising Prof Dean Ho, Head of Department for Biomedical Engineering, NUS, Ms Nancy Zhang, PR Director of Huawei International, Ms Karen Wee, Executive Director of Lions Befrienders, Mr Bennet Lee, Chief Technologist of Aeras Medical and Dr Clement Zheng, Assistant Professor, NUS. The judging panel was impressed at how well the students were able to design and present innovative solutions in a short period of one week. As a testament to the impact of solutions, some of these ideas were submitted to the Tech4City competition organised by Huawei. The students were also invited back to Lion Befrienders to discuss the implementation of their solutions with their research and development team. Queenstown residents can look forward to quality care solutions that will support their physical, social, and mental well-being, and enable them to lead more active and fulfilling lives. Eventually, two teams with empathetic technology-based solutions that support the lives of the elderly and persons with reduced cognitive ability won first place and runner-up.

Winner and runner-up

Team 6, who emerged as the winner, designed a solution for Theme 4. They interviewed a special guest, who is a member of the elected board of Alzheimer’s Disease International, Ms Emily Ong, and she shared with them firsthand her invaluable knowledge and insights about advocating for better transportation systems for persons with reduced cognitive ability, e.g., dementia. With the opportunity to interact with residents and key stakeholders, the team was inspired to research more about this topic. They found that there is a total of 388 reported cases of seniors with dementia who went missing while using public transport in Singapore since 2018 (Figure 6). They ideated an interactive gamified mobile app solution to enhance wayfinding in integrated transport hubs, MRT stations, and bus interchanges through navigation with audio/visual cues.

Team 5 emerged as the runner-up and worked on designing a solution for Theme 3. They interviewed Spark-a-life founder and Lions Befrienders’ Assistant Centre Manager to better understand ways to drive community-led ideas. Through their interactions with residents, the team was made aware of the challenge of isolated seniors or seniors living

alone, or residents who are leading less active/sedentary lifestyles. They came up with a problem statement and designed a solution that empowers residents to take charge of their health, by choosing to step outside of their house to engage with the community through physical activities, social engagement, meaningful conversations, and health screening/education (Figure 7). Their proposed solution aims to bring back the “kampong spirit” where neighbours keep a lookout for one another’s well-being (kampong is the Malay word for ‘village’; in Singapore, the kampong (or kampung) spirit refers to a sense of community and solidarity).

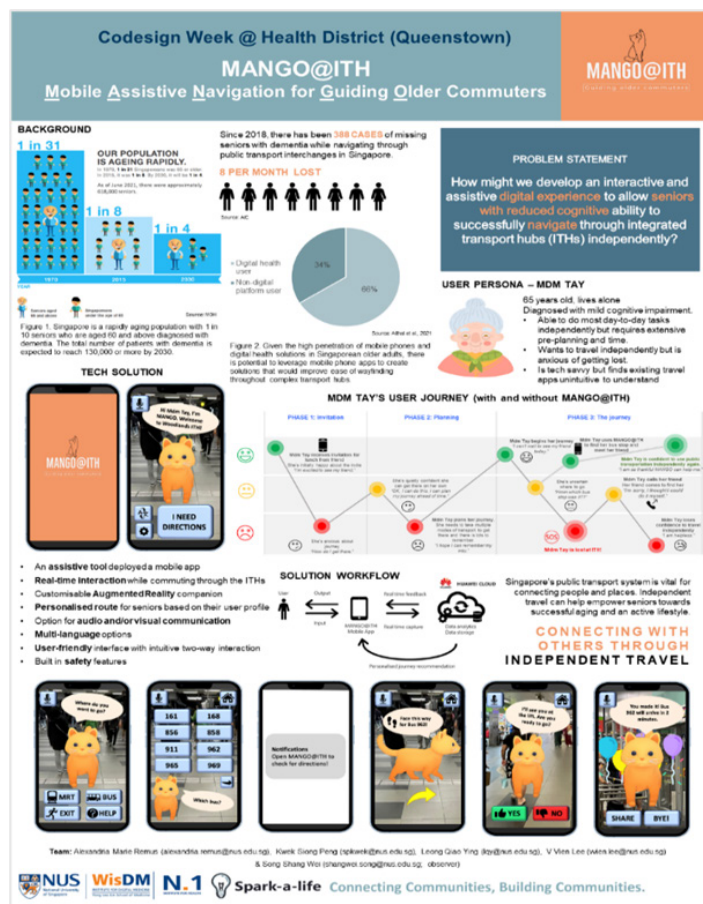


Figure 6: The solution re-imagines wayfinding at integrated transport hubs through a directional orientation-based mobile app with a digital animal avatar.

Observations, reflections and feedback

We observed active ownership by teams throughout the five days. The interdisciplinary knowledge and design expertise of instructors, together with the diverse backgrounds of different stakeholders, added to the value of discussions across physical and online engagements. Although there were some language barriers, it did not stop the senior residents from contributing. They were keen and candid and shared their opinions of current initiatives and innovations during their engagement on Day 1. Remarkably, they also showed up for the pitch to give the students support on Day 5. They tried to understand and were curious about the outcome. The delivery of a highly compact and structured programme saw positive post-event feedback from students. Feedback in the form of a questionnaire revealed that the students have learned about:

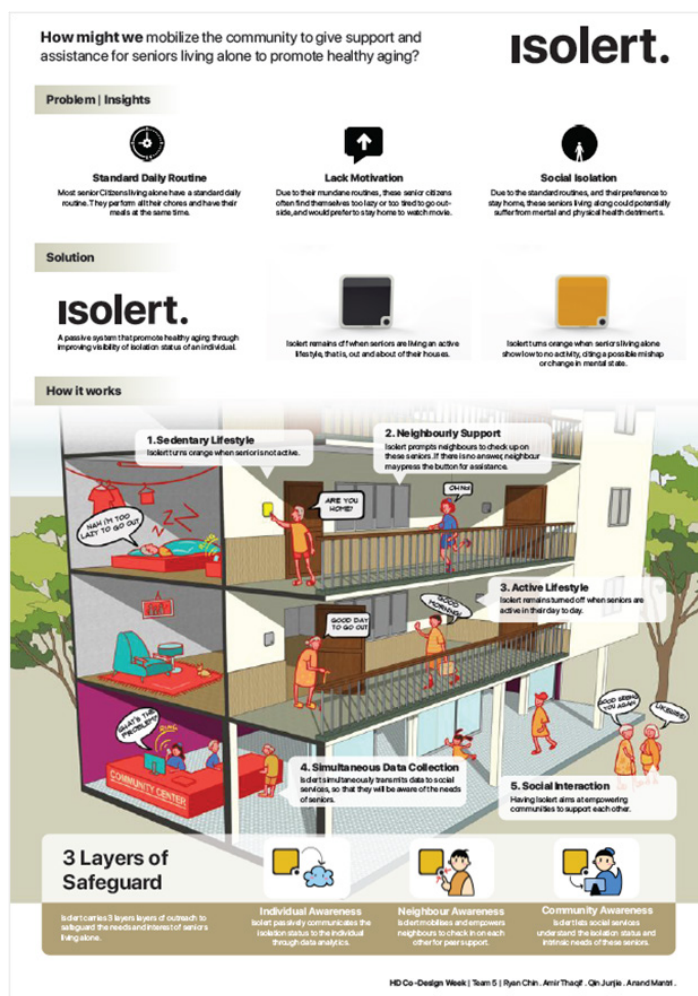


Figure 7: The solution that re-imagines community-led ideas through a home-alert public health system tapping on the “kampong spirit” of neighbourly involvement.

- **Inclusive design**: To use design methodology to “truly care [for] the target audience and involve them in the designing process” when co-creating solutions.
- **Community care**: To be part of “a community that cares about the well-being of their neighbours and friends” through social interactions and meaningful engagements.
- **Empathetic technology**: To become “empathetic to others who are part of the same community” through design, using technology as an enabler.

Students were encouraged to think outside the box, and they also made new friends with common social interests after completing this design challenge. They expressed that they hoped that they were given a longer time to develop their technological solutions for implementation. Other feedback on the Codesign week included:

- “It was a great learning experience, somehow all the teams made it out alive.”
- “It helped us to understand the situation beyond what we initially thought.”

- “It helped us think of other stakeholders we could leverage on.”
- “It taught us a way to ensure the proposed idea is in line with key city archetypes.”
- “It provided us with a toolkit that [is] important to jumpstart discussions, and also helps as prompts that open up more discussion points.”

From the analysis of their responses in the pre-/post-programme surveys, participants’ score of their (1) perceived understanding and confidence on inclusive design increased after the programme (Figure 8), (2) perception and confidence to deal with problems related to people with reduced cognitive ability and their carers improved significantly (Figure 9).

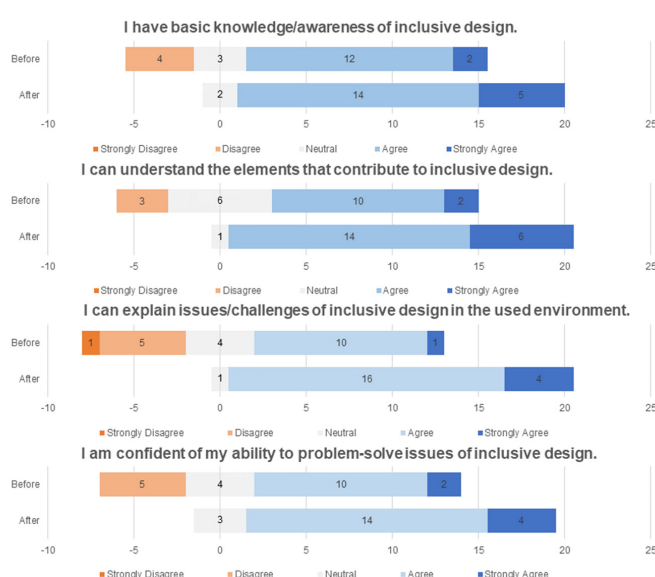


Figure 8: Participants’ perceived understanding and confidence on inclusive design after the five-day hybrid programme (n=21).

In essence, the success factors of the Codesign Week are summarised below.

1. Empathy was emphasised through students’ engagement with senior residents and community partners, which reinforced active learning through innovation by design, by looking through the lens of designers and stakeholders throughout the design process.
2. Daily students-instructor consultations allowed teams to learn efficiently and immediately seek feedback on the ideation process, especially when teams were reframing their problem statements and deciding on their final proposed solutions.
3. The use of a virtual shared folder on Google Drive and Telegram enabled teams to access, exchange, upload and share information openly and efficiently.

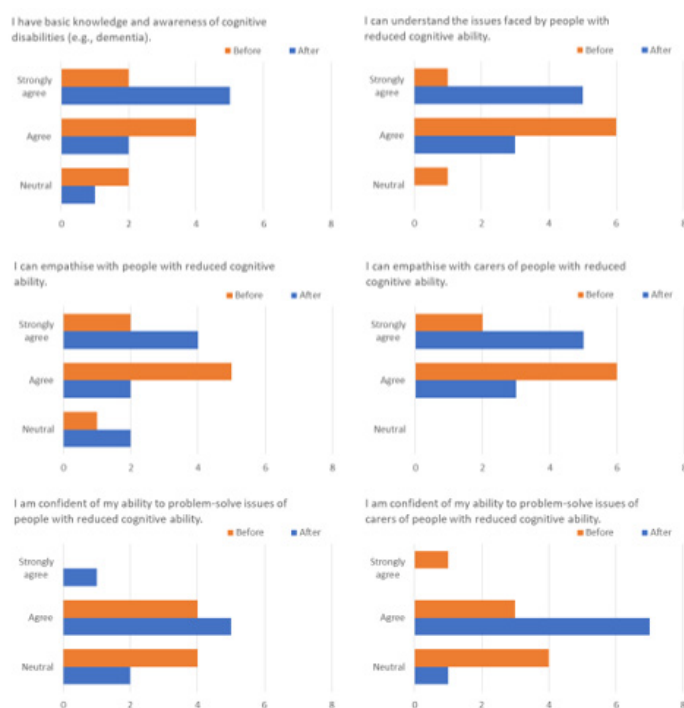


Figure 9: Participants’ perception and confidence to deal with problems/issues related to people with reduced cognitive ability and their carers (n=8).

4. Instant messaging reminders helped students stay on track with key items for deliverables, including design activities and progress report submission on a daily basis.
5. The learning environment provided a real-world experience where participants who come from different fields and personal experiences are expected to collaborate through working with differences in opinions, ideas, and desires, which is an important aspect of managing complexities in codesign.

The students’ engagement with senior residents face-to-face at Lions Befrienders Training Centre enabled deeper connections with a human touch, fulfilling “people” and “place” and allowing them to pose questions right away to community partners about potential technology solutions directly.

Conclusion

Coordinating discussions and collaborations amongst stakeholders requires thought leadership, where organisers need to be clear in setting the goal of achieving desirable design outcomes with the university’s student participants. This planning process included the preparation of a fun and intensive structured programme that focused on active learning with empathy. A well-thought-out programme flow involved a combination of key planning parameters, such as programme requirements and stakeholder identifications by the planning team. Participants were able to interact directly with potential stakeholders to seek input, exchange

information, share opinions and ideas, and ideate with different perspectives. In five days, the Codesign Week provided a good learning opportunity and a conducive environment where budding designers were supported using toolkits to increase their level of empathy and critical inquiry. Through instructor-led sessions and sharing by residents and community partners, the students' knowledge, understanding and confidence in designing for inclusivity and community care increased after the programme. These findings were gathered through the observed impact tabulated from their responses in the pre-/post-programme survey and feedback form. Participants were active and motivated because they were guided through a thorough process that required them to document their learning journey and peer learning. This hybrid programme allowed a flexible learning environment through co-creation, and the planning committee observed their interests in inclusive design and community innovations flourish. Some students even posted about their learning journey on LinkedIn.

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4. Ms. Genevieve Lee, Ms. Tang Xiaoyue, and Mr. Charles Cheng from Huawei.
5. Ms Emily Ong from Dementia Alliance International.
6. All student participants.

References

- Bunn, F, Goodman, C., Russell, B., & Wilson, P. (2018). Supporting shared decision-making for older people with multiple health and social care needs: A realist synthesis. *Health and Social Care Delivery Research*, 6(28), 1–84. <http://dx.doi.org/10.3310/hsdr06280>.
- Denzin, N. K. (2017). Critical qualitative inquiry. *Qualitative Inquiry*, 23(1), 8–16. <https://doi.org/10.1177/1077800416681864>.
- Halsall, B., & MacDonald, R. (2015). *Design for dementia volume 2 – research projects*. Liverpool: The Halsall Lloyd Partnership. https://www.hlpdesign.com/images/case_studies/Vol2.pdf.
- Nathan, L. P., Klasnja, P. V., & Friedman, B. (2007). Value scenarios: A technique for envisioning systemic effects of new technologies. In *Proceedings of The ACM Conference on Human Factors in Computing Systems (CHI)*, 2585–2590. <https://doi.org/10.1145/1240866.1241046>.
- Shah, C., & Leeder, C. (2015). Exploring collaborative work among graduate students through the C5 model of collaboration: A diary study. *Journal of Information Science*, 42(5). <http://dx.doi.org/10.1177/0165551515603322>.
- Silva, A., & Blessing, L. (2021). Innovation by design – A new post-graduate program at SUTD. In Chakrabarti, A., Poovaiah, R., Bokil, P., & Kant, V. (Eds.), *8th International Conference on Research into Design (iCoRD)*, 7-9 January, IDC School of Design, IIT, Bombay, India.
- Suppiah, S. (2020). Exploring a collaborative and dialogue-based reflective approach in an e-learning environment via the Community of Inquiry (CoI) Framework. *Computer-Assisted Language Learning-Electronic Journal*, 20(3), 117–139. <https://dl.ndl.go.jp/info:ndljp/pid/11517963>