

# Health & Social Care Testbed



Not just technology, application in real services, impact on peoples lives.

“Can 5G connectivity be sufficiently cheap and effective in health and social care provision that it will be cost effective to give free access to those unable to afford either phone or broadband access?”

Ann Williams – Liverpool City Council

Rosemary Kay – eHealth Cluster



# LIVERPOOL 5G CONSORTIUM

SENSOR CITY – LEAD – STRATEGIC OVERVIEW

## USE CASES

SOCIAL CARE

HEALTH

eHealth Cluster: Facilitating collaboration, SME Engagement, Adoption & Integration within Health & Social Care via use cases.

LIVERPOOL CITY  
COUNCIL ADULT  
SOCIAL CARE

DIGICREDIS

CGA SIMULATION

DEFPROC

UNIVERSITY OF  
LIVERPOOL

ROYAL LIVERPOOL  
& BROADGREEN  
UNIVERSITY  
HOSPITALS TRUST  
(RLBUHT)

Pharmacy Assistant

Hydration sensors

Digital Twin of  
installation location  
  
Loneliness  
solutions

Public access to  
LoRaWAN network  
  
Push To Talk

Domiciliary &  
Health monitoring  
system

Telehealth in a box  
  
Cloud based clinical  
mobility

Safehouse IoT  
Sensors

Social Care  
Business Models

LIVERPOOL CITY COUNCIL

AMAZON WEB SERVICES

UNIVERSITY OF LIVERPOOL

LJMU

AIMES

Street furniture  
Local infrastructure

Support

Green 5G demonstrator

Optimisation &  
integration

Integrated cloud based  
services  
Research environment

BLU WIRELESS – MESH NETWORK

STRATEGY / POLICY

ADOPTION & INTEGRATION

5G TEST BED  
INFRASTRUCTURE

STRATEGY / POLICY

ADOPTION & INTEGRATION

5G TEST BED  
INFRASTRUCTURE

PILOT PHASE PROJECT MANAGEMENT - INVENTYA

# Liverpool 5G

Feature	Application / Benefit – Now	Application / Benefit - Future
Network everywhere - Gbit broadband to premises - 5G/WiFi in the street	<ul style="list-style-type: none"> <li>• Connect sensors</li> <li>• Connect Alert systems</li> <li>• Access medical records</li> </ul>	<ul style="list-style-type: none"> <li>• Additional sensors</li> <li>• IoT devices</li> </ul>
High Bandwidth & Low Latency	<ul style="list-style-type: none"> <li>• Video conferencing               <ul style="list-style-type: none"> <li>- Health worker to GP / Hospital</li> <li>- Resident to Health Worker / GP</li> <li>- Resident to Family / Friends</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Telepresence support</li> <li>• Remote diagnostics / scans</li> <li>• VR community interaction</li> <li>• Augmented reality video</li> </ul>
Utilises large unlicensed 60GHz mmWave spectrum (5G unlicensed)	<ul style="list-style-type: none"> <li>• Unlicensed Spectrum               <ul style="list-style-type: none"> <li>- Minimises costs to the council</li> <li>- Minimises access costs for users (WiFi)</li> <li>- Enable 5G 'Capacity' small cells</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 100Gbs roadmap (802.11ay)</li> <li>• Highly directional signal transmission</li> <li>• Localisation for spatial reuse</li> <li>• Active interference management</li> </ul>
Open Platform SDN Control Virtualised Services Network Slicing MEC Enabled	<ul style="list-style-type: none"> <li>• Health service application development</li> <li>• SON, Ad Hoc extensibility</li> <li>• End-to-end cloud based application development</li> <li>• Managed end-to-end latency</li> <li>• Ultra Low latency compute functions in network</li> </ul>	<ul style="list-style-type: none"> <li>• Disruptive business opportunities</li> <li>• Intelligence in environment</li> <li>• Big Data collection</li> <li>• VR community</li> </ul>
Council owned WATC fibre network	<ul style="list-style-type: none"> <li>• Highly secure</li> <li>• Compatible with council fibre network/ISP (AIMES)</li> <li>• Easily extendable without laying new fibre / installing mobile base stations</li> </ul>	<ul style="list-style-type: none"> <li>• Can be utilised by council to connect other public service devices</li> </ul>



# Why Kensington?

- *“A boy born in the Royal Borough of Kensington and Chelsea - home to the most expensive street in England - can expect to live to the ripe old age of 83 - 13 years longer than one delivered in Kensington, Liverpool”*  
BBC News, Feb 2016

- 45.8% of households occupied by only one person <sup>1</sup>
- 33.3% of households have someone with a disability or long term health condition <sup>1</sup>
- 90.9 % of the area is in the most deprived 10% nationally <sup>1</sup>



# Medication Management

## Challenges Addressed:

- LCC funds 1,000+ meds prompts per week through home care services
- Recruitment crisis in home care sector
- Medication shortages post Brexit
- Cost of medication errors to care providers and LCC, effect on service users
- Medication wastage costs the NHS £500 million per year<sup>2</sup>
- “It is estimated that over-ordering, stockpiling and not using medication, costs the local NHS around £2.5 million per year.”<sup>3</sup>
- Estimated cost of people not taking their medicines properly and not getting the full benefits to their health is £500m/year.<sup>4</sup>

## Potential Impact:

- Reduction in number of medication visits/costs
- Increase in support for care staff
- Increase in confidence/independence for service users
- Improvement in health outcomes for service users
- Identifying dysphasia (swallowing) related conditions early
- Improved Warfarin management



# Safehouse – IoT sensors

## Challenges Addressed:

- Current analogue bandwidth used in telecare equipment redundant in 2023 when all telecare will have to be digital.
- In July 2018 LCC funded **2233 users** and CCG funded **1773**, giving **4006** in total. <sup>5</sup>
- IoT sensors - opportunity for significant costs savings. E.g. adding digital SIM cards to existing devices = minimum of **£234,000** per annum. <sup>6</sup>
- Current telecare costs **£1.49** per item per week to monitor. <sup>7</sup> The trial will establish comparative IoT costings.

## Potential Impact:

- The LoRaWAN technology provides an opportunity to explore alternatives to traditional telecare with the involvement of residents and care providers at very early stages.
- Reduction in number of GP visits, hospital admissions
- Improvement in health outcomes for service users
- Increased independence and dignity
- Increase in family engagement
- Reduction in costs of monitoring



# Falls detection

## Challenges Addressed:

- Current NHS statistics: >30% of over 65s have at least one fall a year and this is the largest case of emergency admissions for the age group. <sup>8</sup>
- The total annual cost of falls in Liverpool is £7.2 million pounds. <sup>9</sup>
- Costs of falls among older people aged 65+ to health services in Liverpool 2016/17: <sup>10</sup>

• Fallers 65+ (estimated)	£349
• Ambulance Journey (estimated)	£231
• A&E Attendance (estimated)	£124
• Emergency Admission	£2,719
• Elective Admission	£3,774
• Outpatient Attendance (estimated)	£114
• GP Consultation (estimated)	£38

## Potential Impact:

- Potential reduction in falls in service users
- Potential reduction in number of GP visits, hospital admissions
- Improvement in health outcomes for service users
- Reduction in health and care costs



# Loneliness

## Challenges Addressed:

- Public Health England stated the health impact of loneliness is on a par with obesity or smoking 15 cigarettes a day
- Estimated cost of loneliness per person for older people(over 10 years) £6,000<sup>11</sup>
- Estimated cost of loneliness per person (over ten years) £1,700 <sup>11</sup>
- Isolation of carers
- Isolation within supported living services for learning disabilities services
- Reduction in available day services

## Potential Impact:

Through push to talk and community games

- Reduction in loneliness in service users
- Improvement in health outcomes for service users
- Reduction in number of GP visits, hospital admissions, call-outs
- Increased level of service user engagement (button pushes, calls per user, call duration)





# Dehydration

## Challenges Addressed:

- Cause of high levels of unplanned hospital admissions<sup>12</sup>
- In Home Care settings, early detection of signs of dehydration can reduce the likelihood of UTIs and AKIs
- High number of falls caused in the home due to dehydration

## Potential Impact:

- Reduced number of GP visits, prescriptions, hospital admissions
- Reduction in UTIs in service users
- Reduction in falls in service users



# Telehealth

## Challenges Addressed:

- CCG already using for patients where risk of being admitted to hospital for their LTC within the next 12 months is >25%
- Existing trial shows reduction in hospital re-admissions between: 22%-32% <sup>13</sup>
- Patient Reported Outcome Measures - CCG trial <sup>14</sup>:
  - Decrease in healthcare utilisation 55%
  - More control, confidence or ability to cope 90%
  - Lifestyle (e.g. diet, exercise) improvement 52%
  - Sharing of self-care results with others 64%
  - Improved health or better health management 79%
  - Willingness to use Telehealth in the future 76%
- The challenge is to apply telehealth in acute setting to reduce the need for follow up appointments and enable early discharge.

## Potential Impact:

- Reduced number of follow up appointments
- Reduction in emergency readmissions for patients
- Reduction in the mean length of stay for key long term conditions.
- Improvement in health outcomes for service users
- Empowering patients to self-care.



# Cloud based clinical mobility

## Challenges Addressed:

- Redesign of outpatient services
- Telemedicine enables a person-centred approach through:
  - Remote Access Clinics to aid patient flow and experience.
  - Extra-ordinary Virtual MDT for expedited MDT sessions.
- Clinical Mobility – use of single devices to aid peer to peer collaboration driving productivity.
- Secure messaging for broadcast of images and video.
- First of type “Digital Lab” to deliver a safe testbed for collaboration of clinicians, academics and SMEs for IoT devices from the hospital to home.

## Potential Impact:

- Patient Flow improved through use of technology to deliver a “virtual” experience.
- Supports %YOY increase of OPD appointments.
- Better collaboration tools improves clinical productivity. More time with the patient for improved outcomes.
- Digital Lab will act as a gateway to trialling tech in health and social care – difficult market sectors to enter for SMEs.

# Conclusions

- Liverpool City Council Adult Social Care spending has been cut by £92m since 2010 while demand has risen 15%.<sup>15</sup>
- Forecast increasing demands on health and care systems from an ageing population living with co-morbidities.
- Combined LCC & CCG spend on health and social care in 2017/18 was over £232m. This pilot will demonstrate the potential savings 5G enabled technology could bring across services.
- We need new, innovative ways of working.
- Technology has a key role to play but not in isolation, as part of wider system changes, incorporating service users, social care providers, Local Authorities, NHS and technology companies
- At the end of this pilot we will have trialled our “Adoption Readiness Levels” (ARL) which will complement the TRL.

# Sources

- 1 Liverpool City Council Ward Profile Data
- 2 Health Secretary Jeremy Hunt on Medication Adherence 2nd July 2015
- 3 Liverpool CCG Health Liverpool <https://www.liverpoolccg.nhs.uk/get-involved/current-ongoing-consultations-engagements/changes-to-repeat-prescriptions-ordering/>
- 4 Department of Health <https://www.gov.uk/government/news/action-on-medicine-wastage-and-improving-medicine-use>
- 5 Figures obtained from Liverpool City Council – Adult Social Care
- 6 Figures obtained from Liverpool City Council – Adult Social Care
- 7 Figures obtained from Liverpool City Council – Adult Social Care
- 8 Healthy Liverpool Statistics
- 9 Healthy Liverpool Statistics
- 10 Liverpool's JNSA Adults & Older People: Falls & Fragility Fracture Prevention:  
<https://liverpool.gov.uk/media/1356742/jsna-report-falls-and-fragility-fractures.pdf>
- 11 Making the Economic Case for Investing in Actions to Prevent or Tackle Loneliness. LSE 2017  
<http://www.lse.ac.uk/business-and-consultancy/consulting/assets/documents/making-the-economic-case-for-investing-in-actions-to-prevent-and-or-tackle-loneliness-a-systematic-review.pdf>
- 12 Clinical signs of dehydration in older people: (School of Medicine, University of EastAnglia & Gateshead NHS Trust)
- 13 Liverpool CCG trial data
- 14 Liverpool CCG trial data
- 15 BBC News: <https://www.bbc.co.uk/news/uk-england-merseyside-38882189>

Any Questions?