



Sustainable transformation

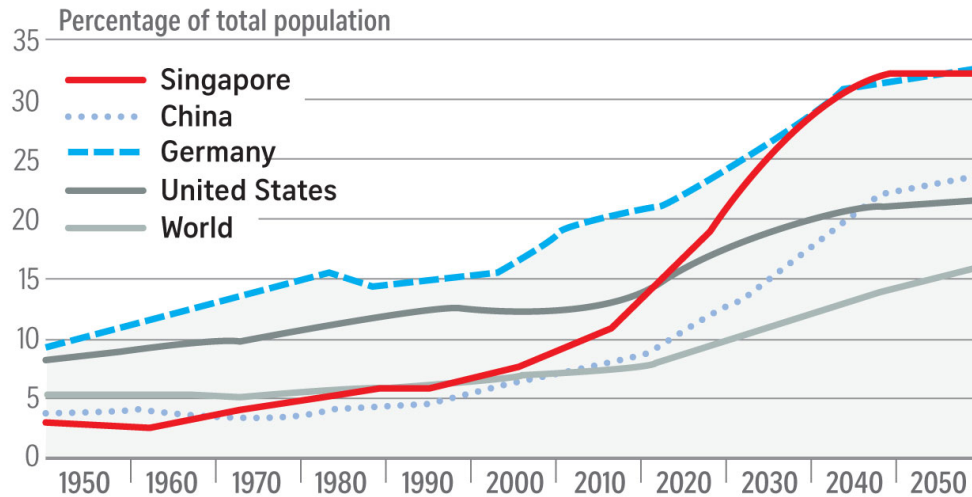
US National Academy of Medicine
Workshop on Science & Technology for Healthy Longevity

Adj A/Prof Selina Seah
17 Jun 2021

Rapidly changing demographics

Rapidly ageing population in Singapore

Proportion of population 65 and older (projected to 2050)



Sources: UNITED NATIONS POPULATION DIVISION ST GRAPHICS

Decrease in old age support ratio

More elderly are living alone, with an increase in demand for chronic disease management



Shrinking & Ageing Workforce

Insufficient healthcare professionals to meet growing demand



Rising Healthcare Costs

Increasing load on healthcare system and burden on healthcare workers and patients



Agenda for Healthy Longevity

Transforming healthcare delivery through new care models:

Care pathways from acute to long-term / community care settings to promote age well



Augmenting capabilities and enhancing productive longevity:

Through automation & smart technologies to safe work environment, including for older workers



Enabling clinical innovation & smart healthcare:

Developing the ecosystem to deliver user-centric solutions

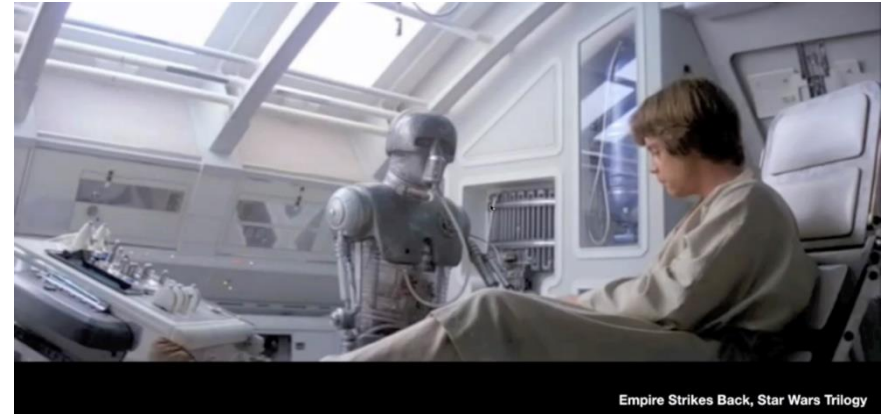
- Redesigning infrastructure and enablers, such as smart wards and smart homes
- Motivating right behaviors and assistive technology



Different context, similar technology

From this...

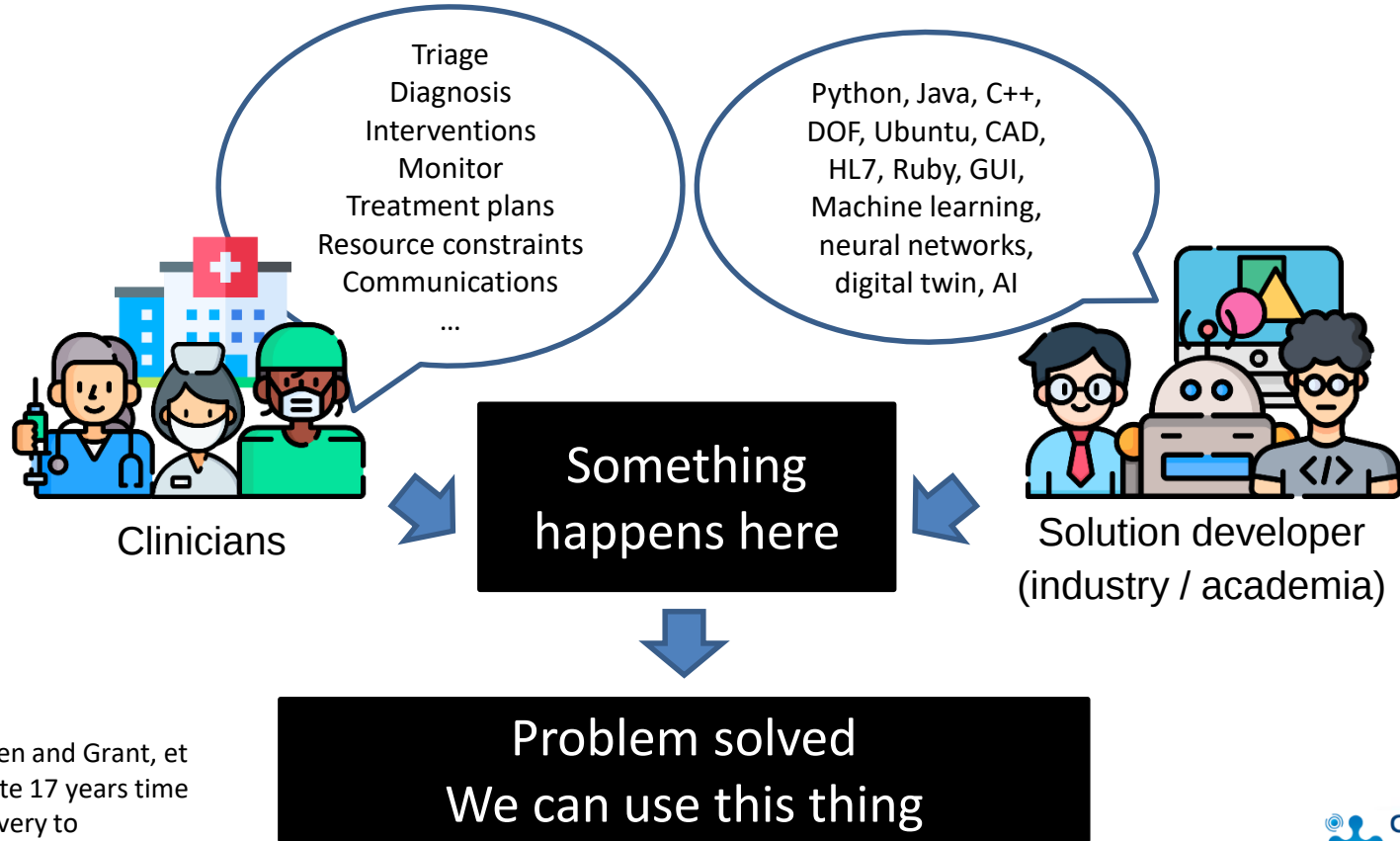
Structured infrastructure, Controlled environment
Technically trained operators



To this...

Diverse infrastructure, Dynamic environment
Long regulatory path and protracted acceptance

How transformation happens... *wait a moment!*



- Balas and Bohen and Grant, et al both estimate 17 years time lag from discovery to commercialization

Supporting needs-driven transformation

- Identifying user challenges & requirements
- Envisioning healthcare workflows to meet future healthcare demands.



Support Process Changes

Implementation Science

- Facilitate the adoption of evidence-based practices into clinical/routine workflows
- Assess naturalistic variability or measure change in response



Drive Product Development



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& Robotics Technology



Bauer M.S, et al. *An introduction to implementation science for non-specialist* 2015; 3(1):32

Enable Adoption

- Steer IHLs/RIs emerging robotic technologies to be applicable for healthcare
- Work with companies to develop solutions that effectively address healthcare needs

- Take lead in pilot deployment of solutions
- Influence adoption mind-set and share on success
- Develop enablers for smart system scaling



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Understand our community



- Guided by data
- Understanding the needs of the community



- Population based approach
- Health-social teams
- Customised care delivery for each community

Beyond Sickness to Health

- Screening for Chronic Diseases
- Functional Screening
- Community Mental Health Care

Beyond Hospital to Community

- Neighbours for Active Living
- Community Nursing / Community Nurse Post

Beyond Brick & Mortar to Digital

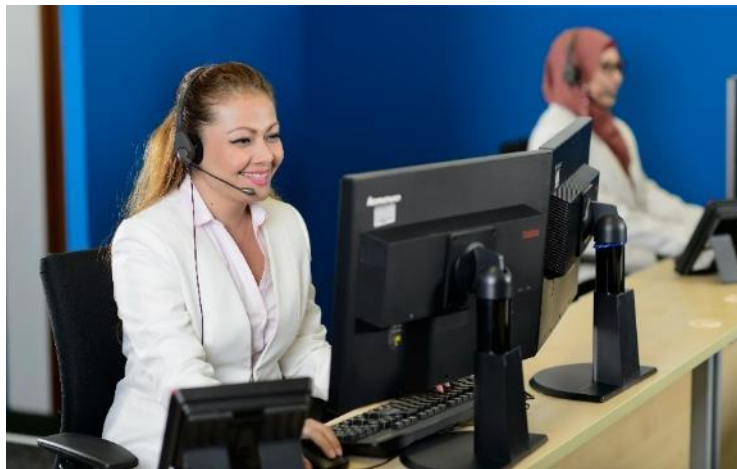
- CareLine
- Health Management Unit
- Telehealth

- Keep well, get well, age well
- Telehealth & digital care
- Together with the community



Health Management Unit

Telecare for chronic disease management



Telecarers (trained nurses) provide regular phone support to patients with diabetes, COPD, heart failure, hip fracture and acute myocardial infarct

Tele-monitoring

Monitor parameters such as blood glucose, pulse rate, blood pressure and weight

Tele-education

Patients are educated on how to recognise and manage symptoms

Care Coordination

Telecarers coordinate patients' care with partners: polyclinics and GPs, case managers, psychologists, AHPs, ILTC sector

Patient Relations Management IT system

Alerts telecarers when patients visit the A&E, are admitted to the hospital, miss their follow-up appointments, or have any abnormal lab results



Early intervention and follow-up care

Telehealth “Pod”



Tablet/Desktop



Glucometer



BP Monitoring Set



Pulse Oximeter



Thermometer



Weighing Scale

Community Nurse



Partners



Onboarding of seniors



Schedule an appointment



Telehealth consult

Remind senior about teleconsult



Assist/guide senior during teleconsult

Understand what technology offers

**Assistive Technologies
enabling community care**



**Precision Robots
assisting procedures**



**Behavioural Modules /
Training Simulation**

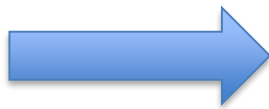


**Autonomous Technologies
automating logistics**



**Rehabilitation Technologies
restoring functionality**

Current situation...



Scaling automation with the Robotics Middleware Framework

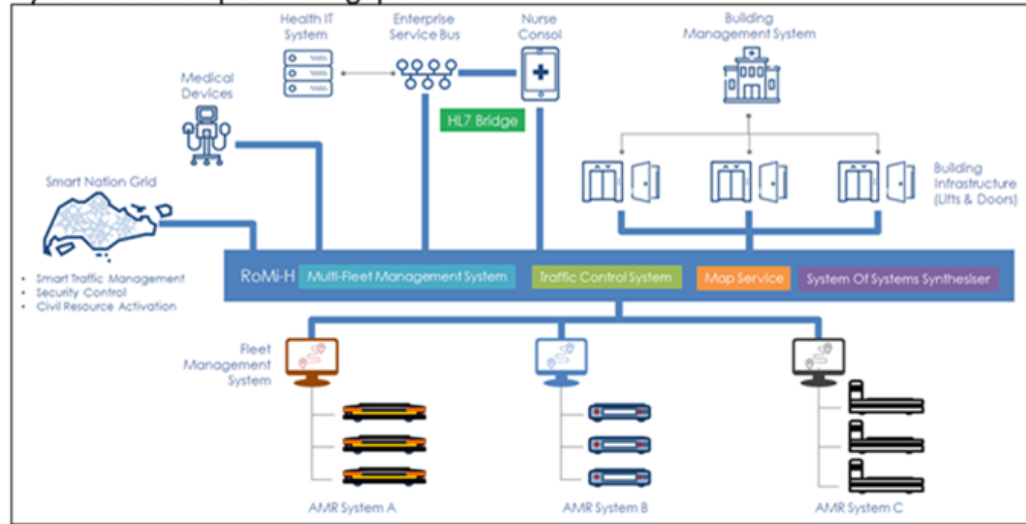
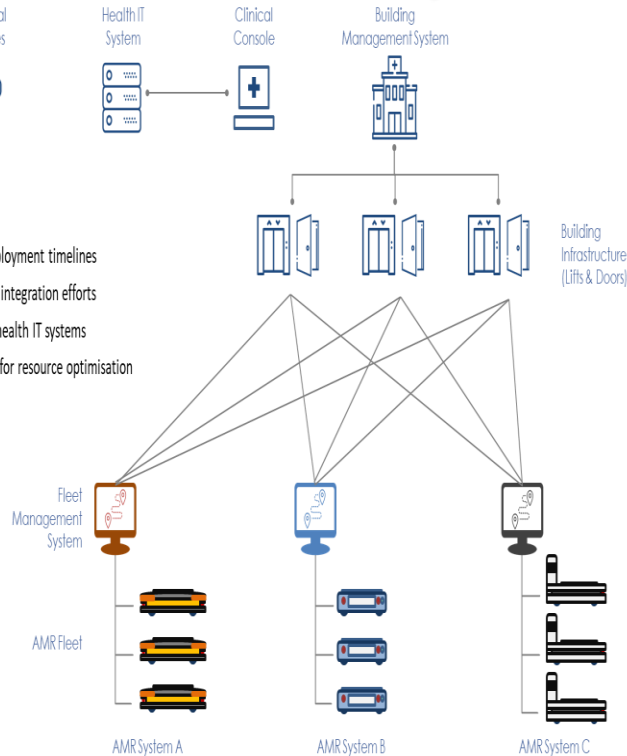
Interoperability

Developed the world's first robotics middleware framework in Singapore, with an operational healthcare version RoMi-H

RoMi-H will enable and accelerate large scale deployment of heterogeneous fleets of robotics, leveraging new safety standards and universal charging systems developed in Singapore

Challenges

- Prolonged deployment timelines
- Duplication in integration efforts
- Open loop in health IT systems
- Lack of ability for resource optimisation



Changi General Hospital
SingHealth

Incorporation of Robotics Requirements in MEP Design Guide

- CHART works with MOHH to update the Healthcare MEP Design Guide to incorporate infrastructure requirements for robotics deployment in new healthcare facilities.
- Safety standards and guidelines on the use of robotics in hospitals and the use of universal charging infrastructure for robotic devices to be incorporated in the MEP Design Guide for new hospitals.
- Updated MEP Design Guide targeted to be published in 2021.



Baseline Components for Scaling-up

- ✓ Scalable Universal Wireless Charging Platform for AGV/AMRs in Healthcare

Baseline Standards & Safety Guidelines

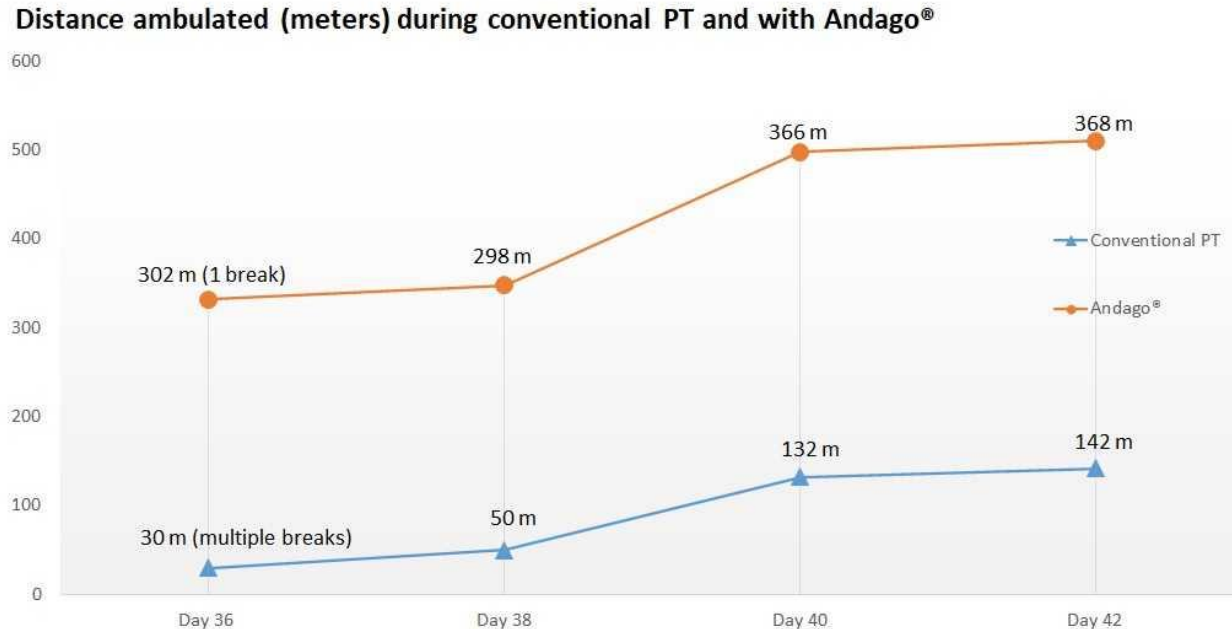
Building libraries on impact of technology to care

Intelligent Healthcare Robotics



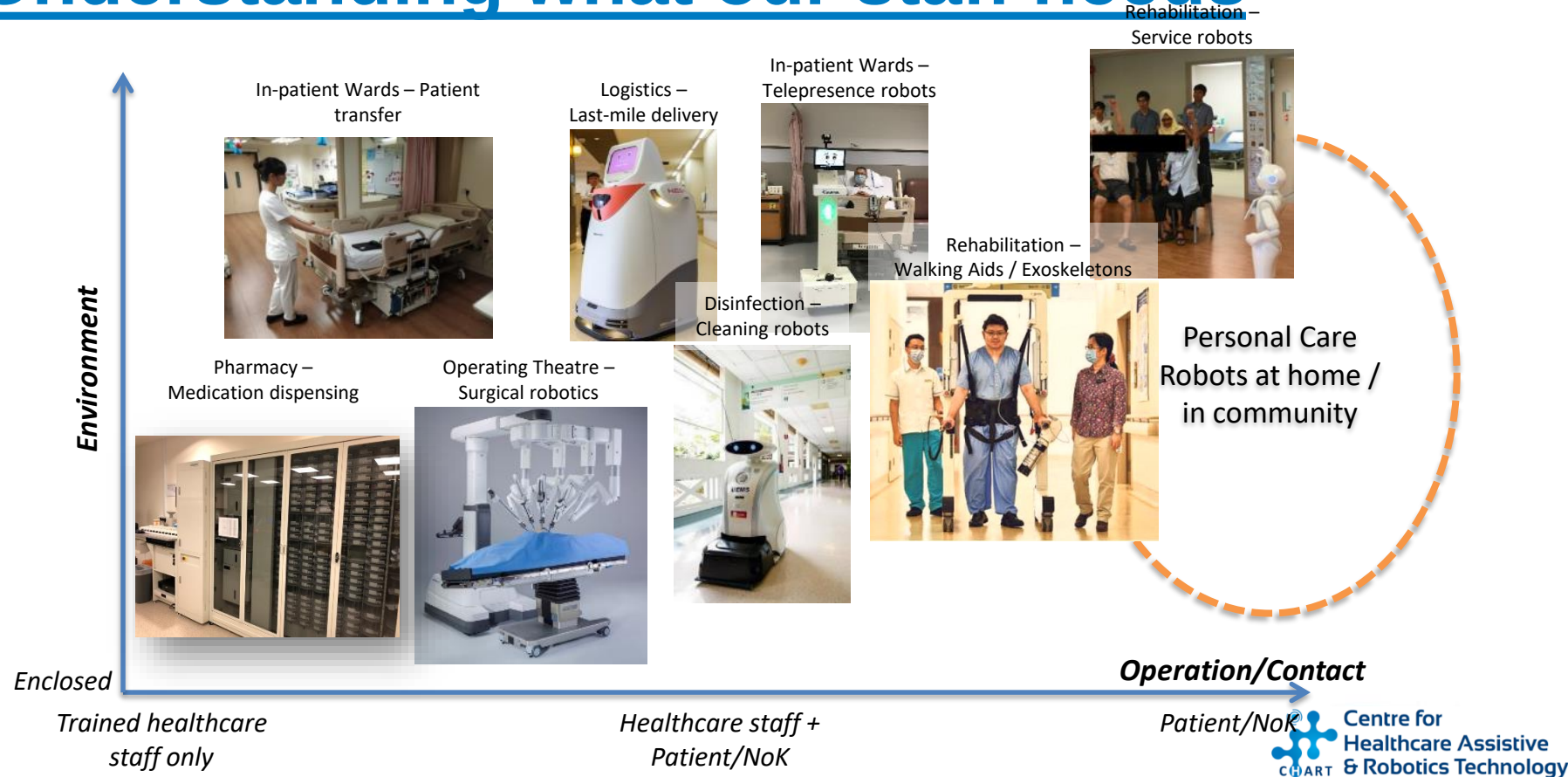
- Using social robots to stimulate patients physically and cognitively & for patient education
- Serves as assistant to healthcare staff – latter can focus on patient safety & content development without the “manual” work
- Measure the impact to develop value-driven care

Distance walked during conventional physiotherapy (PT) and robotic therapy



Published in Annals, Academy of Medicine, Singapore

Understanding what our staff needs



Simulating with people, context & environment in mind



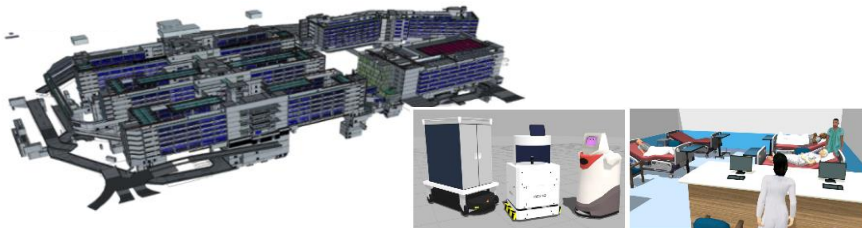
- Prototyping spaces to simulate care settings
- Observe interactions between human vs machine

Simulating with people, context & environment in mind



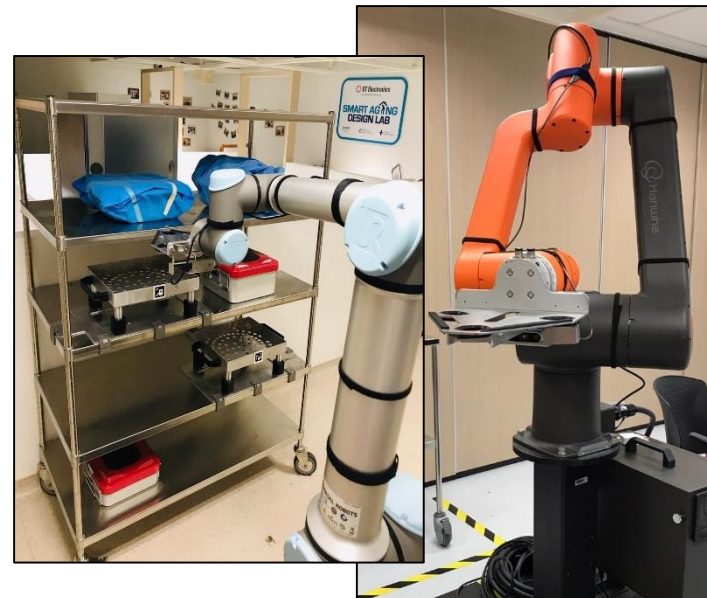
AI Sandbox

Pre-processing and model training workstations for data science and AI projects



Virtual Test Farm

Development of full-scale hospital simulation for operational efficiency & planning, validation testing, discrete event simulation, etc.



Prototyping Lab

Rapid prototyping to allow re-finishing of actual solutions developed (soldering, 3D printing, robot arms etc)

Partnering to Build an Ecosystem of Care

Individual Needs



Community/Population



Social Service Agencies



Community Development Councils & Grassroots



National Agencies



Community Hospitals & Nursing Homes



SingHealth/CGH



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Thank You

chart@cgh.com.sg