

**Future Trends Report
Based on Analysis of the Team's Chosen Community / Organisation in Mid-Term
and Final Evaluation**

Community / Organisation Studied: St. Andrew's Senior Care Centre (Tampines Branch)

STEP 1. Identify Challenges

Read the Future Scene carefully and generate ideas for challenges, concerns, and possible related problems. Choose the 5 most important challenges and write them in the space provided. Include applicable research with appropriate in-text citations.

Challenge #1:

Elderly are not able to accept the implementation of technology in their everyday lives.

During the interview, the Centre Manager told us that the elderly prefer to reminisce the past by looking at old photos and albums and indulge in physical activities instead of just using the technology around them such as iPads. We also heard from the elderly that they would rather stick to their usual activities than try the technological amenities around them. (OBSERVATION)

If the elderly are unwilling to learn about new technology, they will not be able to utilise the convenience of technology, causing them to lag behind and miss out on important functions such as social connection via online communication or health purposes like medication management and health tracking. Other purposes such as entertainment and relaxation are examples of what the elderly stand to lose if they do not experiment with new technology. (WHY)

Elderly spend less time online compared to young adult. According to a study by Lancaster University, the resistance to using digital technologies is mostly due to the lack of desire for technology, the fear of getting things wrong and seeing digital technologies as arduous and time consuming.

A research article published in 2019 (Wang, 2019) where they conducted a study shows that 60% of the participants aged 65 and above, felt offended on the amount of information collected by companies online. 80% reported a medium to high index with respect to their concern above privacy of their data. (RESEARCH)

Challenge #2:

The introduction of robots may render less need for nurses/caregivers and thus leaves them jobless.

The Centre Manager explained to us that there are robots and AI in other branches of their senior care centre that help give the elderly their medications and interact with them, reducing the workload for caregivers (OBSERVATION)

With the use of robots becoming more and more prominent in the decades to come, nurses and caregivers' jobs could be replaced. As a result, this leaves many of them being unable to be employed, and may lead to them taking low or minimum wage jobs, making it difficult for them to provide for their families. (WHY)

In Japan, a greater demand for elder care, along with a nursing shortage, has inspired the development of nursing-care robots like "Robear."

According to AJ Abdallat, CEO of Beyond Limits, they believe that the role of AI is to complement and not replace jobs such as caregivers/nurses. (RESEARCH)

Challenge #3:

With the introduction of robots, elderly may lack human interaction.

The Centre Manager told us that although robots may carry out the jobs of nurses/caregivers more efficiently, there will be a lack of human interaction as the elderly do not communicate with a real person. (OBSERVATION)

This could be a problem as with robots replacing humans as nurses or caregivers, there may not be enough human interaction for the elderly, which may cause a multitude of mental diseases such as dementia, alzheimer's and many more, which derives from the lack of human-to-human interaction. It could also make the elderly feel lonely. (WHY)

“The current robo-carers do not offer anything approaching the nuances and complexities of genuine human interchange, rather an app store version that most people would consider a matter of erratic entertainment rather than a day-do-day necessity.” - John Harris, journalist for The Guardian

Emerson Dameron, content marketing manager of Neoteryx also stated that AI can not replace the human touch in healthcare.

According to a University of Michigan study, 1 in 5 elderly adults is socially isolated from family or friends. U-M researchers also found that this may place them at risk for physical and mental health problems such as Alzheimer's & dementia. (RESEARCH)

Challenge #4:

The fourth industrial revolution may increase the risk of a data breach.

The Centre Manager told us that a data breach in a nursing home would be detrimental as a lot of personal data is stored. Personal information could be retrieved, money could be stolen and accounts could be hacked. (OBSERVATION)

Cybersecurity threats have increased due to the Fourth Industrial Revolution. Places that store personal data such as nursing homes may be targets for hackers, as the data of many individuals may be hacked into.. Personal information of people could be lost, which could possibly be disastrous for the individual. Money could be stolen, if the data of these individuals is accessed by hackers. (WHY)

One example of a data breach is the SingHealth data breach in 2018, where the personal particulars of 1.5 million SingHealth patients, including PM Lee Hsien Loong, were stolen by hackers.

According to an article by Channel News Asia, a cybersecurity firm says that 3.7m customer records stolen from a Sephora data breach is up for sale on the Dark Web. "The sample showed the databases contains login, encrypted password, date of registration and last activity, IP of registration, last IP, gender, name, surname, ethnicity, eye color, skin tone, skin type, hair color, hair concerns, makeup essentials, and skincare routines, he said, adding the set of data was being sold for US\$1,900 (S\$2,613)" (RESEARCH)

Challenge #5:
Cost of Robots

At St. Andrew's Senior Care Centre, we asked the Centre Manager if they plan on introducing robots in the nursing home. She mentioned that at this point, there were not any resources provided as robots are not yet affordable and widespread enough.
(OBSERVATION)

In light of all the benefits that using robots and artificial intelligence can bring to the table, one major factor in the reason why they are still not mainstream is the cost of acquiring this technology in the first place. Robot caregivers are not commonly found, thus to get enough of these robots for the centres will require quite a sum of money. Most nursing homes do not have the budget to afford robots, thus it is not yet common to find robots in nursing homes. (WHY)

An article by The Straits Times states that public spending on long-term care (LTC) was \$600 million in 2015, the latest year for which data is available, according to figures from the Ministry of Health (MOH). While spending on LTC in 2015 was four times that of 2011, it still accounted for only around 7 percent of the MOH budget (\$8.7 billion) and less than 0.15 percent of Singapore's gross domestic product (\$408 billion) that year.
(RESEARCH)

STEP 2. Craft the Underlying Problem

Using the challenges listed in Step 1, identify a problem of major importance to the chosen community / organization in the future. Write your Underlying Problem making sure your question clearly explains the action that will be taken and the desired results/goal of that action.

Incorporating Challenge(s) #2 & #3

Underlying Problem:

Given that there is a high probability of robots taking over humans' jobs at nursing homes, problems such as lack of social interaction and nurses/caregivers being unable to manage these robots may arise. How might we allow technology to complement the current staff at nursing homes so that issues stemming from robots being implemented in nursing homes may be minimised in the year 2030 and beyond?

STEP 3. Produce Solution Ideas

Generate solution ideas to the Underlying Problem in Step 2. Choose the 5 most effective solutions and write the elaborated ideas in the space provided. Include applicable research with appropriate in-text citations.

Solution #1:

Using virtual reality to help elderly reminisce the past.

We, the nursing homes of Singapore, will implement virtual reality in nursing homes where elderly will be able to use virtual reality to look at old photos and the history of Singapore. This can help the elderly get used to new technology and be more willing to try other technology. This allows elderly to seek comfort in trying new things, in turn providing more space for discovery and inquisitiveness in technology.

This solution is effective as when we visited St. Andrew's senior care centre, the centre manager and the elderly themselves said that they preferred to do traditional things and looking back at their past photos. Thus, we inferred that the elderly may not be so enthusiastic in keeping up with the future, but reminiscing the past. Our solution is able to achieve this using technology, which may allow the elderly to open up more to the benefits of technology.

Created in 2015, Rendeever offers a subscription-based service to individuals and facilities to offer older adults immersive, engaging experiences through VR headsets. A program by Dr. Sonya Kim, called Aloha VR, is "designed to engage with seniors with various unmet psychosocial needs," she says. "Aloha VR has helped many of our patients feel re-connected to life. Some of the most challenging dementia patients ... have benefited from our program." Virtual reality can provide elderly with fun while also giving them health benefits.

Solution #2:

Upskilling programs for nursing home employees

We, the nursing homes of Singapore, will create upskilling programs for the purpose of allowing nursing home employees to gain skills of managing robots instead of nursing personally. To allow robots to complement nursing home staff, it is important that the staff have correct and sufficient ability in handling the robots and allowing the robots to release the burden on them.

As addressed in our fundamental problem, we feel that it is most important that nursing home staff are able to use robots to help them in taking care of the staff. Thus, providing them with the skills of managing these robots would be the most quintessential way of allowing these robots to complement them.

According to Whende M. Carroll, Nursing Informatics & Healthcare IT Consultant in Seattle, Robots and AI applied in healthcare collect data about patients, and with a greater comprehension of technology, nurses would be able to individually treat patients based on their data. This allows them to make informed choices using predictive data. Nurses can implement extensive planning and management to improve their patient's conditions.

Solution #3:

Use robots for data-related tasks and manual labour instead of interaction.

We, the nursing homes of Singapore, will shift our focus on the use of robots on tracking data such as medication and health, and do manual labour but leave the interaction to the nursing home staff. This way, robots can ease the burden of the staff while also not creating a lack of human interaction for the elderly. This thus solves the fundamental problem by allowing robots to complement staff and allow the staff to truly get personal with the elderly.

Robots can do the job of handling data much better than humans. Thus, the complicated data such as medication and health tracking can be done by robots, making it easier for staff to tend to the needs of the elderly. Being able to do manual labour such as cleaning floors also saves time for the staff.

Robots around the world have been developed to aid in healthcare, such as those in Japan to help elderly in nursing homes by helping them exercise and pick up rubbish and clutter from the floor, preventing injuries.

Another example is Noah, which was introduced in the Guangzhou Women and Children Medical Centre, which can do things like fetching medicine and transporting documents, allowing nurses to spend more time with the elderly and those in need of care.

Solution #4:

We, the Ministry of Health, will implement more futuristic technology such as holograms to make health checkups more convenient and accessible. Implementing holograms will allow the elderly to consult doctors without having to move, which helps greatly as many elderly have difficulty traveling. Using technology thus aids the nursing home staff, reducing workload and increasing convenience.

A lot of elderly in the nursing home are handicapped or have difficulty walking. Introducing holograms lets the elderly have their consultations with doctors and have regular checkups. The nursing home staff can then use this technology to provide care for elderly without having to bring them out of the nursing home.

Silver Chain Enhanced Medical Mixed Reality (EMMR) is a mixed reality application that will let patients virtually interact with healthcare professionals in their own homes. By using the Microsoft HoloLens headset healthcare professionals will appear as holograms and will be able to care for patients who don't have to be in the hospital, saving time and money for the health system.

An article by Health Central, New Zealand, states "Recent advances from Microsoft included the developing of "Hololens" virtual reality technology – featuring holograms" "Nurses were also using Hololens during home visits so they could access patient notes and treat the patient at the same time. They could then put the headset on the patient so, if required, they could have a discussion with a virtual doctor."

Solution #5:

Providing tutorial lessons to help elderly familiarise themselves with technology.

We, the nursing homes of Singapore, will help elderly get used to new technology by providing them with educational programs that introduce the benefits of technology at the same time. This allows the elderly to ease into the usage of technology by teaching them the basics of how to utilise technology. This thus helps the nursing home staff by allowing them to use technology with the elderly to reduce their workload, allowing robots to better complement the nursing home staff in taking care of the elderly.

As mentioned in our first challenge, elderly may not be able to accept the implementation of technology in their everyday lives. Thus, providing tutorial lessons to introduce technology to the elderly is a way to help the elderly to be more open minded in using and engaging with technology such as robots and holograms. This solution provides an effective way to allow to elderly to learn how to make use of the benefits of technology.

About 20 students, aged between 50 and 80, attended the IM Bonding Learning Project – a tripartite collaboration between the Infocomm Media Development Authority, Lions Befrienders and POSB. The volunteers of this project guided the seniors, walking them through the basic steps of smartphones others may take for granted, including how to use the notifications bar, unlock their phones, switch between applications and surf the internet.

According to the Straits Times, to encourage those aged 50 and above to go cashless, IMDA will also roll out Experiential Learning Journeys, where seniors will be guided by youth volunteers to download banking apps to receive credits and food discounts, top up their ez-link cards electronically and make payments using quick response codes.

STEP 4a. Select Criteria

Generate criteria to determine which solution idea does the best job of solving your Underlying Problem and/or addressing the Future Scene situation. Select the 5 most important criteria for measuring solution ideas and write them in the spaces provided.

Criterion #1:

Which solution will be the most cost efficient for the nursing homes such that it does not put heavy financial strains on them but still be able to complement technology and staff?

Criterion #2:

Which solution will be most feasible for nursing homes so that it has a higher probability of being carried out to integrate technology into the elderly's life?

Criterion #3:

Which solution would have the most appeal to the elderly of the nursing homes so that they would be more likely to accept it?

Criterion #4:

Which solution can be most easily used by the nursing staff to assist them in their job of taking care of the elderly?

Criterion #5:

Which solution would be the least intrusive for the elderly so that there would be not much disruption in the personal lives of the elderly?

STEP 4b. Apply Criteria

List the solution ideas from Step 3 on the grid. Use each criterion to rank the solutions on a scale from 1 (poorest) to 5 (best). The weighting for one important criterion may be doubled if necessary.

Step 3 Sol'n #	Solution Idea	Criteria					Total
		1	2	3	4	5	
#1	Virtual Reality	2	2	5	2	2	13
#2	Upskilling Programs	5	5	2	5	4	21
#3	Using robots for certain tasks	3	4	3	3	5	18
#4	Using holograms	1	1	4	1	1	8
#5	Tutorial lessons for elderly	4	3	1	4	3	15

STEP 5. Develop an Action Plan and Evaluate its Feasibility

Develop your top-scoring solution idea into an Action Plan. Thoroughly explain how the Underlying Problem is solved, how the plan will be implemented, and how the community / organisation will be affected. Explain how this Action Plan is feasible with secondary research consulted, preferably also with primary research (feedback from chosen community / organization)

Action plan derived from Solution #2, #3 and #4:

Our plan will allow technology to be integrated into nursing homes and complement the working at the nursing home by implementing upskilling programs for nurses before adding multi-purpose robots into the nursing homes. We got our ideas of a multi-purpose robots from examples such as the MiRo which is a mechanized animal companion, like the other robots discussed today, it has pill regimen management, general companionship and appointment reminders. But it also keeps an eye on your health at the same time, by questioning its user if they're in trouble. Another robot, ElliQ, is an interactive robot with an integrated tablet. It can check the weather and suggest outdoor activities so its user doesn't stay all cooped up for extended periods. It is interactive as its system utilizes machine learning to figure out its user's preferences and quirks. It can then make proactive activity recommendations based on what it knows its user enjoys. The upskilling programs will educate the nurses on how to manually operate these robots thus helping them incorporate the multi-purpose robots into the nursing homes. These multi-purpose robots will not only decrease the workload of nurses, they will not compromise interaction between nurses and patients. The robots will have the information of these patients such as what medication they need and what time it is to be taken. The robots will then be programmed to make their rounds, giving out the medication when needed. Additionally, these robots will reduce human error as it is giving out medication as all the data is stored and medication will be given out accordingly. As they are making their rounds, there will be a hologram that emerges out of the robot that will allow the elderlies and the nurses to have real-time interaction. Our plan will aid in increasing social interaction between patients and nursing home staff and enlighten nursing home staff on how to operate these multi-purpose robots. The ability to communicate with the nursing home staff members through holograms increases social interaction between them and the patients. This way, with the constant communication and interaction between both parties, elderlies will be less vulnerable to fall victim to mental illnesses such as dementia and alzheimer's, which are results of lack of interaction. The upskilling programs will help educate the staff of nursing homes about the basics of operating a robot. They can thus program the robot to suit their working style and complement them in nursing homes. The upskilling programs for nurses will begin in 2025 while the research and development of the multi-purpose robot will begin in 2022. The upskilling program will span across 3 years, ending in 2028 and the robots would be available by then. They will have 2 years to figure out and experiment with the robot before it is fully integrated into nursing homes in 2030. However, a primary obstacle is some overly cynical elderly and their family that are unwilling to sign up for the nursing homes thinking that having humans take care of them are better than robots. One way we can solve this obstacle is to have nursing homes create some interaction sessions and teach them about how the multi-purpose robots function and how it will benefit them. This way, the elderly and their family will have more knowledge on the nursing homes and robots and will be willing to sign

(Action Plan Continued) up for nursing homes. Parties that will support our action plan are the government, the nursing home staff and the companies that build the robots. As of now, the government is already providing funds for nursing homes to purchase new technology. In the future, the government should also be willing to fund or subsidise the fees for new robots to help nursing homes enter the fourth industrial revolution. The nursing home staff will support our action plan as it helps them reduce their workload by using robots for manual labour. Studies have proven that the suicide rate in the healthcare industry is one of the highest. Therefore, the nursing home staff would not feel stressed out easily and support our plan. The companies that build the robots would benefit as well because they can profit out of selling these highly-sought after robots, helping them earn even more money. Our plan will help nursing home staff have a more relaxed and stress-free work environment. With the need for manual labour such as giving out medicine being removed, the nurses can focus more on interacting with the patients and doing administrative work. The nurses can also be assure the demanding family members of the patients that tip-top care is provided for the patients as robots would reduce human error. We think our plan is humane and eco-friendly as the robots are mostly made out of metal, a man-made material. Therefore, we would not be wasting the earth's resources by ordering the robots. Nursing homes have a high probability of carrying out our action plan as it is simple and easy to operate by the staff, after they go through upskilling programs. It is also a less intrusive way to integrate technology into the elderly's life, and is of high appeal to the elderly as it is an interesting new way for elderly to carry out their daily routines.

(How will our plan address the KVP?)

Our plan will allow technology to be integrated into nursing homes and complement the working at the nursing home by implementing upskilling programs for nurses before adding multi-purpose robots into the nursing homes. We got our ideas of a multi-purpose robots from examples such as the MiRo which is a mechanized animal companion, like the other robots discussed today, it has pill regimen management, general companionship and appointment reminders. But it also keeps an eye on your health at the same time, by questioning its user if they're in trouble. Another robot, ElliQ, is an interactive robot with an integrated tablet. It can check the weather and suggest outdoor activities so its user doesn't stay all cooped up for extended periods. It is interactive as its system utilizes machine learning to figure out its user's preferences and quirks. It can then make proactive activity recommendations based on what it knows its user enjoys. The upskilling programs will educate the nurses on how to manually operate these robots thus helping them incorporate the multi-purpose robots into the nursing homes. These multi-purpose robots will not only decrease the workload of nurses, they will not compromise interaction between nurses and patients. The robots will have the information of these patients such as what medication they need and what time it is to be taken. Additionally, these robots will reduce human error as it is giving out medication as all the data is stored and medication will be given out

(Action Plan Continued) accordingly. The robots will then be programmed to make their rounds, giving out the medication when needed. As they are making their rounds, there will be a hologram that emerges out of the robot that will allow the elderly and the nurses to have real-time interaction.

(How does our plan address our Underlying Problem's Purpose)

Our plan will aid in increasing social interaction between patients and nursing home staff and enlighten nursing home staff on how to operate these multi-purpose robots. The ability to communicate with the nursing home staff members through holograms increases social interaction between them and the patients. This way, with the constant communication and interaction between both parties, elderly will be less vulnerable to fall victim to mental illnesses such as dementia and Alzheimer's, which are results of lack of interaction. The upskilling programs will help educate the staff of nursing homes about the basics of operating a robot. They can thus program the robot to suit their working style and complement them in nursing homes.

(What is our timeline for implementation?)

The upskilling programs for nurses will begin in 2025 while the research and development of the multi-purpose robot will begin in 2022. The upskilling program will span across 3 years, ending in 2028 and the robots would be available by then. They will have 2 years to figure out and experiment with the robot before it is fully integrated into nursing homes in 2030.

(What obstacles might be encountered? How would we solve this obstacles?)

However, a primary obstacle is some overly cynical elderly and their family that are unwilling to sign up for the nursing homes thinking that having humans take care of them are better than robots. One way we can solve this obstacle is to have nursing homes create some interaction sessions and teach them about how the multi-purpose robots function and how it will benefit them. This way, the elderly and their family will have more knowledge on the nursing homes and robots and will be willing to sign up for nursing homes.

(Who will support our action plan?)

Parties that will support our action plan are the government, the nursing home staff and the companies that build the robots. As of now, the government is already providing funds for nursing homes to purchase new technology. In the future, the government should also be willing to fund or subsidise the fees for new robots to help nursing homes enter the fourth industrial revolution. The nursing home staff will support our action plan as it helps them reduce their workload by using robots for manual labour.

(Action Plan Continued) Studies have proven that the suicide rate in the healthcare industry is one of the highest. Therefore, the nursing home staff would not feel stressed out easily and support our plan. The companies that build the robots would benefit as well because they can profit out of selling these highly-sought after robots, helping them earn even more money.

(How will our plan affect the future scene?)

Our plan will help nursing home staff have a more relaxed and stress-free work environment. With the need for manual labour such as giving out medicine being removed, the nurses can focus more on interacting with the patients and doing administrative work. The nurses can also be assure the demanding family members of the patients that tip-top care is provided for the patients as robots would reduce human error.

(Why do we think our plan is humane?)

We think our plan is humane and eco-friendly as the robots are mostly made out of metal, a man-made material. Therefore, we would not be wasting the earth's resources by ordering the robots.

(Feasibility)

Nursing homes have a high probability of carrying out our action plan as it is simple and easy to operate by the staff, after they go through upskilling programs. It is also a less intrusive way to integrate technology into the elderly's life, and is of high appeal to the elderly as it is an interesting new way for elderly to carry out their daily routines.

Bibliography

Cite the resources you consulted using the APA format.

List of References:

Avenue, N. (2017, March 17). How Virtual Reality Helps Older Adults. Retrieved from <https://www.forbes.com/sites/nextavenue/2017/03/14/how-virtual-reality-helps-older-adults/#10f8333344e2>

Byford, S. (2015, April 28). This cuddly Japanese robot bear could be the future of elderly care. Retrieved from <https://www.theverge.com/2015/4/28/8507049/robear-robot-bear-japan-elderly>

Carroll, W. (July, 2018). Artificial Intelligence, Nurses and the Quadruple Aim. Online Journal of Nursing Informatics (OJNI), 22(2). Retrieved from <https://www.himss.org/library/artificial-intelligence-nurses-and-quadruple-aim>

Edwards, C., & Edwards, C. (2018, May 18). Will automation take over healthcare jobs? Industry experts share their opinion. Retrieved from <https://www.medicaldevice-network.com/features/will-automation-take-healthcare-jobs-industry-experts-share-opinion/>

Harris, J. (2018, July 02). Robots could solve the social care crisis – but at what price? | John Harris. Retrieved from <https://www.theguardian.com/commentisfree/2018/jul/02/robo-carers-human-principles-technology-care-crisis>

Platoni, K. (2016, June 29). Virtual Reality Aimed At The Elderly Finds New Fans. Retrieved from <https://www.npr.org/sections/health-shots/2016/06/29/483790504/virtual-reality-aimed-at-the-elderly-finds-new-fans>

Robear-designboom09. (n.d.). Retrieved from <https://www.designboom.com/technology/riken-robear-robot-nursing-care-02-26-2015/attachment/robear-designboom09/>

Times, F. (2016, May 09). The soft side of robots: Elderly care. Retrieved from <https://www.youtube.com/watch?v=ppPLDEi82lg>

Technology to Support Aging in Place: Older Adults' Perspectives. (2019, April 10). Retrieved from <https://www.mdpi.com/2227-9032/7/2/60/pdf>

Why some older people are rejecting digital technologies. (2018, March 12). Retrieved from <https://www.sciencedaily.com/releases/2018/03/180312091715.htm>

YellRobot.com. (2018, August 28). Robots in Hospitals Are Making Deliveries and Performing Surgery. Retrieved from <https://yellrobot.com/robots-in-hospitals/>

Kwang, K. (2019, August 02). Sephora data breach: 3.7m customer records up for sale on Dark Web, says cybersecurity firm. Retrieved from <https://www.channelnewsasia.com/news/singapore/sephora-data-breach-customer-records-for-sale-dark-web-11772722>

Hermes. (2017, October 07). Long-term care: If this is so important, why aren't we putting our money where our mouth is? from <https://www.straitstimes.com/opinion/new-ways-to-fund-better-long-term-care>

Holographic doctors could be the future of healthcare. (2017, October 03). Retrieved from <http://digitalhealthage.com/holographic-doctors-could-be-the-future-of-healthcare/>

Health Central. (2017, November 05). Retrieved from <https://healthcentral.nz/holograms-and-virtual-doctors-in-our-medical-future/>

Keeping seniors engaged in technology. (2017, July 05). Retrieved from <https://www2.imda.gov.sg/news-and-events/impact-news/2017/07/keeping-seniors-engaged-in-technology>

Tham, I. (2018, March 07). Expanded courses to help seniors be digitally ready. Retrieved from <https://www.straitstimes.com/singapore/expanded-courses-to-help-seniors-be-digitally-ready>