Understanding the challenges of adoption and the benefits of the use of digital remote monitoring:

'Baby Boomer generation and the 3rings plug'

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"We each develop a rhythm and a routine in our use of space and in our relationships with the places of our lives that provide a sense of being in place ......"

"We gradually come to wear our environment like a glove, as, with increasing familiarity, it almost literally becomes a part of our persona ......"

"As we grow older or become increasingly frail, we adapt to reduced physical capabilities and changes in our environment in a manner that allows us to continue functioning effectively."

Rowles, G. D. (2000)¹

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¹ Habituation ... The secret to your success is found in your daily routines
Aim: To enable routine monitoring of People with Dementia by Family Carers

The aim was to investigate the use of a 3rings™ plug as a means of maintaining independence for people living alone who have dementia, which would enable a family carer to recognise changes in routine behaviour.
The technology that we used: The "Internet of Things" and the 3rings plug.

It plugs into the wall, then

- A kettle or TV plugs into it
- It monitors the use of the kettle or TV
- If the kettle hasn’t been used during a specific time period, the Family Carer is alerted via email or text
- The Family Carer then gets in touch with their relative to see if there is a problem
- The Family Carer then tells 3rings the reason for the alert e.g. emergency, action needed, no action needed or false alert
- The Family carer then resolves the alert.
Understanding the Patterns

Why is mum making tea in the middle of the night?

The grey area shows your events.

The dots show when the kettle was turned on.
The method we used for the study.

- **Study design**: A non randomised feasibility study over 6 months with background data gathering and surveys.
- **Recruitment**: A sample of people with dementia living alone in the Testbed Region (South Yorkshire) and a Family Carer.
- **Ethics and Informed Consent** gained.
- **Surveys**: The Edmonton Frail Scale; The Zarit Burden Interview; The Short Warwick-Edinburgh Mental Well-being Scale.
- **Analysis**: Statistical analysis of responses to alerts and surveys.
31 People with Dementia and matched family carer recruited

Participants

Barnsley: 3 people
Doncaster: 4 people
Rotherham: 3 people
Sheffield: 21 people

Each person had a family carer who took part. 30 lived in South Yorkshire, and one lived further away.

Alzheimer’s and Westfield recruited
Technology and the "Baby Boomer" Generation

- Baby Boomers were born mid 1940's to mid 1960's
- Many technological changes have happened during Baby Boomers' lifetime
- Baby Boomers believe technology should look good and be value for money
- Technology anxiety is inversely related to technology experience in Baby Boomers
- Access to technology on a trial basis enables users to become familiar with the technology thus increasing experience
Technology Acceptance Model (TAM)  

A systematic review found six factors which influenced technology acceptance by older adults:

1. Usability of technology;
2. Expected benefits and perceived usefulness;
3. Perceived need for technology;
4. Alternatives to technology;
5. Influence of family friends or professional carers;
6. Desire to 'age in place'

We wondered whether these factors had an influence in the acceptance of technology with people in our study.
"It was frustrating when I couldn't get onto the site [but] I am not good with technology. Once I had got to grips with it, and [knowing] I'd got you as a back up ... It's like anything, the more you do it, the better you become at it" FC

"I think if it hadn't been for you setting it up I would have struggled" FC

"[I've found it] really easy, even though I'm a bit of a blockhead with technology" FC
Unobtrusiveness vs Burden

"I had completely forgotten about it" PwD

"Nothing to dislike about it. It's there and it just works. It's unobtrusive. You don't notice it after a couple of days" PwD

"It hasn't made any difference to them at all, and it's not intrusive. It hasn't raised their anxiety at all, and that is important for them and me" FC

Patterns of routine and potential risk

"It's very useful because I can keep track of unusual behaviour and see what the patterns are" FC

"I don't worry about them. I feel they have got more independence without me 'phoning 20 times a day" FC

"From tea time onwards they don't seem to be having a drink" FC
TAM Factors and 3rings plug participants

1. Usability of technology;
2. Expected benefits and perceived usefulness;
3. Perceived need for technology;
4. Alternatives to technology;
5. Influence of family friends or professional carers;
6. Desire to 'age in place'
75% of Baby Boomers competent using the 3rings technology

Common factors

• up to date mobile phones
• appeared confident using them
• appeared familiar using the internet
• regularly used mobile and computer technology at work or home
25% of Family Carers who were Baby Boomers, initially struggled using the technology

Common factors
- phones with older technology which was slow
- did not appear confident using them
- did not appear familiar using the internet on their phones
- difficulty responding to alerts due to using a similar, but incorrect website

Perhaps the expected benefits and perceived usefulness which affects technology acceptance 7 could explain why Baby Boomers who initially struggled with the technology persevered.
Number of Alerts per person, per month
Comparison group for purpose of analysis

• 31 anonymised data sets
• People did not have dementia
• Randomly selected from the 3rings database
• 1 months data for each 3rings plug
Typical Patterns of Alerts

The solid lines represent our study group. The dashed lines represent the comparison group.
Survey Scores for People with Dementia: Pre and Post implementation

Short Warwick-Edinburgh Mental Well-being Scale:
• slight decrease in totals is not statistically significant

Edmonton Frail Scale:
• slight increase in totals is not statistically significant

The surprise was that 13 People with dementia had improved well-being scores.
Survey Scores for Family Carers: Pre and Post implementation

Short Warwick-Edinburgh Mental Well-being Scale:
• slight decrease in totals is not statistically significant

Zarit Burden Interview:
• Slight increase in totals is not statistically significant

The surprise was that 18 FC's levels of burden reduced, 15 FCs well-being scores improved or stayed the same.
Correlations between Well-being and frailty surveys, Well-being and burden surveys

Pre-implementation
• Well-being and Frailty score was correlated (weak to moderate correlation, $r = -0.433$) for People with Dementia.

Post-implementation
• Well-being and Frail scores was correlated (weak to moderate correlation, $r = -0.418$) for People with Dementia
• Well-being and Burden was correlated (moderate correlation, $r = -0.526$) for Family Carers
Changes in Well-being and Frail scores

Person with Dementia
Well-being slightly worse by 4 points
Frailty slightly worse by 2 points

Family Carer
Well-being improved dramatically by 13 points
Zarit score improved dramatically by 14 points
Second Case Study

Changes in Well-being and Frail scores

Person with Dementia
Well-being slightly improved by 2 points
Frailty slightly improved by 1 point

Family Carer
Well-being worse by 4 points
Zarit score worse by 6 points
Question 1: "Has the 3rings plug enabled family carers (who are 'baby boomers') to recognise routine behaviours via digital monitoring"?

Answer 1: The study demonstrates a high level of adoption and acceptance, and the specific use of monitoring and alerts to inform family caring.

Question 2: "What challenges are particular to 'baby boomers' using digital remote monitoring technology"?

Answer 2: Only 25% struggled in our study. This indicates that 1 in 4 may need further support and guidance. The Technology Acceptance Model supports an understanding of what is needed, including a strong motivation to 'age in place', and a strong perceived usefulness, and compensation for increased frailty and associated stress.
Partners in the Study:

<table>
<thead>
<tr>
<th>Who they are:</th>
<th>What they contributed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testbed: Perfect Patient Pathway</td>
<td>Funding</td>
</tr>
<tr>
<td>Westfield Health:</td>
<td>Supply 3rings plugs</td>
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<td>Identified potential participants</td>
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<tr>
<td>Alzheimer's Society:</td>
<td>Identified potential participants</td>
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<td>Age UK:</td>
<td>Identified potential participants</td>
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<td>Sheffield Hallam University (SHU):</td>
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<td>Dr Sally Fowler-Davis</td>
<td>Data set export and collation</td>
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<td>Deborah Barnett MSc</td>
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<td>Dr David Curtis</td>
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<td>Dr John Kelly</td>
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<td>Dr Karen Kilner</td>
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<tr>
<td>Our Steering Group</td>
<td>Advice and guidance about progress</td>
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</tbody>
</table>


