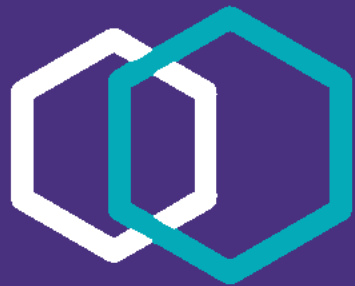
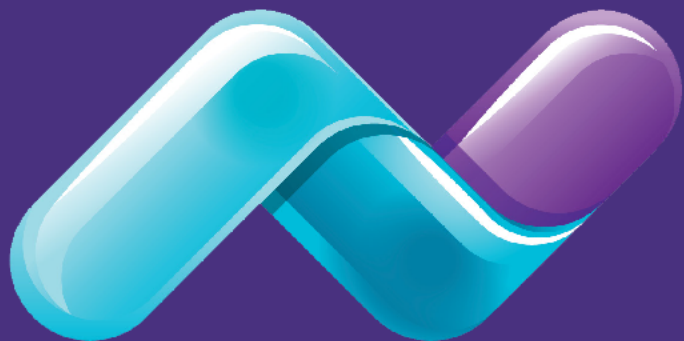


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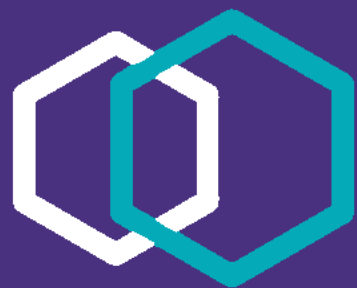


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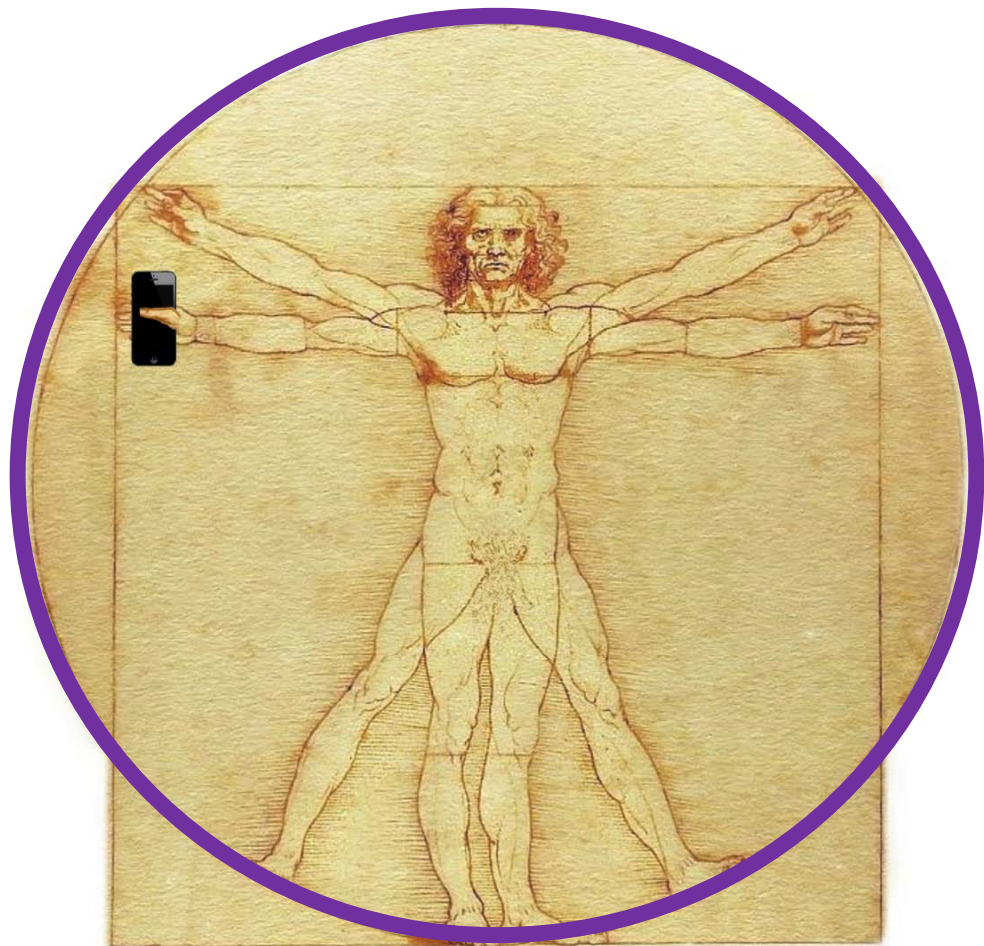
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WELCOME



With apologies to Leonardo

Dana Bradford

Senior Research Scientist

Australian e-Health Research Centre, CSIRO

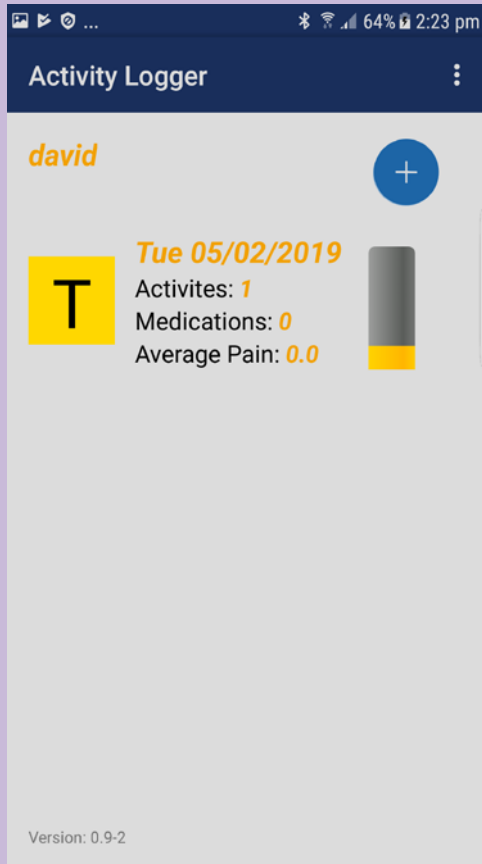
Tailoring technologies to
enhance autonomy and
improve health outcomes

Health Autonomy

- Preventative measures
- Early detection
- Accurate diagnosis
- Comprehensive prognosis
- Access to reliable resources
- Informed decision making
- Clear reporting
- Access to support networks
- Promote independence
- Equal partner in healthcare



Pain ROADMAP



Activity Logger

david +

Tue 05/02/2019

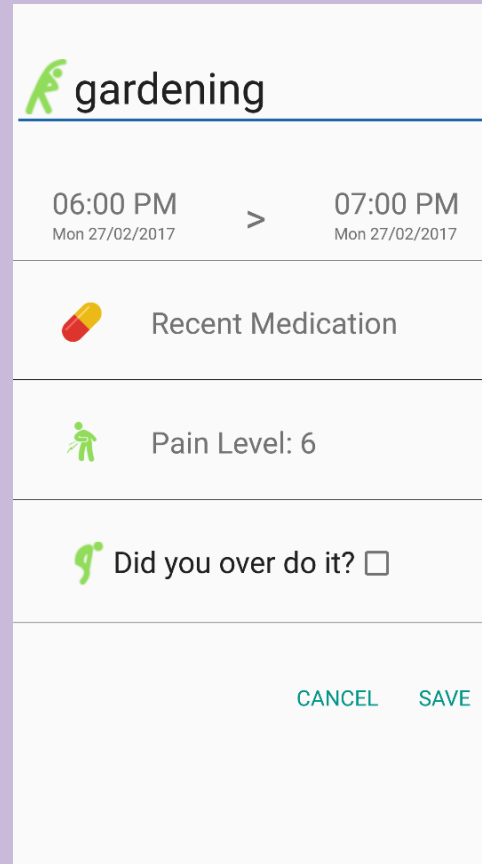
T

Activites: 1

Medications: 0

Average Pain: 0.0

Version: 0.9-2



gardening

06:00 PM > 07:00 PM

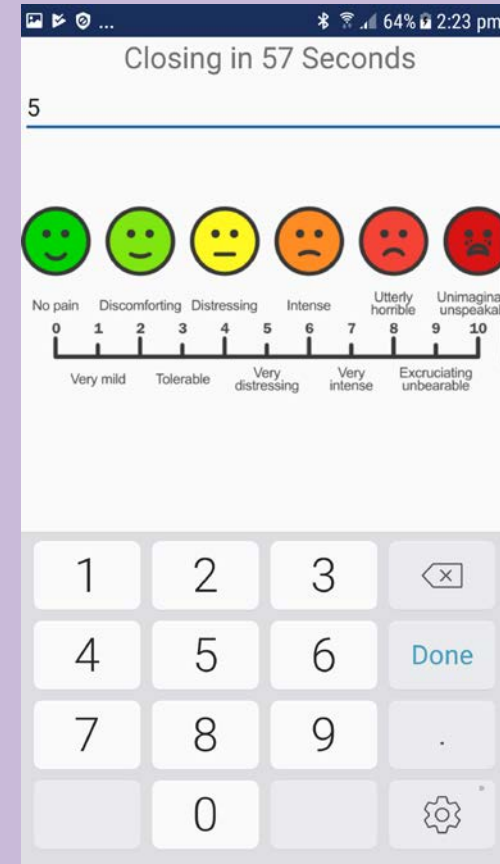
Mon 27/02/2017 Mon 27/02/2017

Recent Medication

Pain Level: 6

Did you over do it?

CANCEL SAVE



Closing in 57 Seconds

5

No pain Discomforting Distressing Intense Utterly horrible Unimaginable

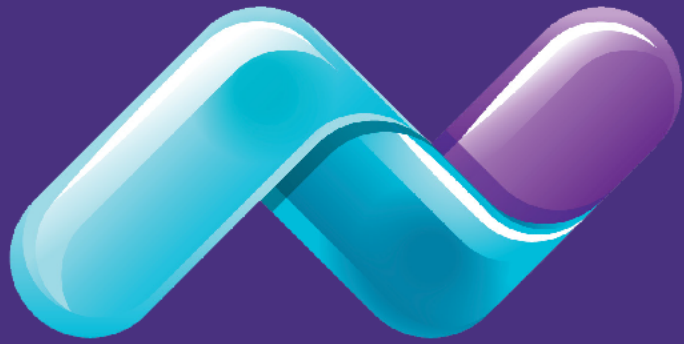
0 1 2 3 4 5 6 7 8 9 10

Very mild Tolerable Very distressing Very intense Excruciating unbearable

1 2 3 4 5 6 7 8 9 0 Done

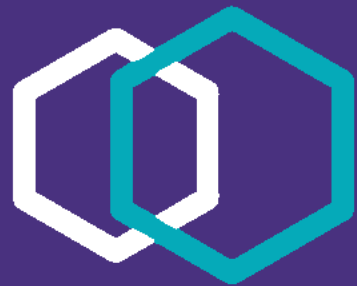
Pain ROADMAP Patient Outcomes

- Observed 'over activity' periods decreased from 2.5 to 0.25 ($p < 0.001$)
- Pain levels stabilised ($p < 0.001$)
- Extra 49 minutes of productive time on average
- 5 (of 7) individuals ceased PRN medication
- Decreased opioid intake by 20% on average
- 2 individuals went back to work fulfilling a planned goal



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Could sensor data
have saved a life?

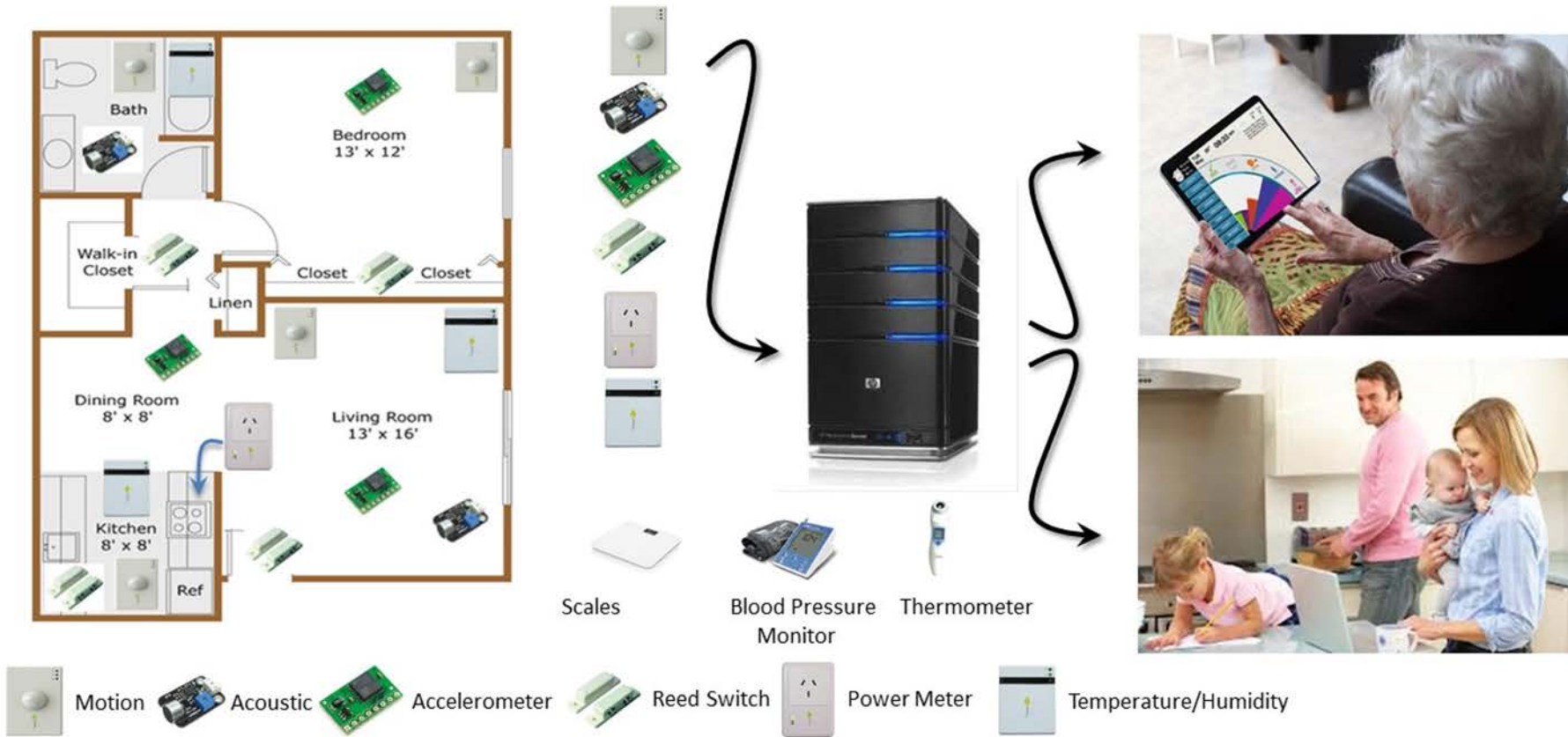
The story of
Mrs Elle



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Smarter Safer Homes

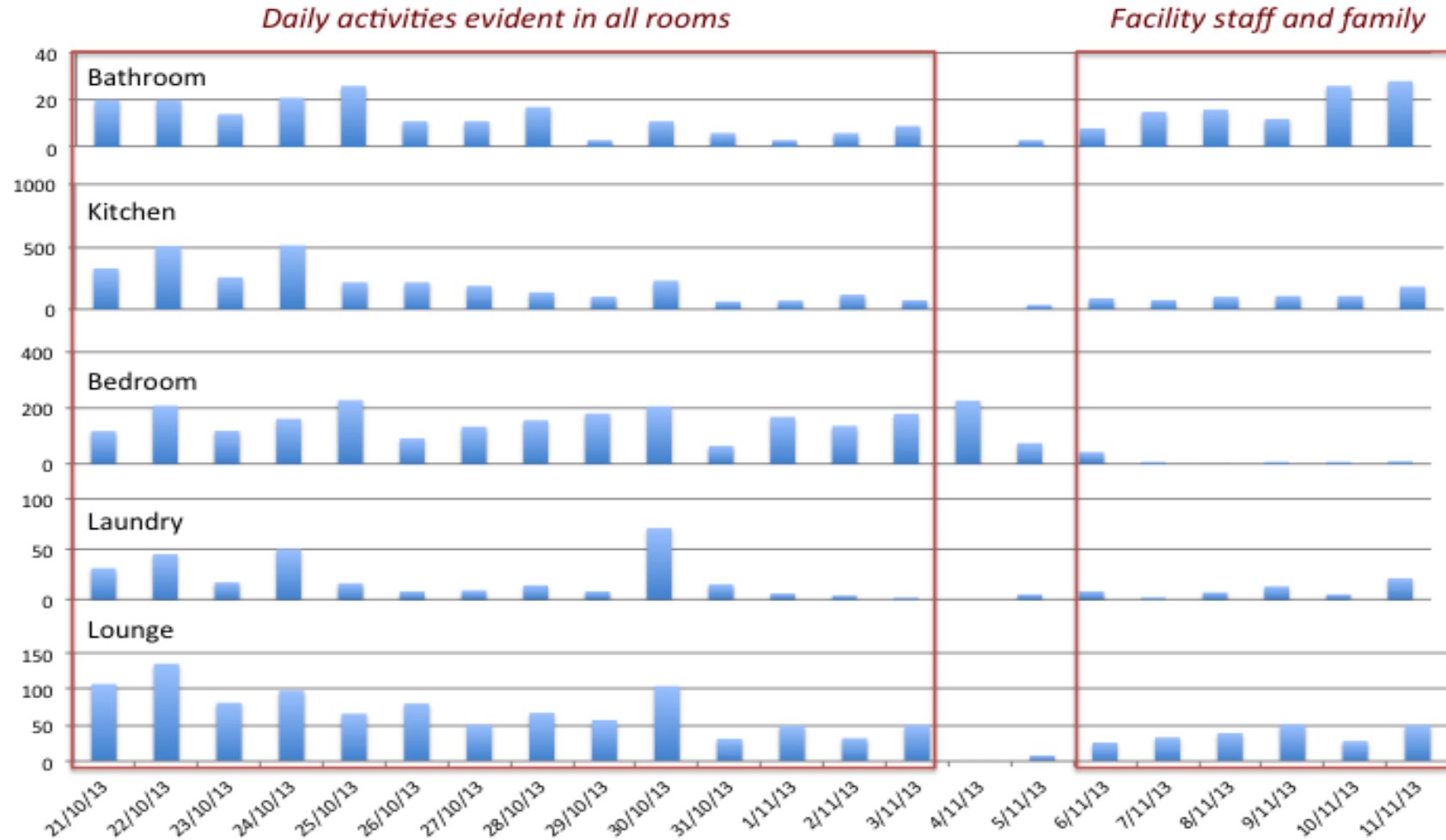




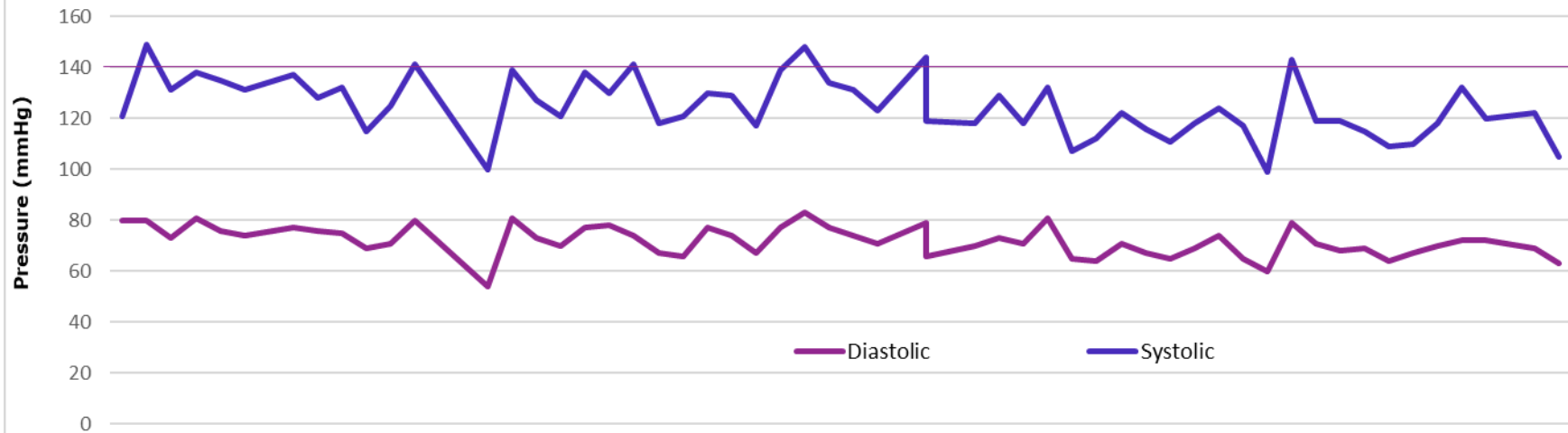
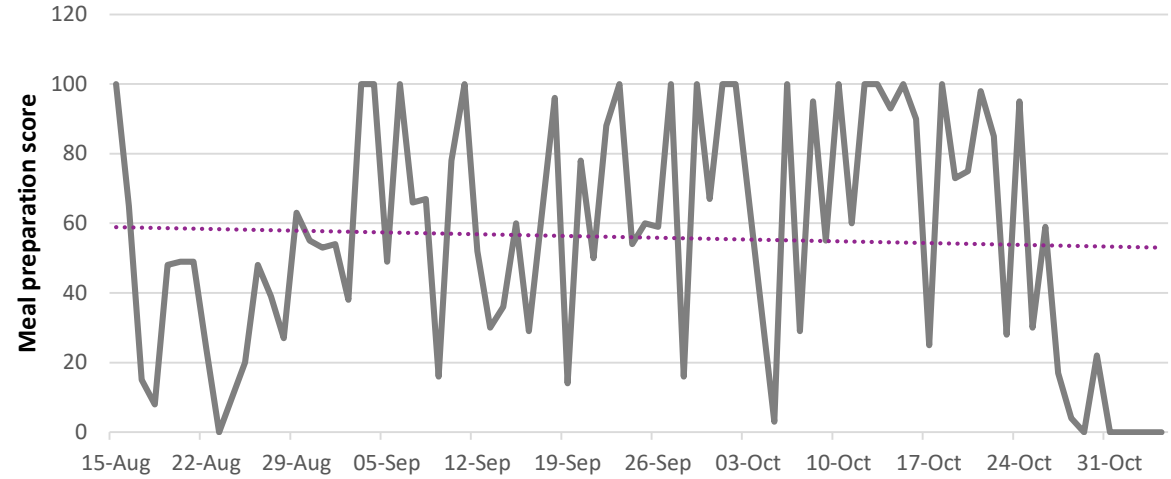
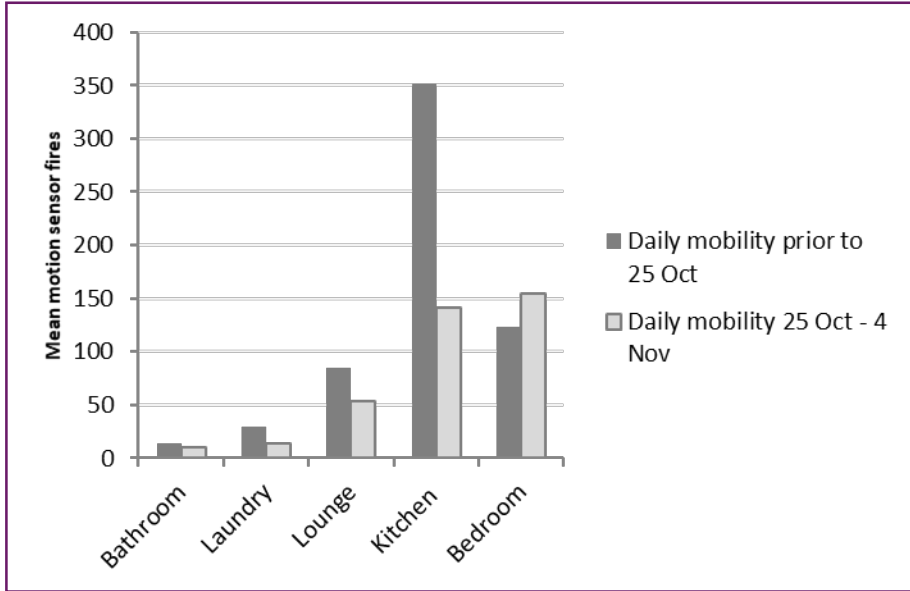
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Absence of sensor data



Secrets in the Sensors





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Physiological and Behavioural Changes

- reduced mobility
- reduced meal preparation and
- reduced attention to hygiene



Indicative of fatigue

- high blood pressure
- odd fluctuations in blood pressure
- low pulse rate
- high red blood cell count



Recently visited GP with her concerns and had medication changed

- low body temperature
- losing weight
- missed weekend activities and intrastate drive



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Power of Smart Homes

Harness information available from the sensors and devices to provide a predictive picture far more detailed than the glimpses currently seen by medical professionals.

Challenge:

to channel the accumulated information through a clinical portal to medical professionals to alert them and to inform clinical decisions based on every day behaviour.

Coordinated action between the monitoring system, the response service and the medical health team.



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Dedication

Dear Mrs Elle

*We would have alerted every specialist
in town*

Had our system known how to save a life.

Genomic Healthcare

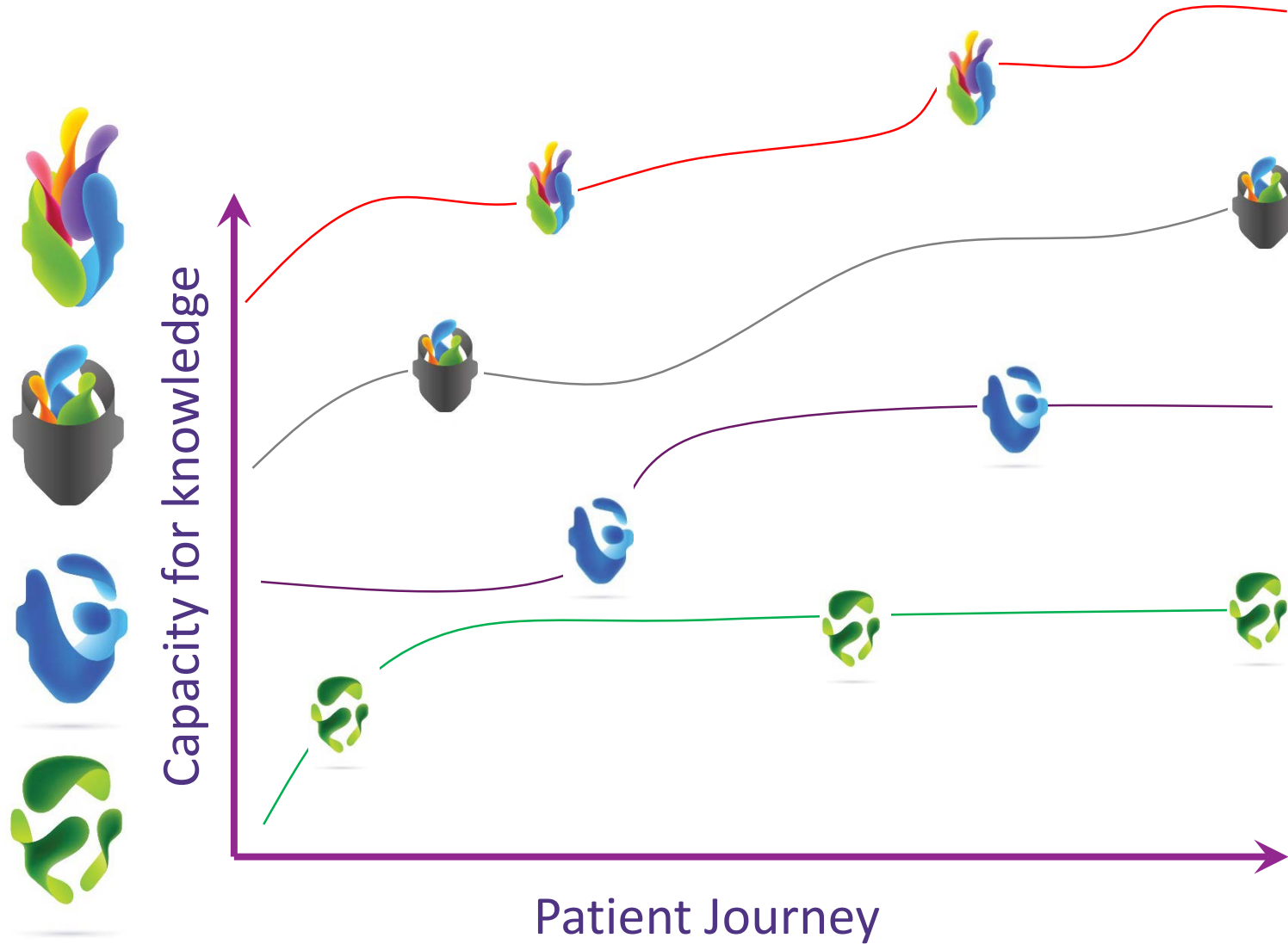
Potential to revolutionise healthcare provision

- Better understanding of disease
- More accurate diagnosis
- Personalised therapeutics
 - Right drug first time
- Repository
- Patient portals

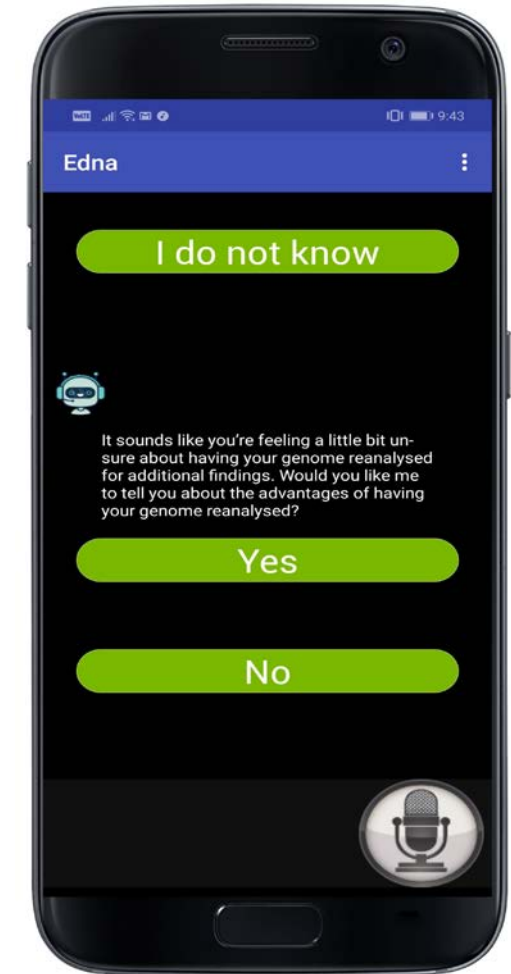
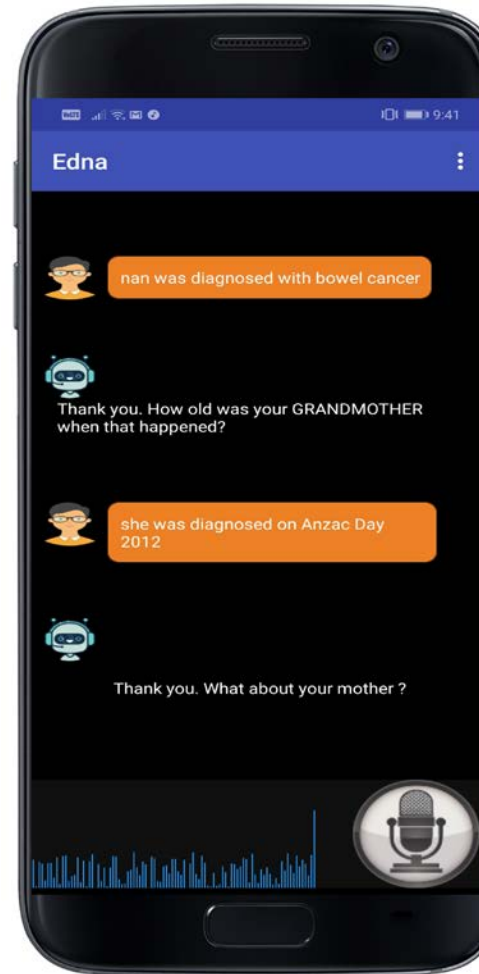
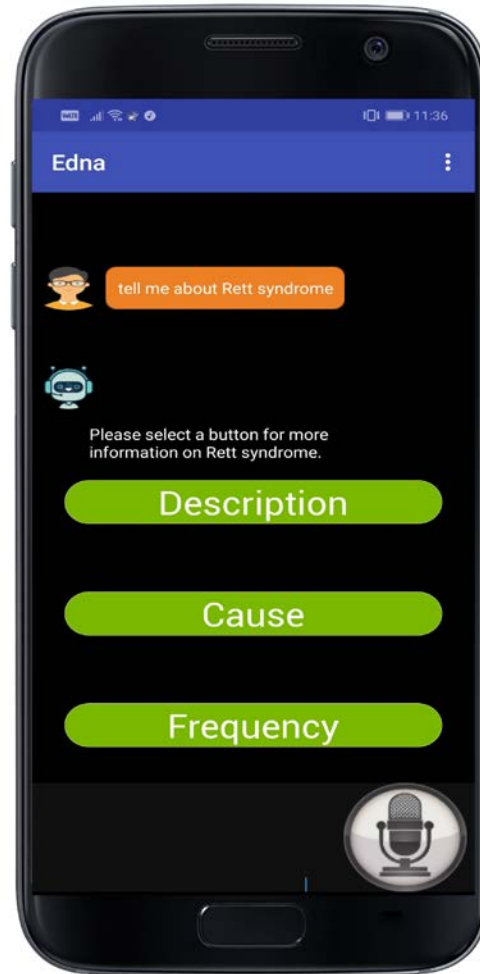
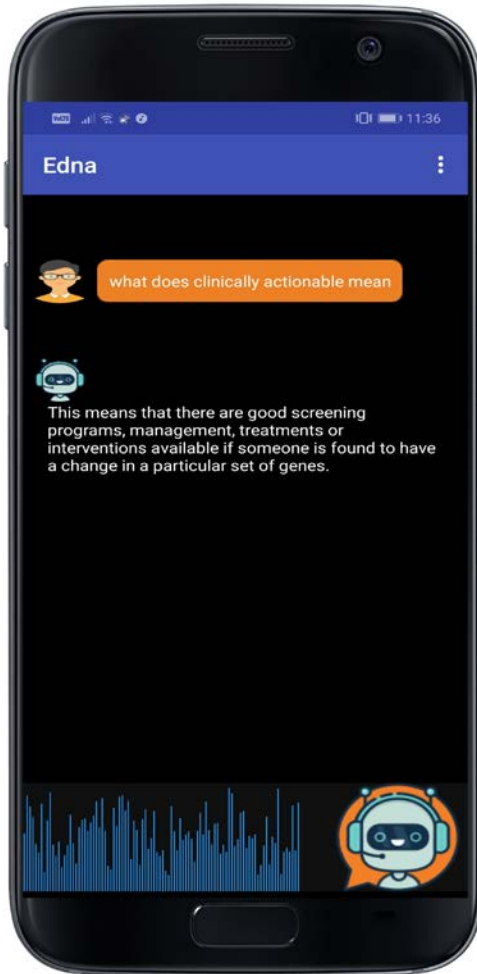
Implementation – consent, curation, reporting
Indigenous genomics



Health Literacy



eDNA the trainee genetic chat bot



Potential to support mental health

Natural language processing

Detection of key words and phrases
indicating mental health issues

Chat agents

Conversation tool

Avatars

Intervention
programme delivery



Wearable activity tracking devices

Monitoring sleep and activity

Affective computing

Facial recognition

Speech rate

Intonation

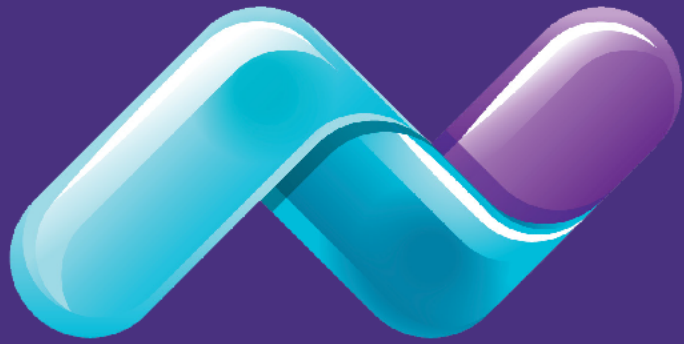
And more..

Call records

Internet history

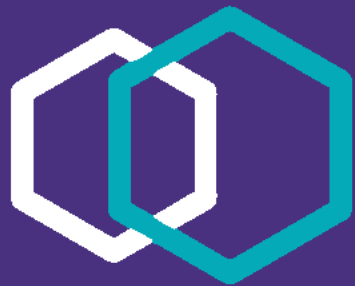
Music

Phone use



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Do smartphones
have a role as a
'medical device'
and if so, where are
the boundaries?



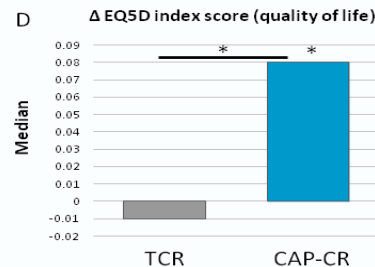
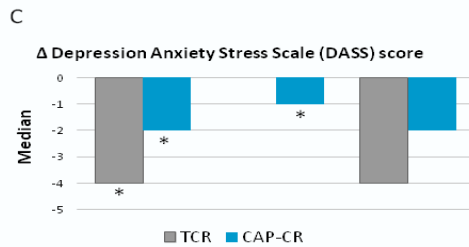
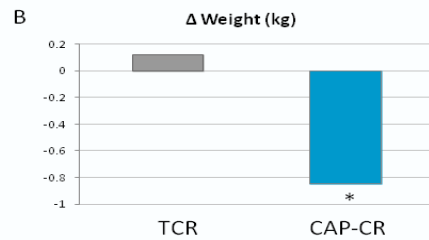
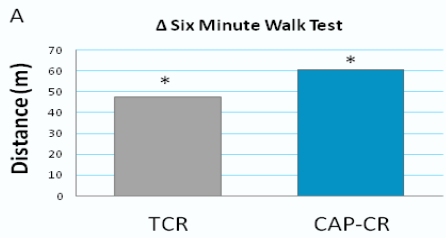
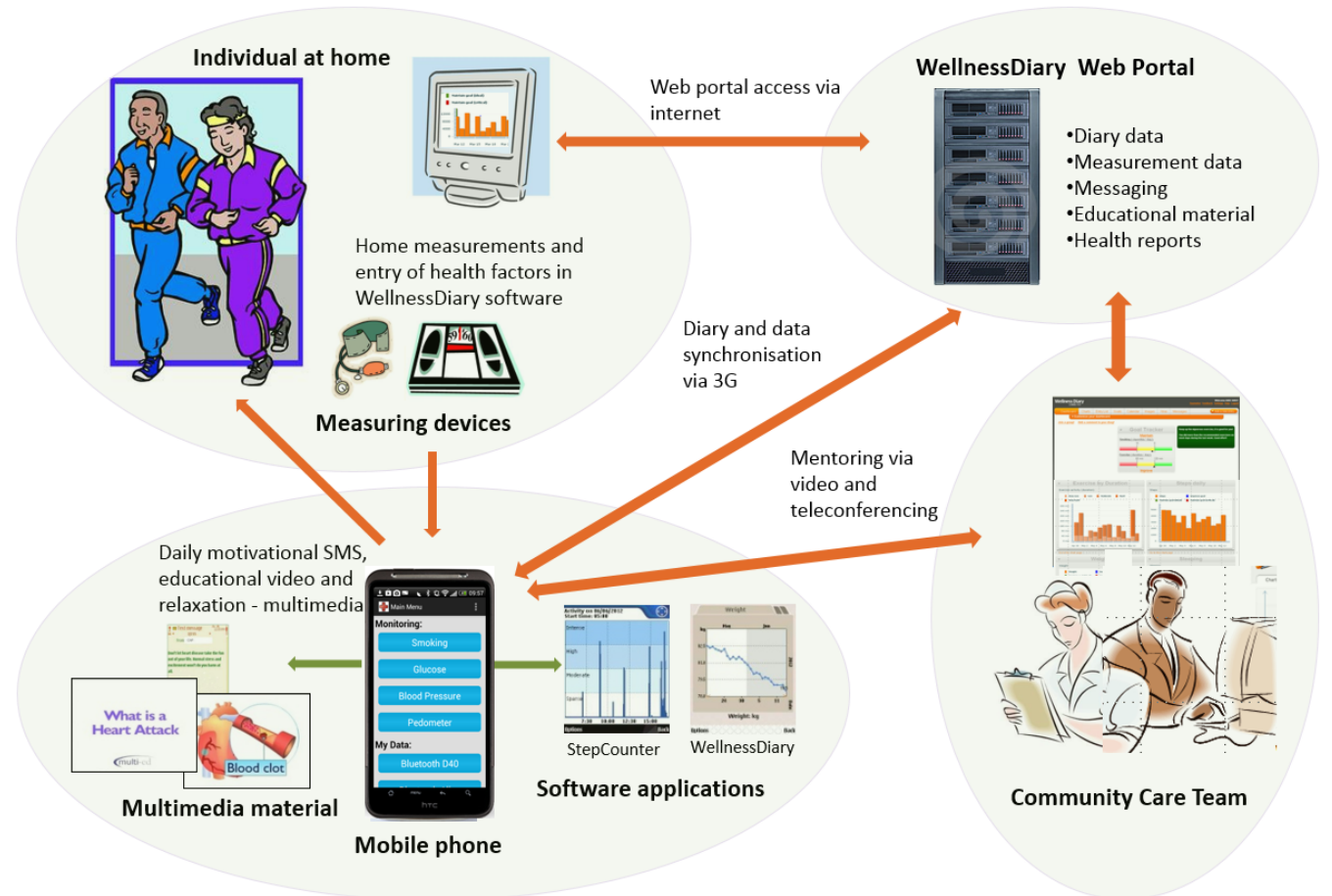
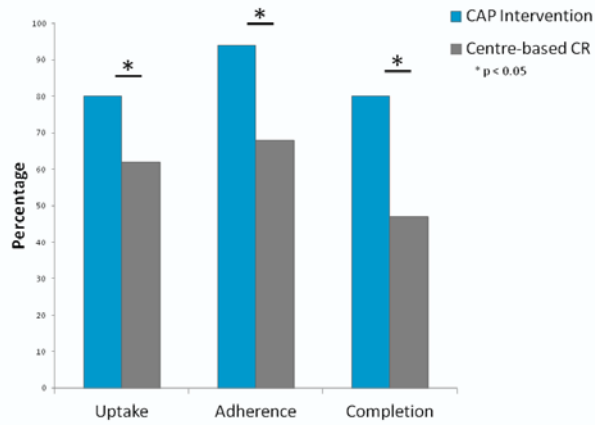
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Infrastructure for Health Autonomy



Cardiac Rehabilitation





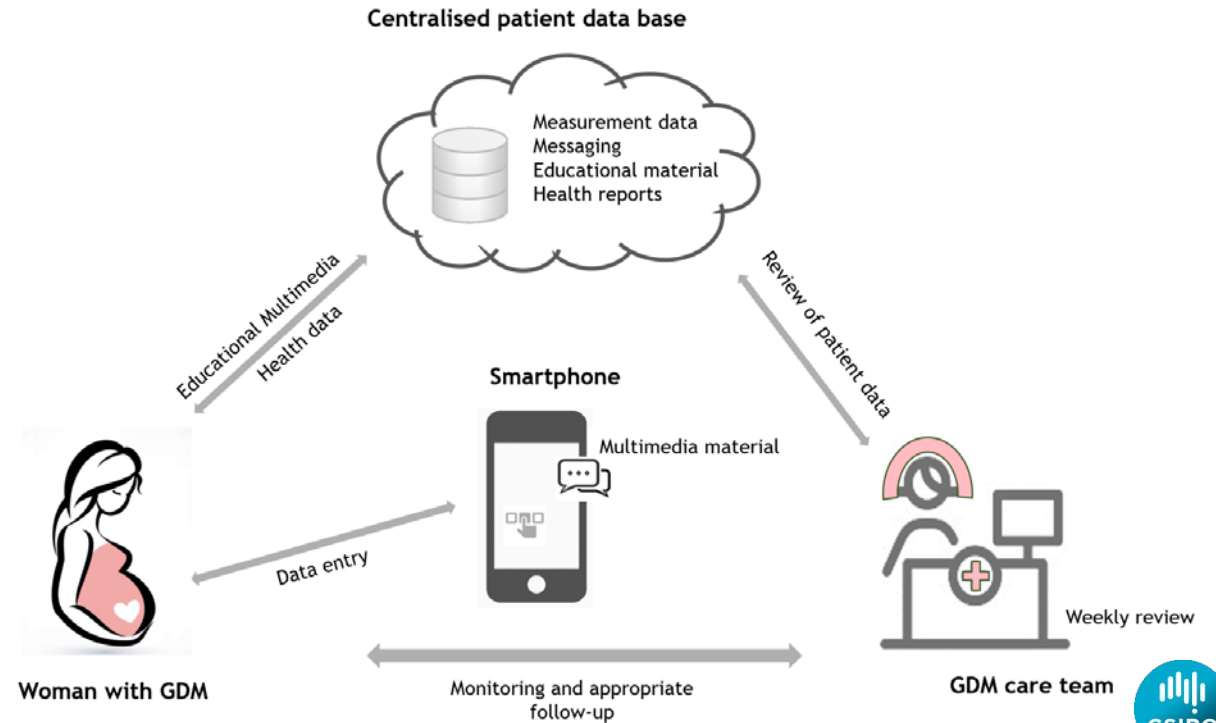
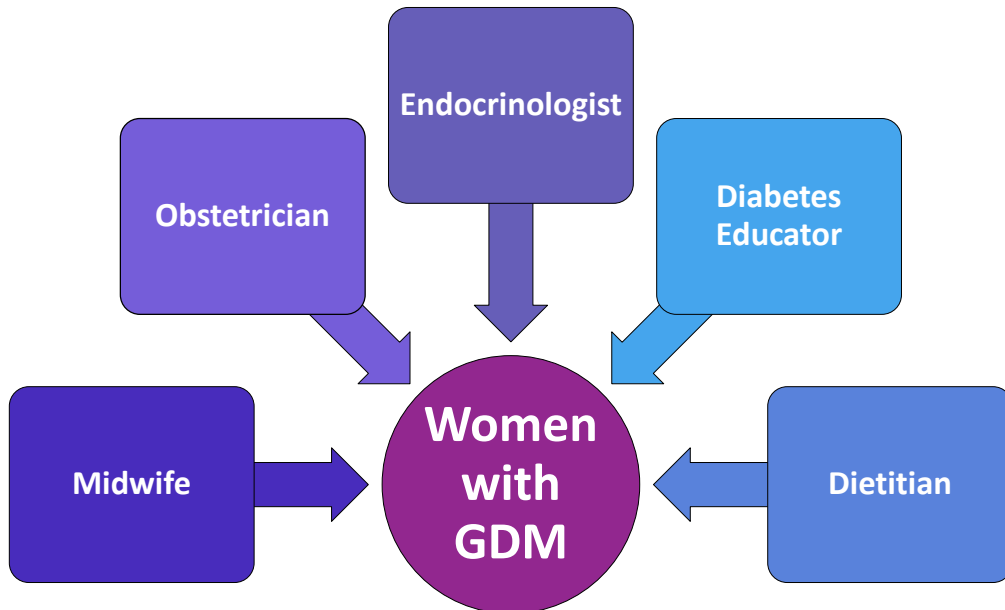
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M♥THer



App found to be user friendly, convenient and highly recommended
Improved the multidisciplinary care co-ordination
BGL clinical reviews significantly higher
Early intervention

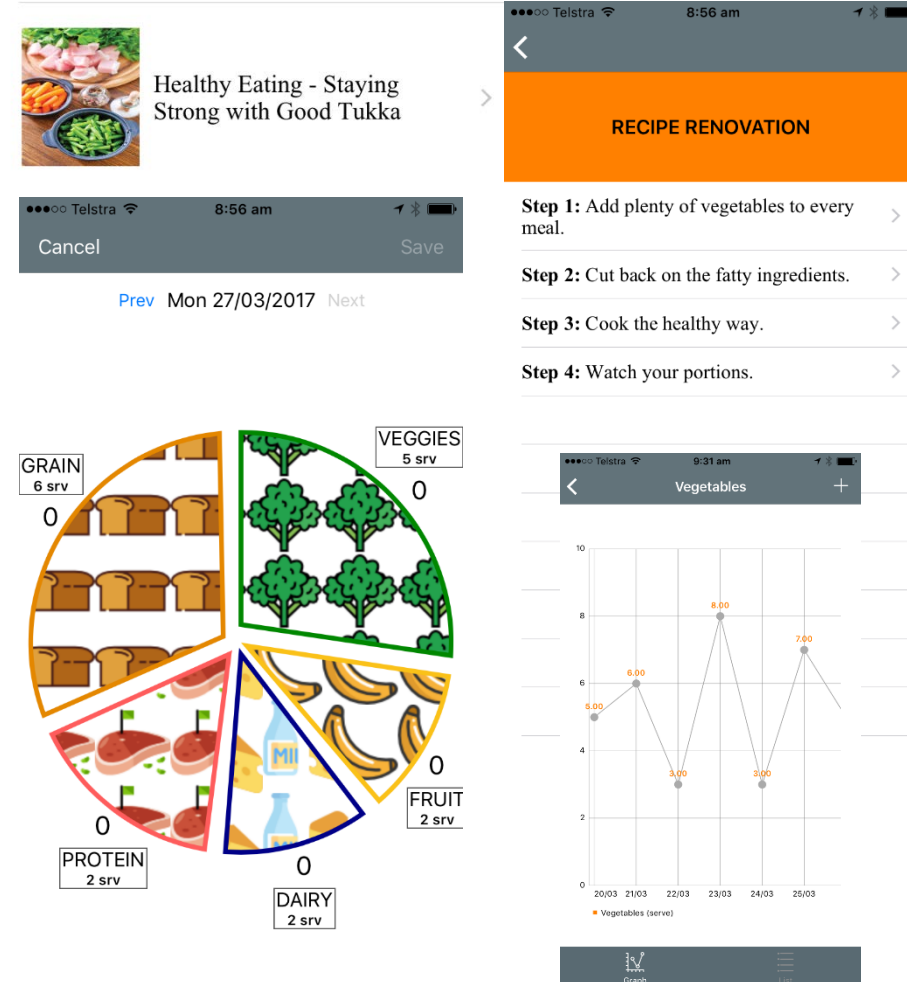


Chronic Disease Management

Dietitians yarn about food plates

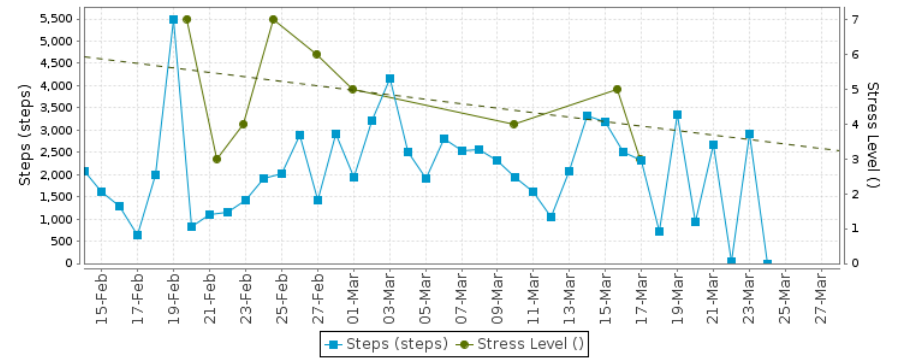
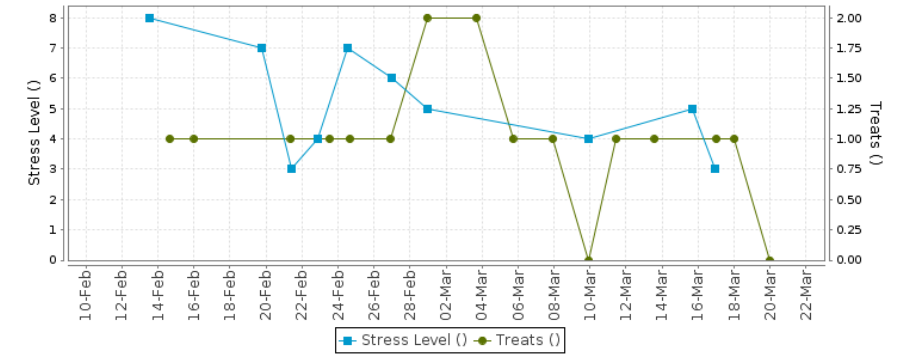


WIO clients made it clear that they would like to be able to track how many serves of vegetables, starches, etc they were eating a day.

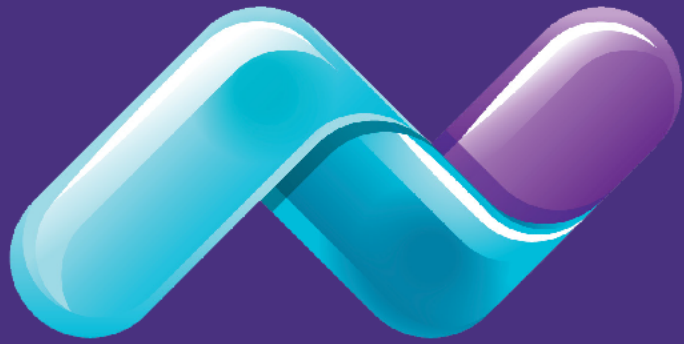


The screenshots show a mobile application interface. The top screenshot displays a recipe titled "Healthy Eating - Staying Strong with Good Tukka" with a "RECIPE RENOVATION" button. Below this are four steps: "Step 1: Add plenty of vegetables to every meal.", "Step 2: Cut back on the fatty ingredients.", "Step 3: Cook the healthy way.", and "Step 4: Watch your portions." The bottom screenshot shows a "Vegetables" tracking screen with a line graph. The graph plots "Vegetables (serve)" over time from 20/03 to 25/03. The data points are: 20/03 (5.00), 21/03 (6.00), 22/03 (3.00), 23/03 (8.00), 24/03 (3.00), and 25/03 (7.00). A pie chart below the graph shows the following food categories and their current serves: GRAIN (6 srv), VEGGIES (5 srv), FRUIT (2 srv), DAIRY (2 srv), and PROTEIN (2 srv). Each category has a "0" next to it, likely indicating a target or current count.

A Stella* Story

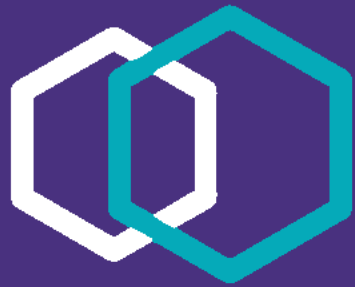


* Pseudonym



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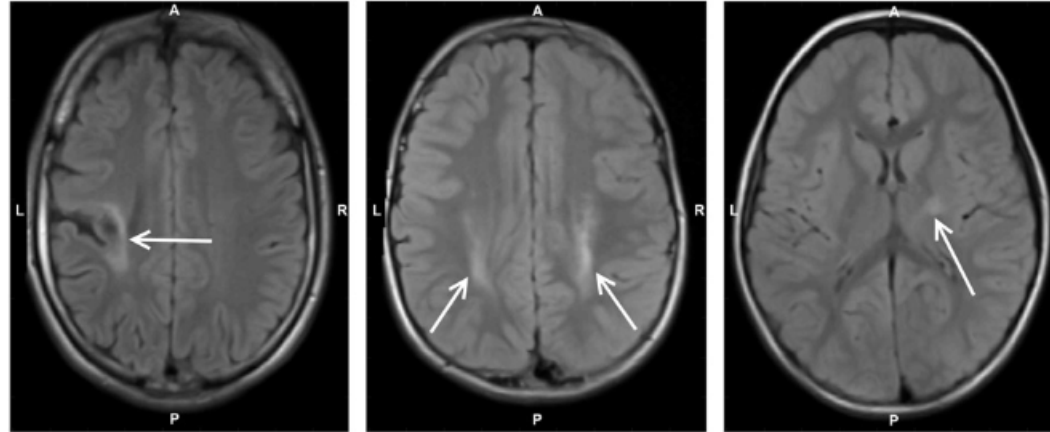
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Do we have existing
technologies that
can be modified for
new patient
populations?...

Structural MRI to quantify lesion burden

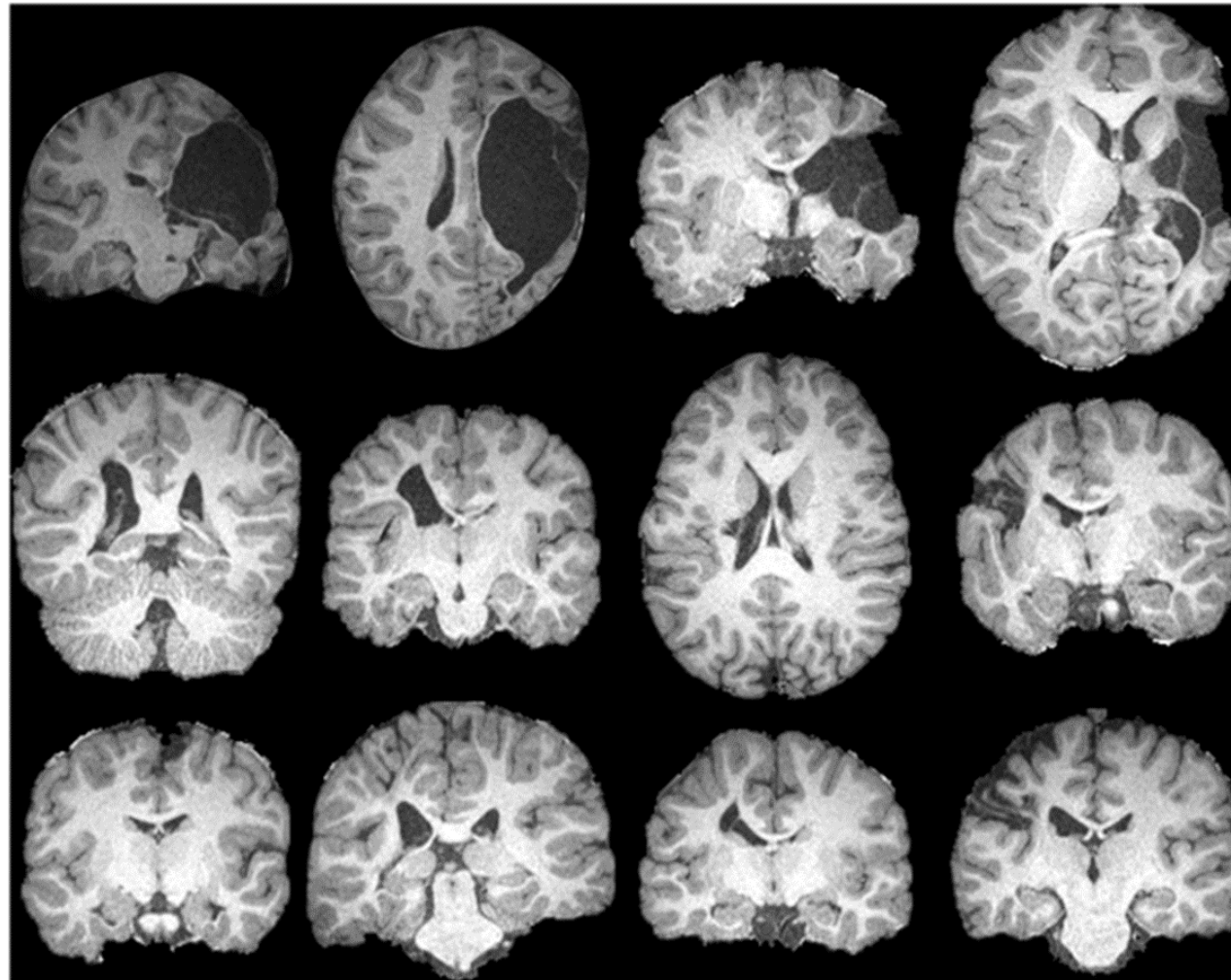


Grey matter (GM) lesion, white matter (WM) lesions and internal capsule (IC) lesions

- N=107 unilateral cerebral palsy; 18 healthy controls
- Accurate, validated method of automatic segmentation
- Significant correlations between lesion burden and clinical scores

Highlighted the importance of quantifying GM lesions

Cerebral palsy neuropathology

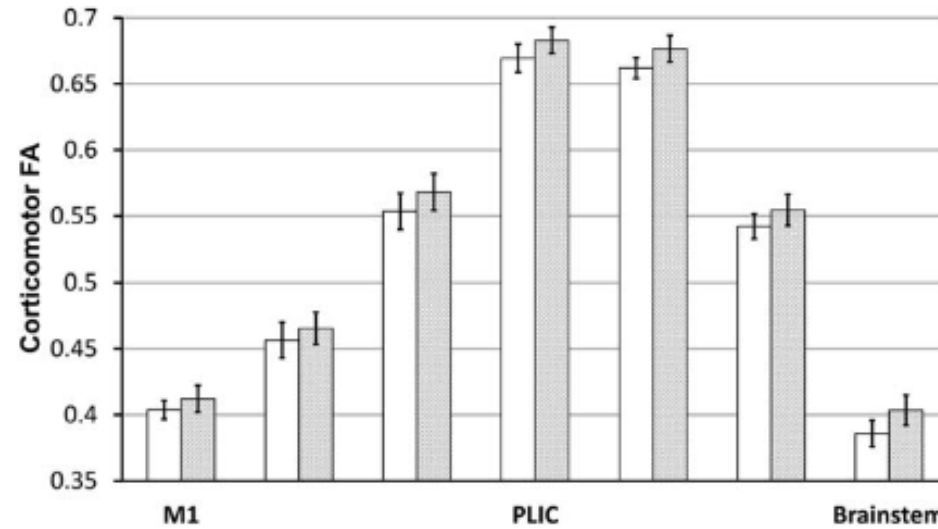
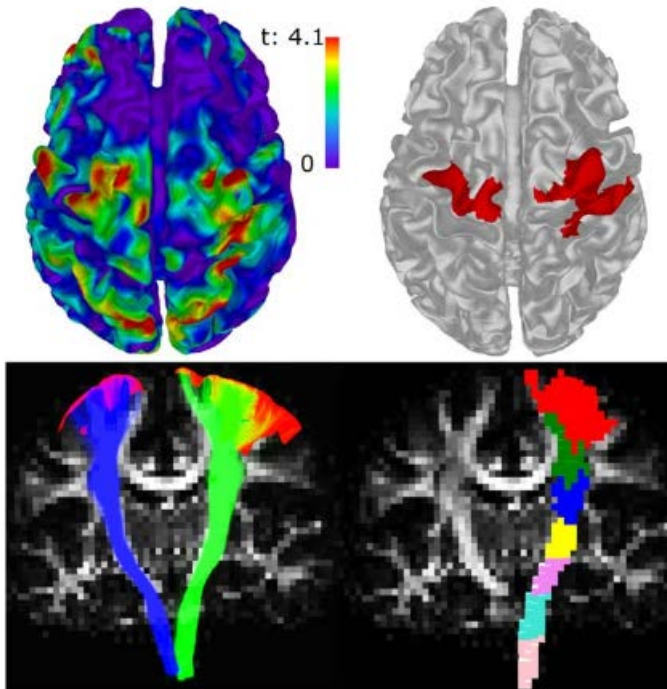




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Measuring Neuroplasticity



N= 24 healthy adults (14 f; Age 18-40, M=28)

10min/day for 4 weeks manual training finger-thumb opposition LH

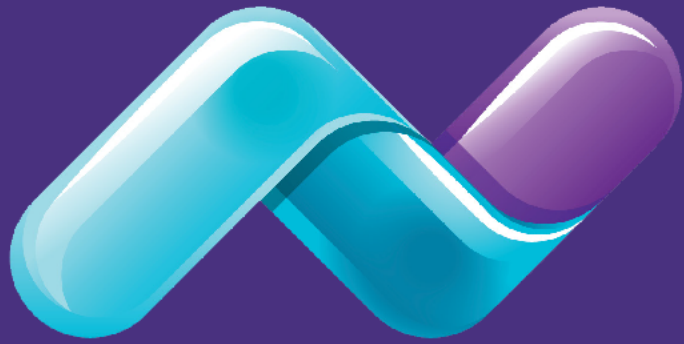


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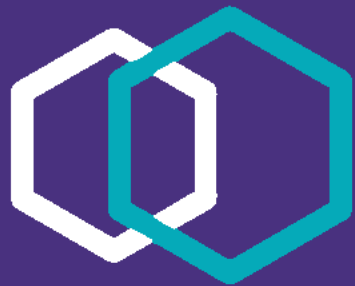
Sensors to Augment GMs Assessment





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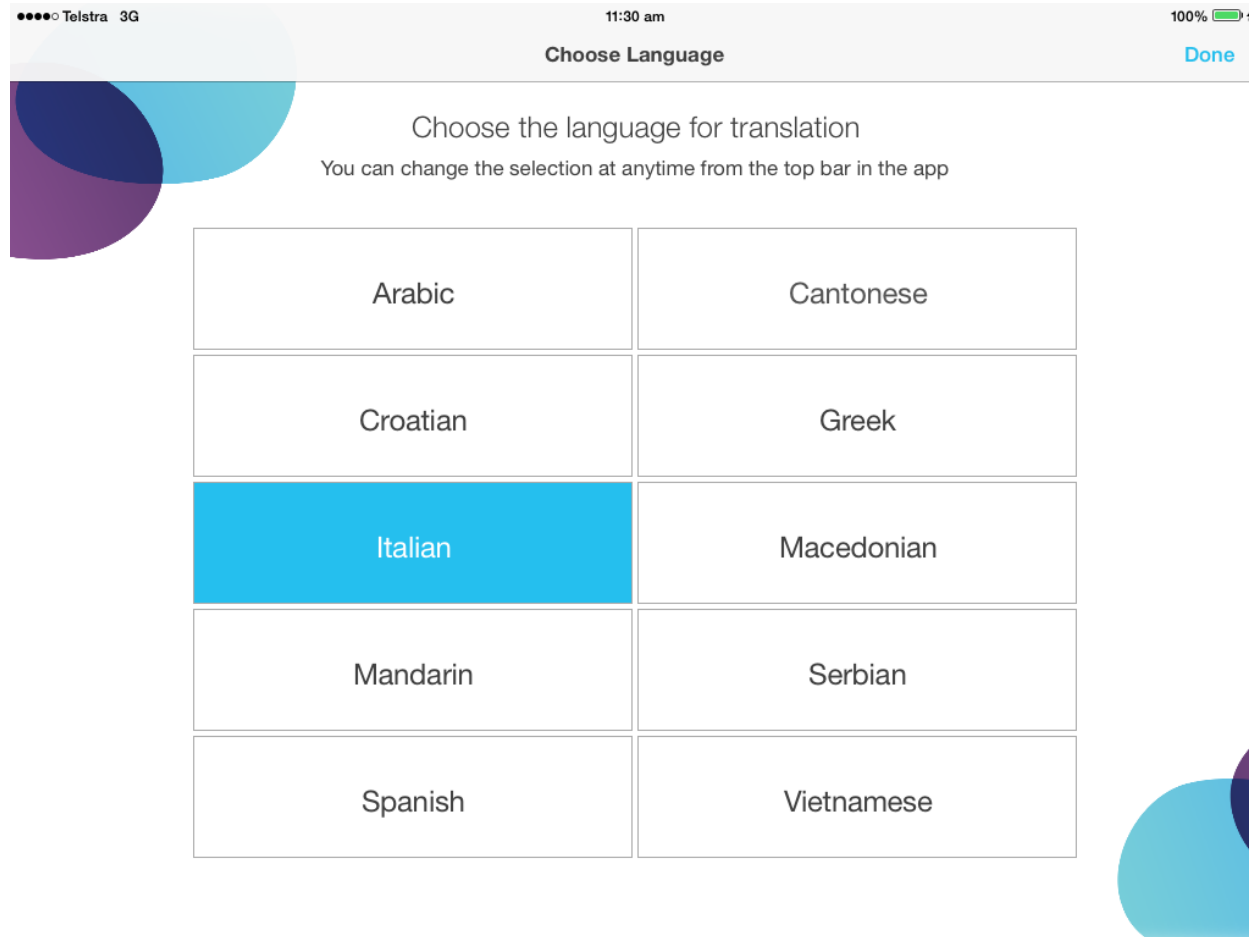
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What are we *not* measuring or monitoring, that is limiting our ability to provide best quality healthcare?

CALD Assist

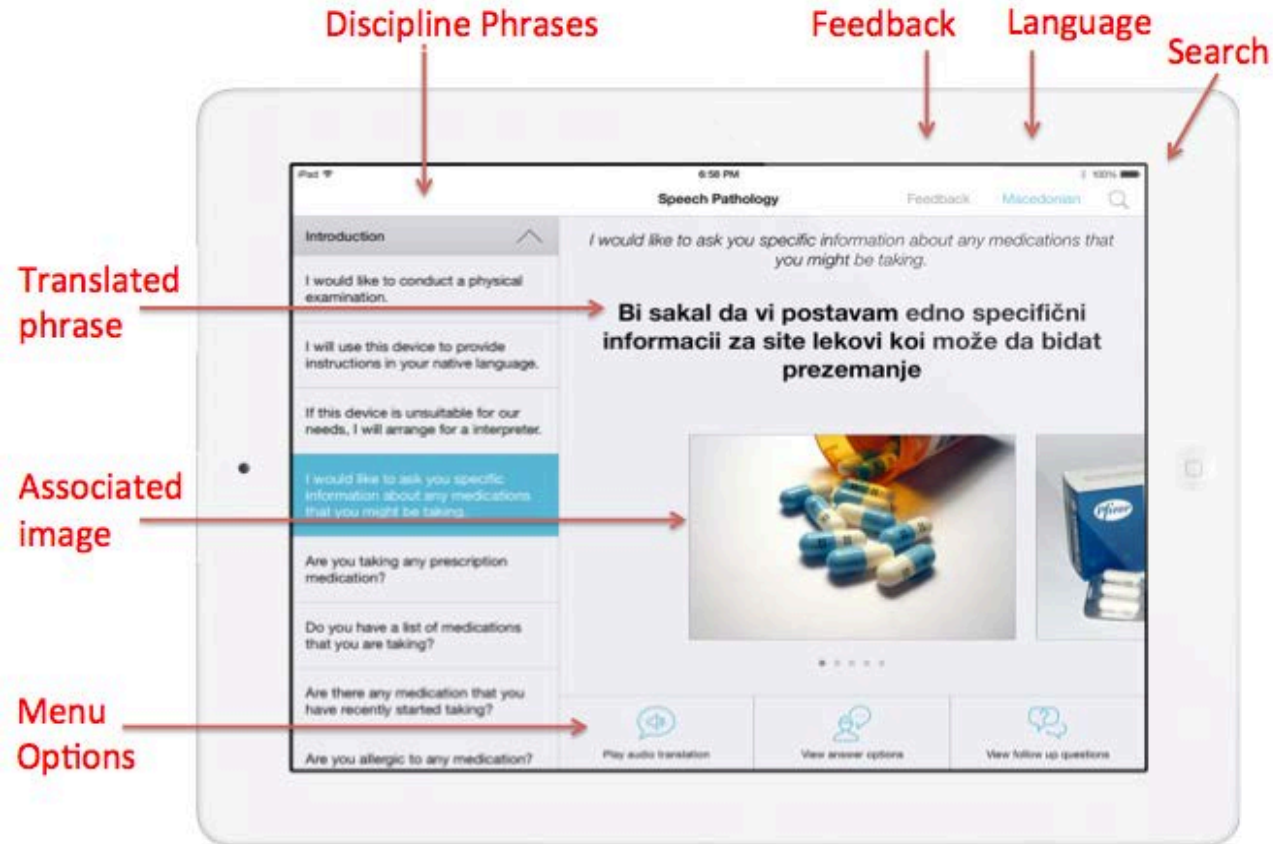




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Features and functions of CALD Assist



Awards for CALD Assist

- 2015 Health Informatics Society Australia, Branko Cesnik Award for Best Academic/Scientific paper
- 2015 Gold 'Improving health equality and closing the gap' Victorian Public Healthcare Awards
- 2017 'Improving the Continuum of Care' Health Round Table Innovations Award
- 2018 'Certificate of Merit' Victorian iAwards
- 2018 'Pitchfest' winner National iAwards

Available in the iPad App store for free download



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Conclusion

- Health technology doesn't have to be complex or expensive
 - Empower the consumer
- Include people with lived experience in development
- Role of family and carers in technology
- Uptake is improved by internal champions
- Autonomy is a coordinated effort

*Tailoring technologies to the target population
will enhance autonomy and improve health outcomes*

Cerebral Palsy Researchers



Kerstin Pannek

Cerebral palsy imaging

- Lee Reid
- Alex Pagnozzi
- Susmita Saha

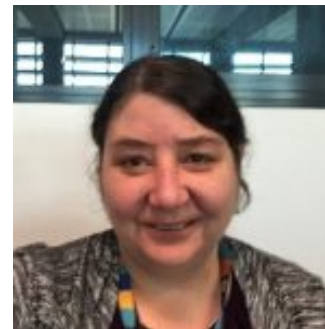


Sensors

- Christian Redd

Data management

- Julie Trinder
- Parnesh Raniga



Families
Clinicians
Therapists
Radiographers
Researchers
Med Students
Cerebral Palsy Alliance
QCPRRC
NHMRC

Further Acknowledgments

Mobile Health Platforms

Health Services Group – Mohan Karunanithi
Smarter Safer Homes – Qing Zhang
Cardiac Rehabilitation – Marlien Varnfield

Institute for Urban Indigenous Health
Woolloongabba and Goldie Mobs
Health psychologist - Tabs Basit

Metro North Hospital and Health Services
Pain ROADMAP - David Ireland

Genomics Healthcare

Melbourne Genomics – Clara Gaff
Chat bots – David Ireland
Patients from the Demonstration Projects

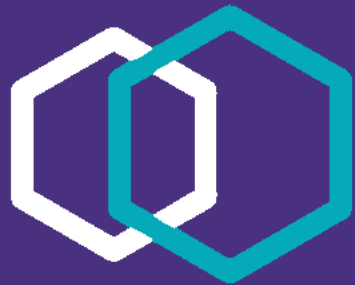
CALD Assist

Western Health – Sally Brinkmann
Speech Pathology – Courtney Pocock
HCI - Jill Freyne, David Silvera, Karen Harrap
Clinicians and Patients at WH



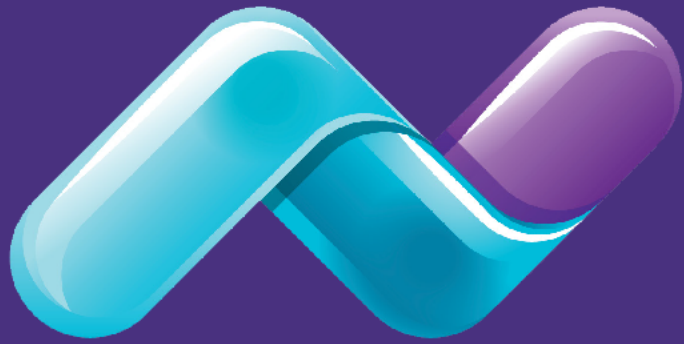
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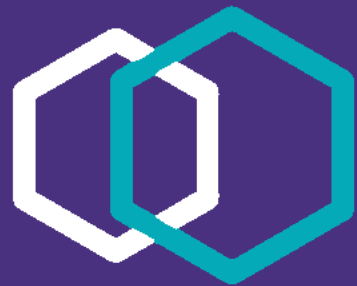
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Thank you



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Do we have existing technologies that
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