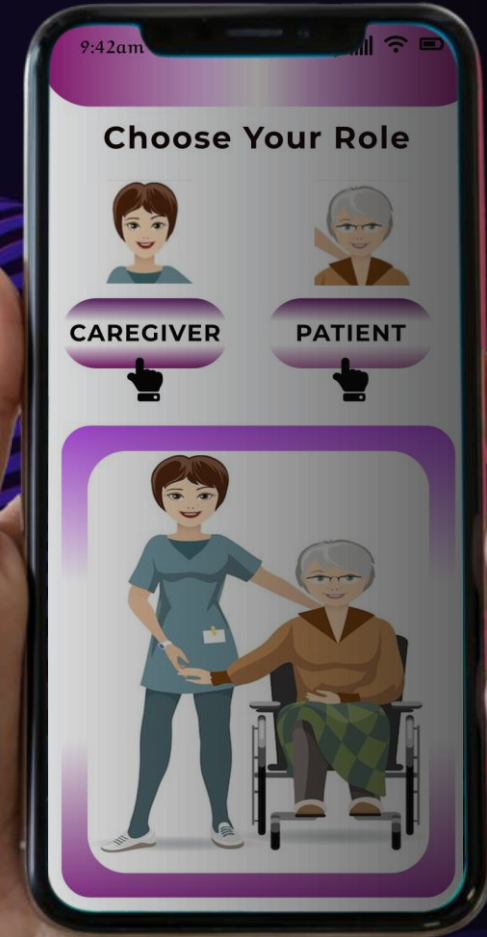


Empowering Dementia Care with Tech Solutions

PREPARED BY TEAM G



Contents

- 01** Problem Analysis
- 02** Solutions
- 03** Feasibility
- 04** Cost Analysis
- 05** Risks & Mitigations
- 06** Appendix

Facing the Future: Shaping Dementia Care in a Changing World

55M+

People live with dementia globally (as of 2021)

92K+

People are currently diagnosed with dementia in Singapore (as of 2021)

131M+

People will be living with dementia globally by 2050

241K+

Will live in dementia in Singapore by 2050

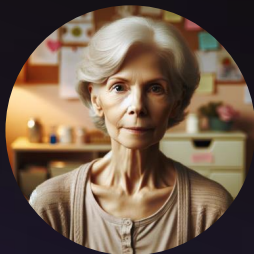
Macro – Environmental Factors

- Political:** Policy changes in elder care affect Quantum Leap's operations and finances in Singapore.
- Economic:** Funding supports Quantum Leap, but budget limits and market shifts impact expansion.
- Social:** Demand for elderly care tech influences Quantum Leap's solution uptake.
- Technology:** Quantum Leap must stay current with IoT and AI advancements to innovate.
- Legal:** Quantum Leap deals with legalities in data, consumer rights, and partnerships.
- Environment:** Quantum Leap is aligning sustainable solutions with global energy goals.

Risks and Opportunities

- Strengths:** Quantum Leap offers cost-effective, government-backed solutions with strategic partnerships.
- Opportunities:** Quantum Leap aims to use AI and tech to grow and address workforce gaps.
- Weaknesses:** The company faces staff shortages, budget limits, marketing constraints, and tech resistance from seniors.
- Threats:** Quantum Leap is challenged by fast-changing technology and a competitive market.

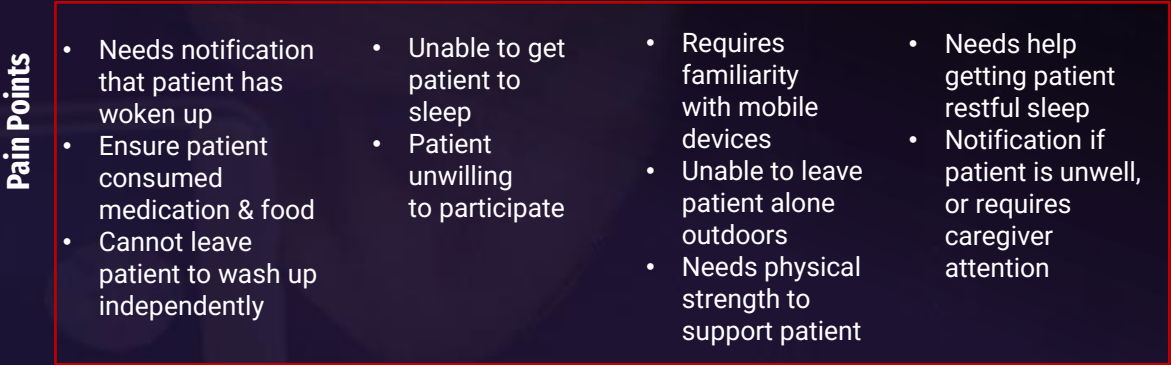
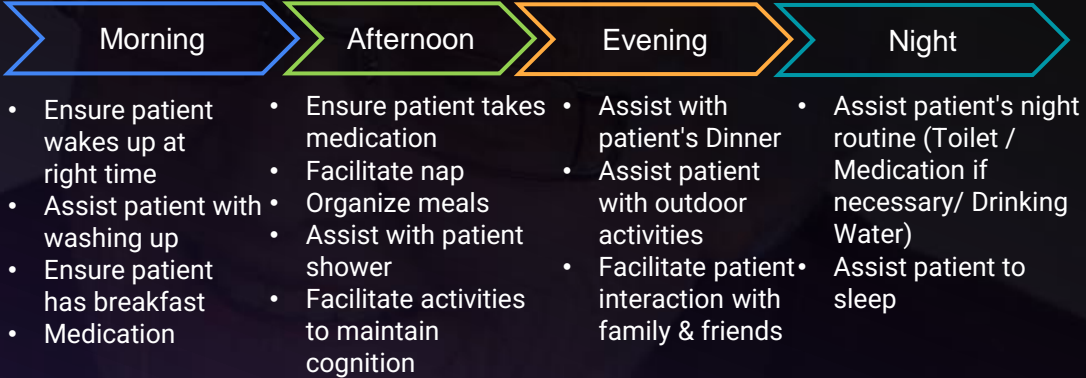
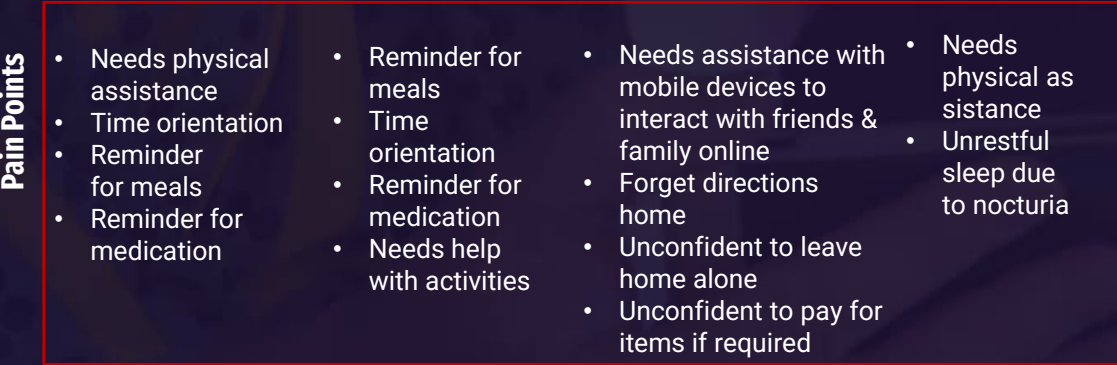
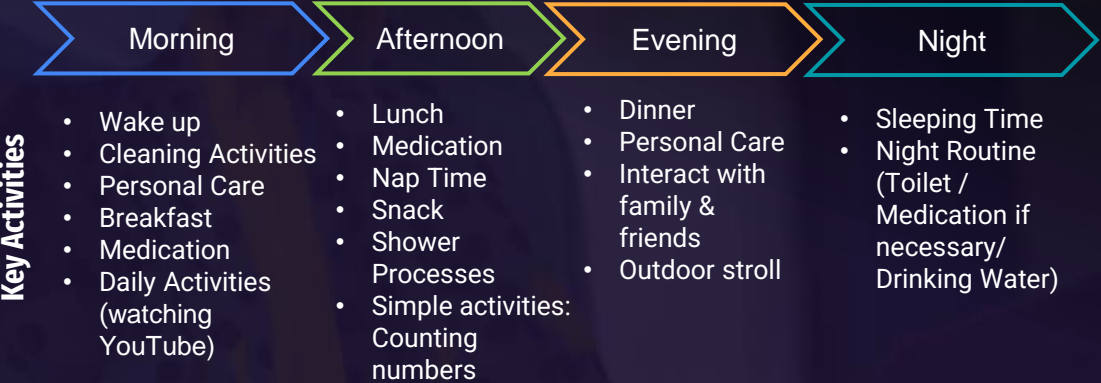
Deep Dive into Caregiver and Patient daily routines reflects struggles...



Dementia Patient Persona:
Maria, 70 years old



Caregiver Persona:
Lucy, 35 years old



The Hard Truth of Dementia Care: A Caregiver's Journey Through Challenges reflects needs of constant support of patients

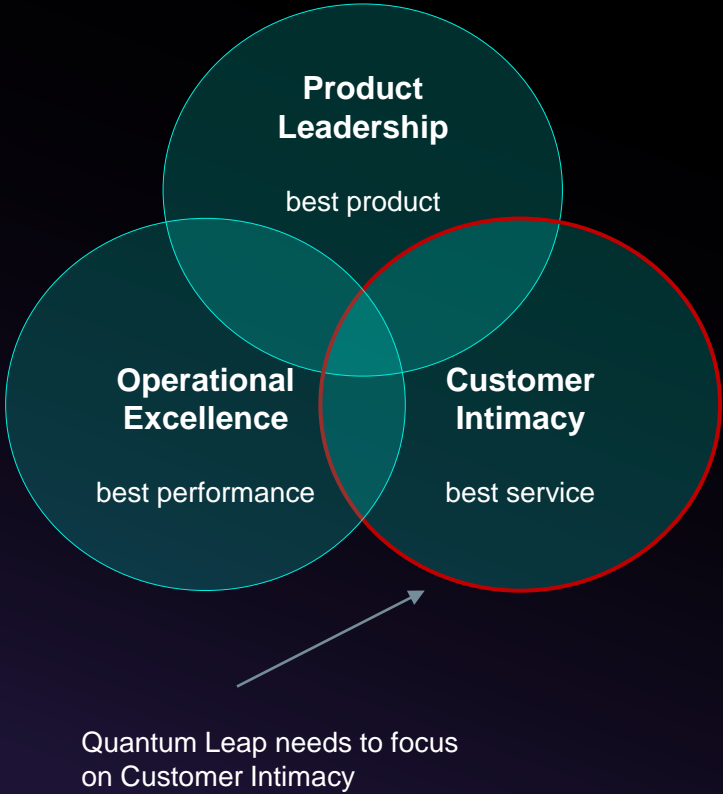
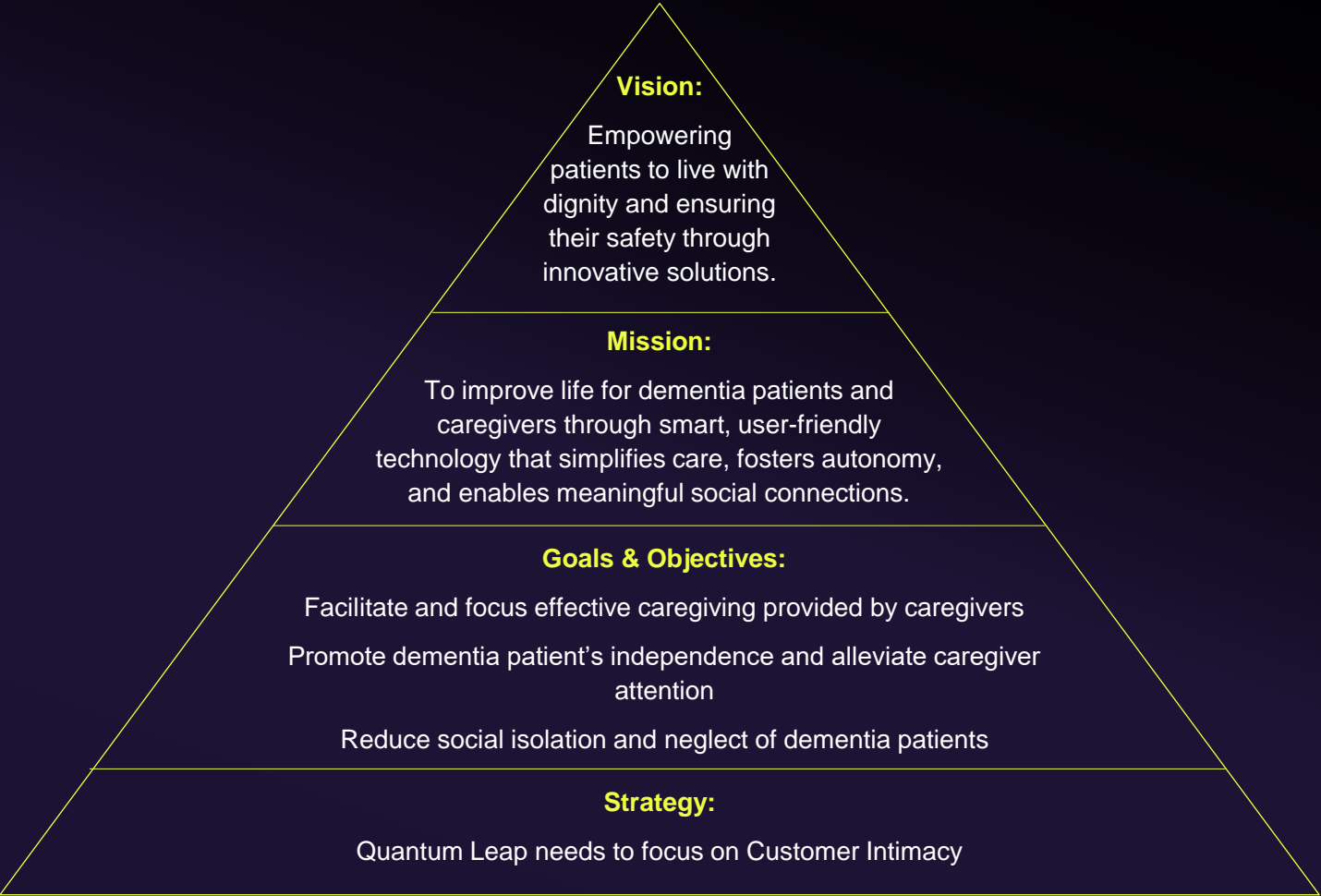


Background: The interview with Saraja provided some insights into the challenges faced by caregivers of Alzheimer's and Dementia patients, emphasizing the emotional and practical difficulties.

Key Highlights & Insights:

- **Caregiver Challenges:** Caregivers face significant emotional and practical difficulties due to the patients' memory loss, requiring constant support.
- **Memory Loss Impact:** The tendency of Alzheimer's and dementia patients to forget things places a heavy burden on caregivers, affecting their emotional well-being and daily routines.
- **Support Needs:** There's a highlighted need for better support systems and resources for caregivers to manage their responsibilities and reduce stress.
- **Awareness and Education:** Increasing awareness and providing education on coping strategies for caregivers can help alleviate some of the challenges faced

There is a need for Digital Transformation of dementia care leveraging the strengths of Quantum Leap



Setting Objectives to address pain points for dementia care

PAIN POINTS

OBJECTIVES



Physical / Emotional Stress

- Patient unwilling to participate in daily activities

Maximize patient adherence and caregiver satisfaction through reliable reminder delivery, user engagement, and efficient task completion facilitated by the QuantumCare App's Daily Events Assistant and VoiceBot integration.



Time Management

- Ensure patient consumed medication & food
- Needs notification that patient has woken up
- Notification if patient requires caregiver



Empowering dementia patients in Singapore to lead independent and safe lives through technology, aiming to reduce incidents of patients losing their way home to below 50 patients per year.



Social Isolation

- Unable to leave patient alone outdoors
- Unable to take breaks or leave duties
- Requires familiarity with mobile devices



Increase dementia awareness, provide best practices in caregiving, facilitate caregiver onboarding, seek community support, and enhance information accessibility through integration with WhatsApp.



Social Interaction:

- Interaction with family and friends
- Assistance with mobile devices to interact with friends & family



Develop devices for dementia patients to facilitate safe & independent living and free up caregiver's attention and time by leveraging technology.



Orientation & Chronology Issues:

- Time Orientation
- Reminder for meals and medication



Promote Social interactions among seniors and offer caregiver support via virtual platforms and buddy matching initiatives.



Cognitive Challenges:

- Weaken judgment skills
- Forget directions home
- Unconfident to leave home alone

Caregivers

Patients

Solutions

Ultimately, we are targeting this two goals

Goal 1



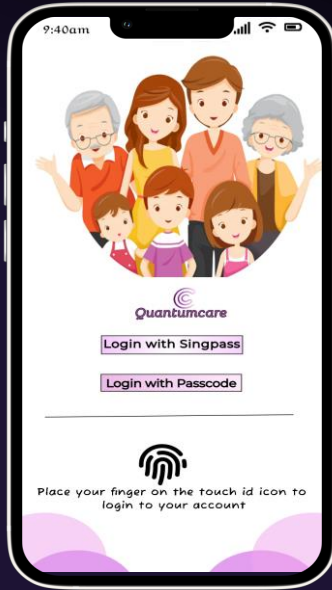
To achieve a delicate balance between providing effective caregiving and personal life for caregivers

Goal 2



To uphold the principles of independence, dignity, and safety for dementia patients

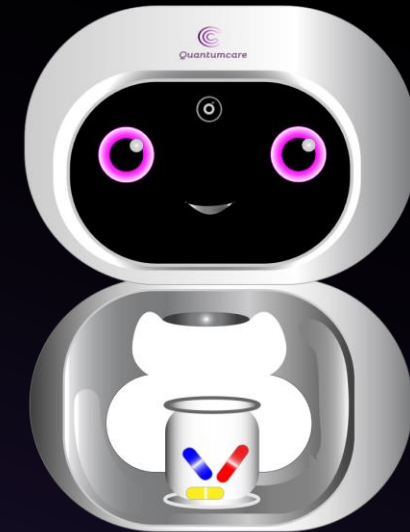
Here is how we improve the life of dementia caregivers and patients addressing priority pain points



Proposal 1
Quantum Care App
Quantum Care App to address key pain points with respective features



Proposal 2
VoiceBot (Bluetooth)
Enhance adherence and independence via integrated Vocal reminders



Proposal 3
LeapMedi (IoT)
IoT enabled medicine boxes to promote independence and relieve caregiver attention

Proposal 1 : Quantum Care App

Virtual Social Clubs (Care Connect)

Virtual Meetups Platform: An integrated platform within the app that facilitates the creation and joining of virtual social clubs based on interests, languages spoken, and the care receiver's dementia stage. This could include book clubs, music appreciation groups, or hobby-based gatherings.

Activity Calendar: A shared calendar for organizing and participating in virtual events, such as holiday celebrations, group exercises, or art classes. The calendar could suggest activities and allow caregivers to RSVP, encouraging regular participation.

Buddy Program Matching: An algorithm-based matching system to pair caregivers with peers in similar situations for mutual support. Buddies can share experiences, advice, and provide companionship through regular check-ins.



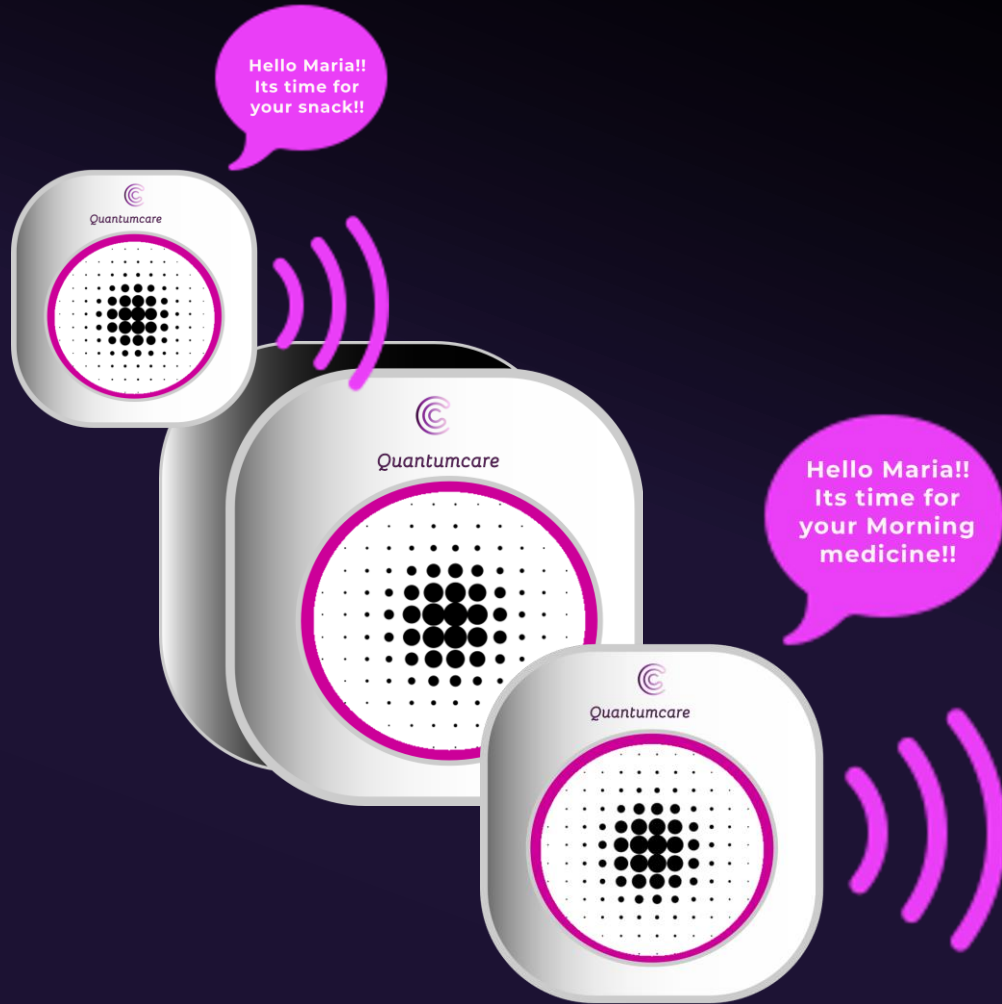
E-learning Platform & WhatsApp Chat-Commence (CareHub)

- Dementia Awareness Modules (to understand more details of dementia)
- Video Lessons on Best Practices (video tutorials cover caregiving techniques)
- Caregiver onboarding (A structured program for new caregivers to guide them the basics of dementia care)
- Community support forums (to access community resources and to get emotional support and information sharing)
- Integrated all information into WhatsApp chat for easier accessibility.

Virtual Volunteer Call Center service with GPS locator (HelpLink) –

- Swift assistance for lost patients via emergency calls to public volunteers.
- Instant GPS tracking ensures quick location identification for support.
- Community provider model connects caregivers and volunteers to aid patients efficiently

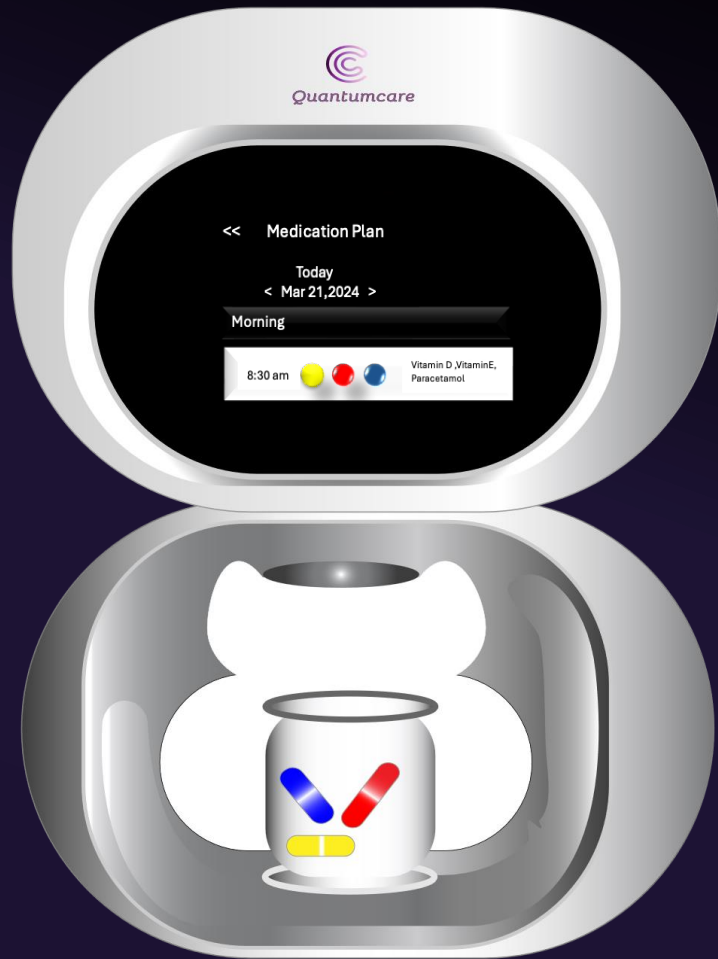
Proposal 2 : VoiceBot (Bluetooth)



Virtual Assistant cum Customized Vocal Reminders Device (VoiceBot)

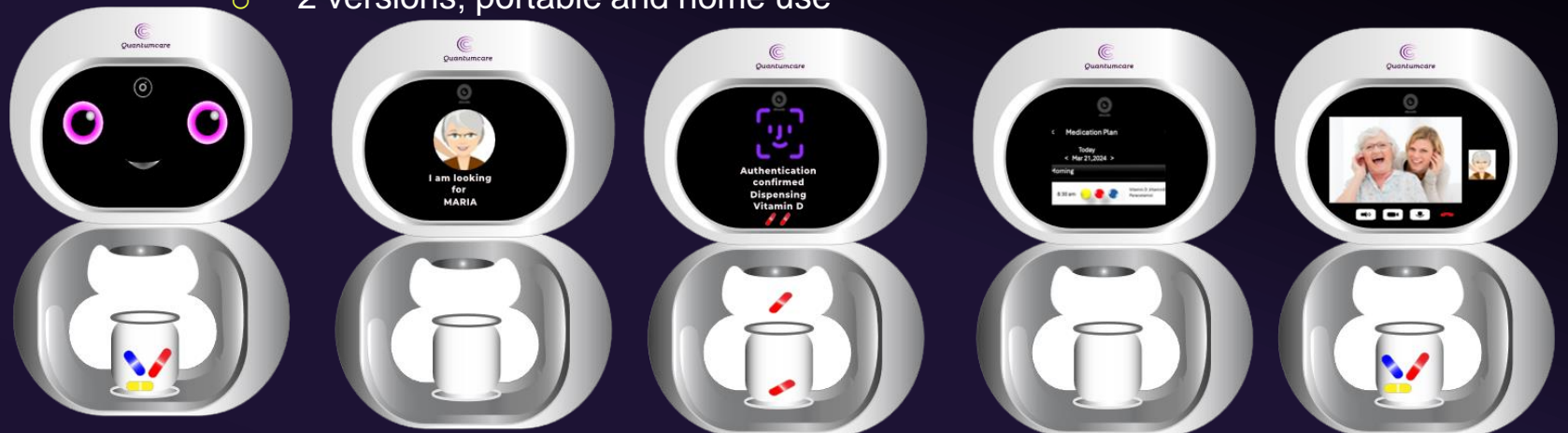
- QuantumCare's Daily Events Virtual Assistant enables seamless scheduling for dementia patients and caregivers.
- Integrated with VoiceBot via Bluetooth, it audibly announces alerts for essential tasks like meals and medication.
- VoiceBot installation in patient residences ensures timely reminders, offering vital support beyond mobile devices.

Proposal 3 : Medication Box - LeapMedi (IoT)



Expansion of IoT device suite in QuantumLeap's LeapCare (LeapMedi)

- Expand remote oversight of a dementia patient's daily activities
- Alleviate need for constant attention provided by caregivers to dementia patients
- Promote independent living for dementia patients
- Smart IoT enabled Medication Box:
 - Remote dispensing and tracking of medicine consumption
 - Scheduled timeslots for medication with buzzer
 - Facial recognition to ensure consumption
 - Video-conferencing built-in directly via QuantumCare app should assistance be required
 - Alert provided to caregiver via mobile app on status of consumption
 - 2 versions; portable and home use



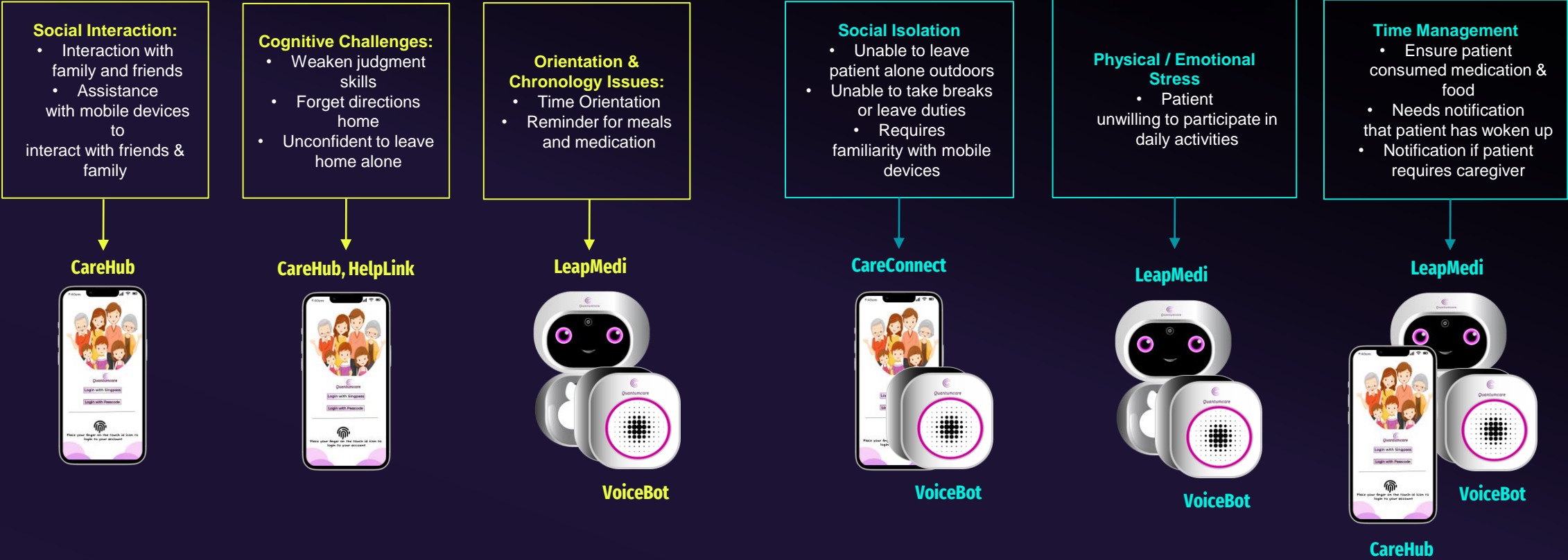
Mapping of the Pain Points + Journeys and how we make life easier



Dementia Patient Persona:
Andrea, 70 years old



Caregiver Persona:
Lucy, 35 years old



KPIs for Solutions



Solutions provided to reduce caregiver contact time with dementia patients:

This (VoiceBot, LeapMedi) frees up time for caregivers to partake in social activities, while promoting dementia patients to live safely and independently.



Reduce cases of dementia patients losing their way home to below 50 patients annually:

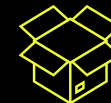
QuantumCare aims to decrease dementia-related missing persons cases to below 50 from 127 in 2021, with HelpLink speeding up patient identification and retrieval.



Achieve adoption and penetration of QuantumCare for both caregivers and dementia patients:

Ensure QuantumCare adoption and gradually establish market presence as de-facto mobile app solution in the dementia arena.

Supply



Technical Expertise	Outsourcing	Insource
<p>QuantumCare App Development – Considering that we will be managing unstructured data from IoT and relying heavily on the Open-Source community, we suggest the following software for seamless operations</p> <ul style="list-style-type: none">• Server-side Operations – Node.js or Golang• Frontend – Vue.js• Database – MongoDB• Data Streaming - Kafka• Cloud – Azure Cloud Services• UX Design – Figma / Sketch	<ul style="list-style-type: none">• Either consider outsourcing software development to Indonesia / India / the Philippines, supervised by in-house leads.• Or recruit interns from local universities for an App Blueprint setup• Collaborate with Singapore University computer engineering graduates to develop this app as part of a term project	<p>Software Development: Utilize existing team or recruit new members like Technical Lead cum Project Manager and Quality Analyst for QuantumCare App supervision and quality assurance</p> <p>Device Development:</p> <ul style="list-style-type: none">• Enhance existing Quantum Leap Bluetooth devices with voice output for VoiceBot functionality.• Or need to create a new Bluetooth device dedicated to VoiceBot.• Develop Smart IoT Pills Box integrating hardware components and IoT sensors for efficient medicine usage monitoring.

Cost Revenue Analysis

Cost

Category	Cost	Year 0 Total Cost	Year 1 Total Cost	Year 2 Total Cost	Year 3 Total Cost	Year 4 Total Cost
Outsource	1 x Backend Developer- \$4000/month x 3 months	\$24,000	-	-	-	-
	1 x Frontend Developer(UI) - \$4000/month x 3 months					
In-House (Development, Operations & Maintenance)	1 x Tech Lead cum PM x \$5000/month x 3 months	\$87,000	-	-	-	-
	1 x Quality Analyst x\$4000/month x 3 months					
	1 x Jr FullStack Developer x \$3500/month x 10months		\$36,864	\$ 37,749	\$ 19,327	\$19,791
	1 x Jr Quality Analyst x \$2500/month x 10months					
Data Cost	450TB x Azure DB Service x \$0.2/month	\$ 4,290	\$ 4,290	\$ 4,290	\$ 4,290	\$4,290
	Azure Notification Hub- Standard x \$267.50/annum					
Device Cost	LeapMedi - 920 units x \$50/unit	\$73,600	\$85,606	\$ 164,836	\$ 247,820	\$334,691
	VoiceBot - 920 units x \$30/unit					
Miscellaneous		\$ 10,000				
Total Cost		\$ 198,890	\$ 126,760	\$ 206,875	\$ 271,437	\$ 358,773

Revenue

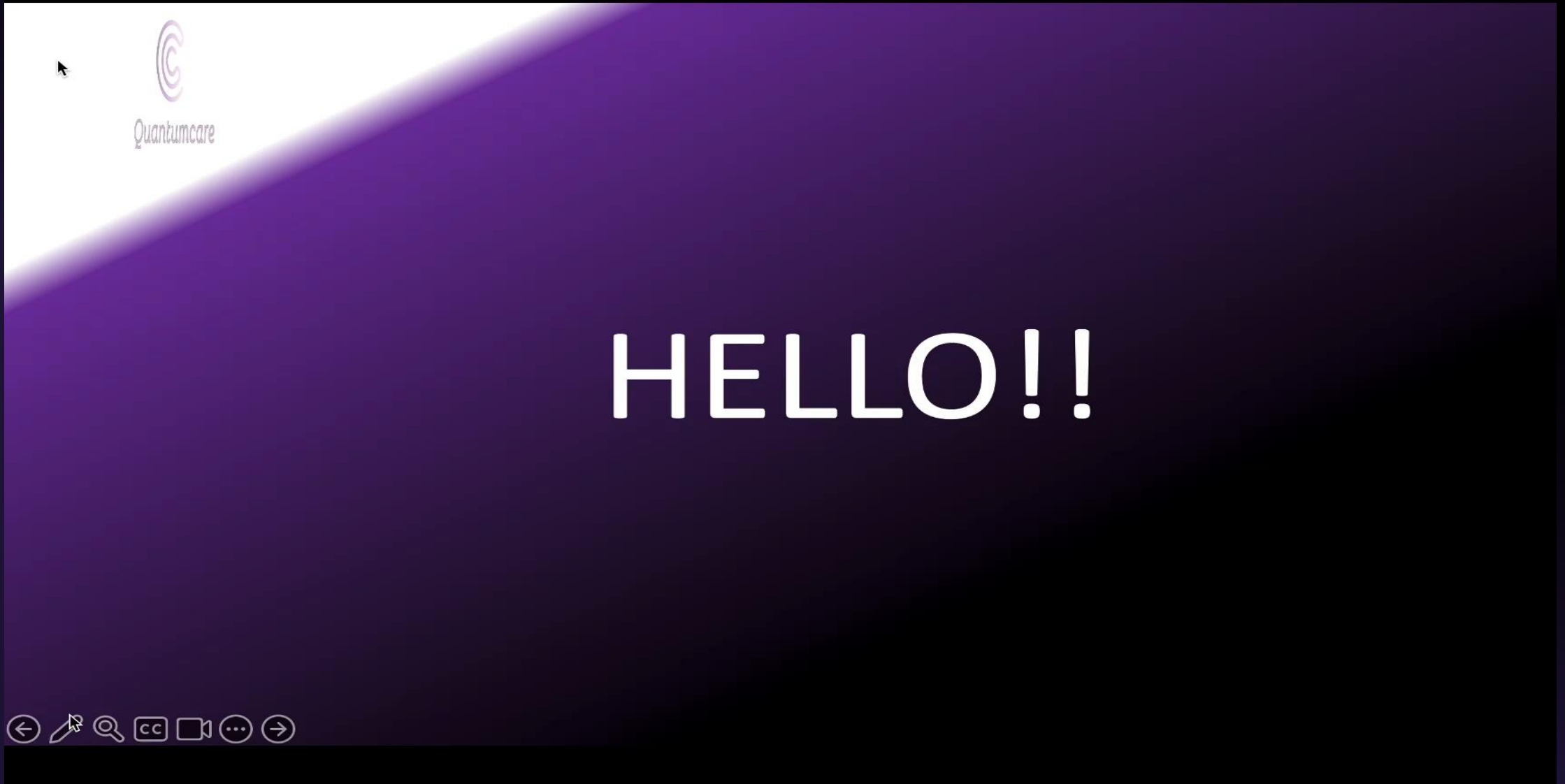
	Year 0	Year 1	Year 2	Year 3	Year 4
Cost	\$ 198,890	\$126,760	\$ 206,875	\$ 271,437	\$ 358,773
Revenue	\$ 358,432	\$358,432	\$606,648	\$ 854,864	\$ 1,103,080
Investment Gain	\$159,542	\$231,672	\$ 399,773	\$ 583,427	\$744,307
ROI	82.22%				
Annualized ROI	12.75%				

Risk & Mitigation – Top 3

#	RISK	MITIGATION
R1	The QuantumCare app can't help if dementia patients forgets their phone	<ul style="list-style-type: none">Advise caregivers to keep dementia patients' phones within close reach to prevent misplacement.Utilize VoiceBot service for regular notifications, aiding patients in locating their phones.Proactive measures reduce stress, fostering independence and control over belongings.
R2	People may worry about privacy because different users (like patients, caregivers, and volunteers) use the app, and it collects data for features like HelpLink and CareHub. They wonder how Quantum Leap will use and keep this data safe, especially if it's stored on public cloud services.	<ul style="list-style-type: none">Implement robust data encryption protocols for transit and storage.Adhere strictly to relevant data protection regulations, such as Singapore's PDPA.Conduct regular audits and penetration tests to identify and rectify vulnerabilities.Enforce stringent access controls on public cloud systems to enhance data security.Provide comprehensive staff training on data privacy best practices.
R3	Users, especially patients, might get confused by the many features on the app. They might not know which feature is best for them.	<ul style="list-style-type: none">Developing a user-centric design with distinct roles (patients, caregivers, volunteers).Dynamic feature population upon login tailors the experience for each user role.Offer customizable feature selection to enhance usability and engagement, promoting inclusivity and personalization.

		Likelihood				
		Rare	Unlikely	Possible	Probable	Almost Certain
Business Impact	Severe				R2	
	Large				R3	
	Moderate				R1	
	Small		R2			
	Significant		R3	R1		

DEMO



Thank you!

Prepared by team G:



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Nann Tin Nwe Aye



Kieman Tan Yujian



Kruti Chandrasekhar



Appendix



Assumptions

- Assuming Quantum Leap has software infrastructure, capability and resources to streamline the IoT devices manufacturing and development, leveraging an existing network of suppliers for production (in China).
- Additionally, it is anticipated that Quantum Leap possesses in-house software to bolster its existing solution, which could be utilized as a foundation for the development of the new application and minimize its costs.
- Cost calculations include an average 2.4% inflation rate from 2024 to 2028, but revenue projections remain unaffected for conservative benefit assessments

Business Model Canvas: Quantum Leap

Key Partners:

- KOWA
- Community Centers
- AAC
- Silver Generation Office
- Singapore Government
- Volunteers

Key Activities:

- Developing and implementing cost-effective design and build solutions
- Integrating IoT devices for dementia patients
- Collaboration with industry partners for projects

Key Resources:

- Skilled employees
- Technology & AI modules
- Partnership with government
- Government funds

Value Propositions:

- Practical, cost-effective design and build solutions
- Futuristic and smart environments for clients
- IoT devices for dementia patients
- Collaborative partnerships for solutions

Relationships:

- Ongoing support and maintenance for implemented solutions
- Consultative approach to understand client needs
- Engaging with customers for feedback and improvement

Channels:

- Industry events and conferences
- Partnerships with government & healthcare agencies
- Flyers
- Food van
- AAC awareness

Customer Segments:

- Seniors
- Dementia patients
- Caregivers
- Government organizations

Cost Structure:

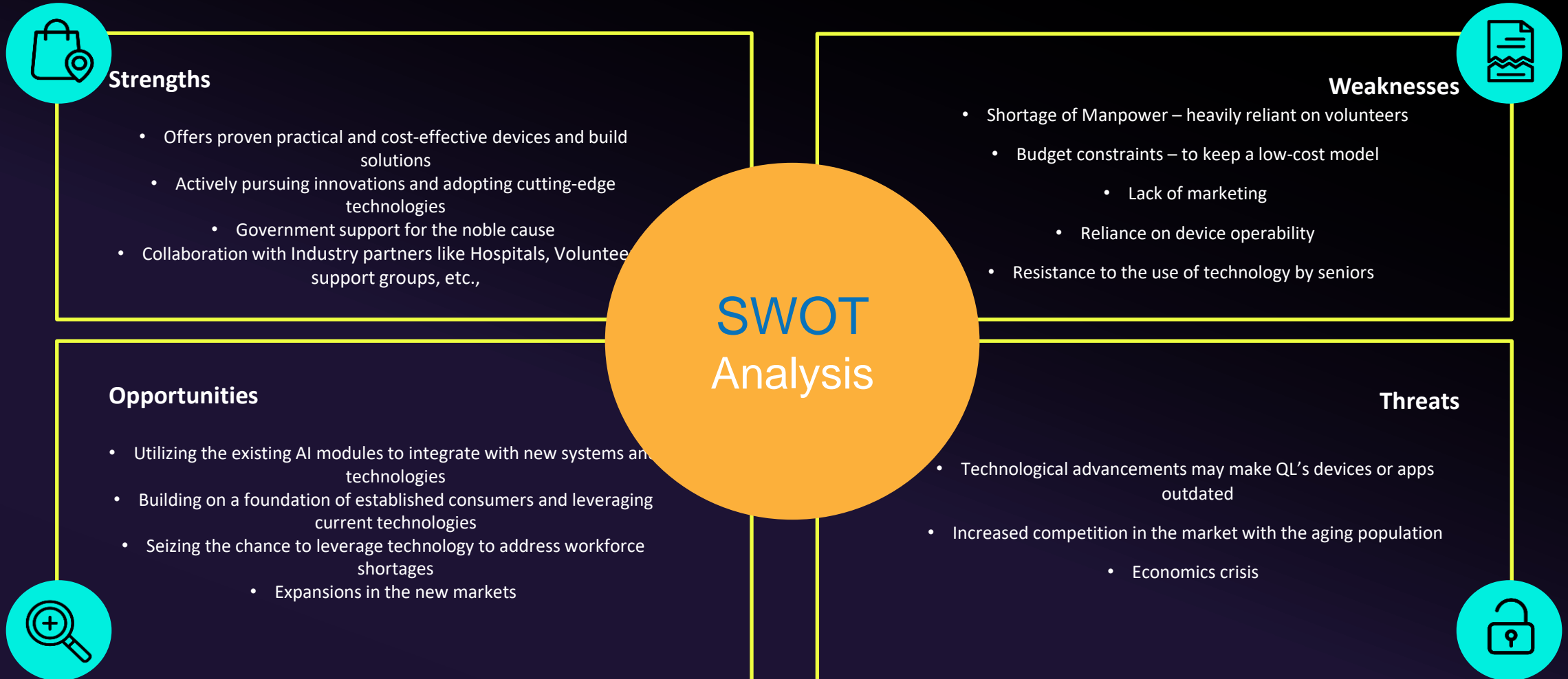
- Personnel costs (salaries, benefits)
- Technology, Infrastructure expenses
 - Marketing
- Operational expenses (rent, utilities, etc.)

Revenue Streams:

- Government grants & funds
 - Sales of devices
- Subscription or service fees for IoT devices & support services
 - Project based revenue from design & build solutions

PESTLE Analysis: Quantum Leap

POLITICAL	ECONOMIC	SOCIAL	TECHNOLOGY	LEGAL	ENVIRONMENTAL
<p>Government Support:</p> <p>QL benefits from Singapore Government initiatives in elder and dementia patients care.</p> <p>Impact of Policy Changes</p> <p>Changes in regulations can affect QL's operations and funding.</p>	<p>Government and Corporate Support:</p> <p>QL and AAC receive funding from the government and partnering companies, bolstering financial stability.</p> <p>Budget Constraints</p> <p>Economic fluctuations may limit QL's ability to expand and operate efficiently.</p> <p>Market Demand</p> <p>Economic conditions dictate consumer spending, impacting the demand for QL's services</p>	<p>Aging Population</p> <p>This leads to growing demand for solutions for elderly and dementia patient care that improve the quality of living</p> <p>Awareness and Acceptance</p> <p>Social attitudes towards technology and its role in daily life can impact the adoption of QL Inc.'s solutions.</p>	<p>Advancements in IoT</p> <p>Rapid advancements in IoT present opportunities for QL to innovate and develop new solutions.</p> <p>Integration of AI</p> <p>QL can leverage current AI solutions to enhance its offerings, but it must keep pace with rapid pace of AI advancement.</p>	<p>Regulatory Compliance</p> <p>QL must adhere to legal and regulatory requirements related to data privacy, consumer protection, and intellectual property rights in the development and deployment of its solutions.</p> <p>Contractual Agreements</p> <p>Legal considerations in partnerships and collaborations, such as contracts and agreements with industry partners and suppliers, can impact its operations and success.</p>	<p>Sustainability</p> <p>QL maybe required to develop environmentally sustainable solutions, aligning with global efforts to reduce environmental impact.</p> <p>Energy Efficiency</p> <p>With an increasing focus on energy efficiency and conservation, QL can benefit financially along with improving its public image and reputation.</p>



Persona Patient - Maria



Key Findings

- 1. Memory challenges: Frequent forgetfulness, including recent activities like medicine, requiring careful monitoring to avoid double dosing.
- 2. Emotional and physical support: Patience is crucial in assisting with daily tasks, as the individual may be reluctant to do things on their own and may feel blockage and fear when alone.
- 3. Independence – patient yearns to live independently but are unable to, often requiring assistance for most of their activities
- 4. Reduced quality of life – dementia severely impacts the patient's decision-making process and memory.
- 5. Safety – with the impact on motor skills, patients may be more prone to falling and suffering physical injuries

About the patient

Patient's age	70 Years
Gender	Female
Medical conditions	Memory loss, Weak motor skills, difficulty in daily activities.
Previous treatments	None reported
Introduction	She has been experiencing these symptoms for the past 2 years, with increasing memory loss

Persona Caregiver - Lucy

About the Caregiver

Caregiver's age	35 Years
Gender	Female
Goals	Providing high-quality care Promoting independence Ensuring safety and well-being of patient Providing emotional support Advocating for the person's needs
Challenges	Want to better understand patient's psyche, needs and wants Trouble with patient behavioral challenges Financial stress
Needs	Additional information on patient to ensure adherence to daily activities Allow dementia patient to live more independently without their intervention



Key Findings

1. Caregiver coordination and challenges: Maintaining 24/7 care with two caregivers, addressing issues like irregular sleep patterns, utilizing technology for tracking activities, and respecting privacy concerns related to cameras.
2. Financial cost – expensive to maintain oversight on dementia patient, on top of medical expenses and hiring professional caregiving services
3. Trouble motivating dementia patients to perform daily activities that can improve their condition or prevent deterioration of dementia
4. Emotional stress – constantly worrying about dementia patient and frustration when efforts do not translate to tangible improvement
5. Physical demands of caregiving – laborious to assist dementia patients who require physical assistance
6. Time – time consuming to perform caregiver duties and maintaining consistent oversight for dementia patients, especially if not operating as full-time caregiver
7. Unaware of technological advancements that may assist with caregiving role

Patient Customer Journey



Dementia Patient Persona:
Maria, 70 years old

**Key
Activities**

Morning

- ❖ Wake up
- ❖ Cleaning Activities
- ❖ Personal Care
- ❖ Breakfast
- ❖ Medication
- ❖ Daily Activities (watching YouTube)

Afternoon

- ❖ Lunch
- ❖ Medication
- ❖ Nap Time
- ❖ Snack
- ❖ Shower Processes
- ❖ Simple activities - Counting numbers

Evening

- ❖ Dinner
- ❖ Personal Care
- ❖ Interact with family & friends
- ❖ Outdoor stroll

Night

- ❖ Sleeping Time
- ❖ Night Routine (Toilet / Medication if necessary/ Drinking Water)

Pain Points

- ❖ Needs physical assistance
- ❖ Time orientation
- ❖ Reminder for meals
- ❖ Reminder for medication

- ❖ Reminder for meals
- ❖ Time orientation
- ❖ Reminder for medication
- ❖ Needs help with activities

- ❖ Needs assistance with mobile devices to interact with friends & family online
- ❖ Forget directions home
- ❖ Unconfident to leave home alone
- ❖ Unconfident to pay for items if required

- ❖ Needs physical assistance
- ❖ Unrestful sleep due to nocturia

Caregiver Customer Journey



Caregiver Persona:

Lucy, 35 years old

Key Activities

Morning

- ❖ Ensure patient wakes up at right time
- ❖ Assist patient with washing up
- ❖ Ensure patient has breakfast
- ❖ Medication

Afternoon

- ❖ Ensure patient takes medication
- ❖ Facilitate nap
- ❖ Organize meals
- ❖ Assist with patient shower
- ❖ Facilitate activities to maintain cognition

Evening

- ❖ Assist with patient's Dinner
- ❖ Assist patient with outdoor activities
- ❖ Facilitate patient interaction with family & friends

Night

- ❖ Assist patient's night routine (Toilet / Medication if necessary/ Drinking Water)
- ❖ Assist patient to sleep

Pain Points

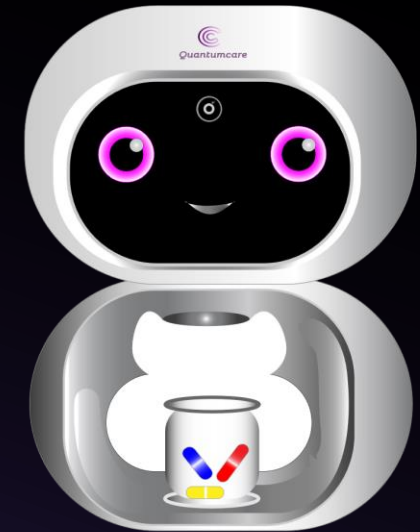
- ❖ Needs notification that patient has woken up
- ❖ Ensure patient consumed medication & food
- ❖ Cannot leave patient to wash up independently

- ❖ Unable to get patient to sleep
- ❖ Patient unwilling to participate

- ❖ Requires familiarity with mobile devices
- ❖ Unable to leave patient alone outdoors
- ❖ Needs physical strength to support patient

- ❖ Needs help getting patient restful sleep
- ❖ Notification if patient is unwell, or requires caregiver attention

Summary of the Ecosystem Visualizations



Prototype: Quantum Care App



Prototype: VoiceBot (Bluetooth)



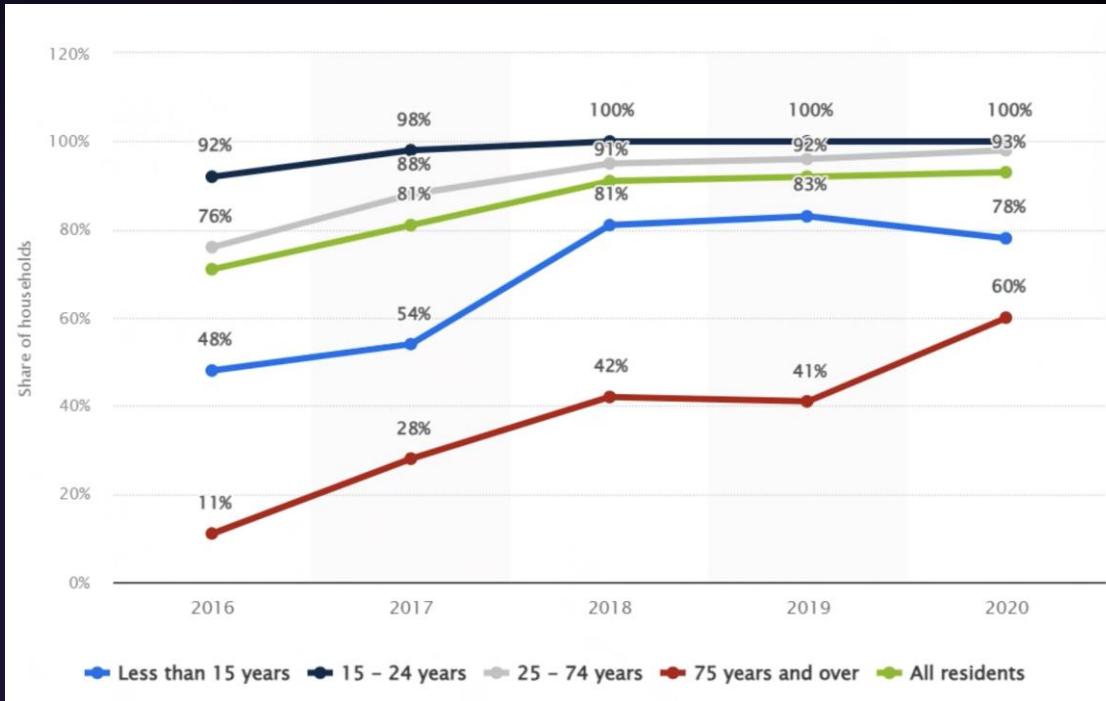
Prototype: LeapMedi (IoT)



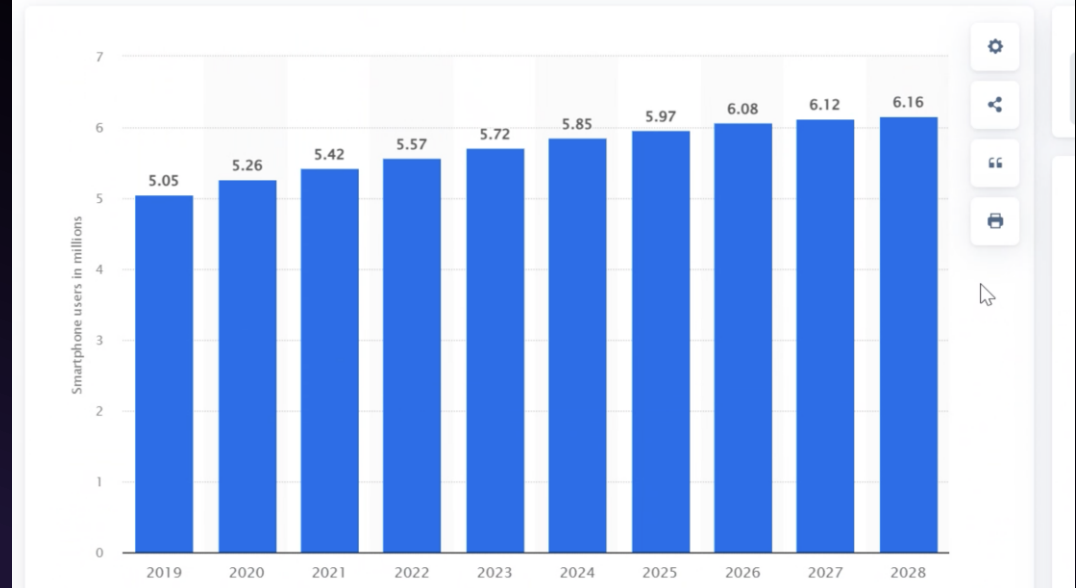
Portable version for LeapMedi



Statistics of smartphone users in Singapore



Number of smartphone users in Singapore from 2019 to 2028
(in millions)



1. <https://www-statista-com.libproxy.smu.edu.sg/statistics/494598/smartphone-users-in-singapore/>
2. [Singapore: smartphone usage by age group 2020 | Statista \(smu.edu.sg\)](#)