<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>MARIO: Managing active and healthy ageing with use of caring service robots</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author(s)</strong></td>
<td>Casey, Dympna</td>
</tr>
<tr>
<td><strong>Publication Date</strong></td>
<td>2017-10-02</td>
</tr>
<tr>
<td><strong>Publisher</strong></td>
<td>NUI Galway</td>
</tr>
<tr>
<td><strong>Link to publisher's version</strong></td>
<td><a href="https://doi.org/10.13025/S8SP9X">https://doi.org/10.13025/S8SP9X</a></td>
</tr>
<tr>
<td><strong>Item record</strong></td>
<td><a href="http://hdl.handle.net/10379/7024">http://hdl.handle.net/10379/7024</a></td>
</tr>
<tr>
<td><strong>DOI</strong></td>
<td><a href="http://dx.doi.org/10.13025/S8SP9X">http://dx.doi.org/10.13025/S8SP9X</a></td>
</tr>
</tbody>
</table>

Some rights reserved. For more information, please see the item record link above.
Managing Active & Healthy Ageing with Service Robots

MARIO
Alzheimer Europe Berlin 2017
MARIO: Managing active and healthy aging with use of caring service robots

• Aims to address the difficult challenges of loneliness, isolation and dementia in older persons through companion/service robots.

• 10 partners from 6 Countries- France, Italy, Greece, Germany, Uk, Ireland

• 3 pilot sites for the introduction of MARIO robot –
  – Italy (Acute Hospital), UK (Community) & Ireland (Nursing Homes)

• Duration 3 years February 2015- February 2018
Who is Mario?

• A companion robot aiming to help People With Dementia (PWD) battle isolation and loneliness
Why a companion robot?

• No cure yet but
• Psychosocial interventions (PSI’s) - non-pharmacological interventions include behavioural therapies, educational programmes, psychotherapy and social support interventions.
• (PSI) can optimise functioning, promote social connectedness and autonomy; enhance QOL and slow down deterioration

The companion robot MARIO via the use of enabling technologies, provides PSI which focus on promoting social connectedness and reducing isolation.

Why MARIO?

• An iPad and other smart phone technology could offer some of the applications but often may be too complex for most older people with dementia to access and use.
• An iPad is disembodied.
• MARIO is specifically developed and designed with PWD and their carers for use with PWD
• MARIO has
  – An embodied voice which will make it more acceptable
  – an easy-to-use interface so a carer, or family member can personalise it to the PWD’s individual needs and preferences
3 pilot sites

United Kingdom: Stockport -community

Ireland: Galway-Long stay residential care

Italy: San Giovanni- Hospital
Mario’s iterative design process

• Consulted key stakeholders including PWD across all sites
• Identified what PWD need Mario to do for them
• Identified what design elements they felt would make MARIO’s appearance more friendly
Evidence from the literature

Touchscreen technology

• Programs and apps presented on touchscreen devices can be customised to the needs of the users (Astell et al 2014),
• increase socialization, providing memory prompts, facilitate activities, and deliver educative tools (Lim et al 2013; Astell et al 2014)
• Support using the technology is common - person with dementia interacts with the technology in the presence of a clinician/ carer allowing input to be encouraged or shared (Weir et al 2014)
• More use could be made to deliver independent activities for meaningful occupation, entertainment, and fun (Joddrell & Astell 2016)
Evidence from the literature contd.

- **Paro (Zoomorphic - Seal)**
  - used to facilitate therapeutic work with people with dementia

- **Aibo (Zoomorphic – Dog)**
  - found to stimulate more social interaction than a real dog

- **Babyloid (Humanoid)**
  - less acceptability than Paro

- **Giraff (Telepresence robot)**
  - facilitated people with dementia to interact with their family
  - People with dementias emotional response, communication and engagement improved as a result of its use
Influence on MARIO

• The creation of a group of applications including- My Music, My Hobbies, My Memories, and My Family and Friends activated by touch screen or verbal instruction.

• A central UI component developed to provide developers with specific UI patterns in developing their applications
  – Limiting freedom of design to developers
  – Keeping consistent user experience across apps
Change in MARIO’s appearance

Before

After
Challenges considered

- A number of potential challenges with people with more moderate to severe dementia in residential care considered
- Would the person with dementia understand MARIO when he spoke?
- Would MARIO understand the person with dementia when they spoke?
- How would the person react to the presence of a companion robot?
- Would the person interact with MARIO using simple apps to accomplish tasks? (listening to music, playing games, reading news headlines)
- Would the person with dementia be able to use the touch screen?
Early acceptability and application testing

- Ethical approval obtained from University Research Ethics Committee (Ireland)
- Informed consent obtained from people with dementia in the first instance and also next of kin
- Process consent also utilized continually checking if participants were happy to continue
Early Results

• Testing conducted over 4 weeks and on average, two interactions, per person, were carried out each week
• 5 people with dementia
  • M=3; F=2; all in 80+ age bracket
  • Moderate to severe dementia
• Most had dementia for previous 3 years
Data collection

- Bespoke questionnaires developed based on expertise of the team, literature and input from the MARIO Ethics and data privacy board & Advisory boards
  - One questionnaire for people with dementia to complete
    - Do you like how MARIO looks?
    - Can you hear MARIO?
    - Which application is your favorite?
  - One observational tool completed by the researcher facilitating the test
    - How involved the participant was in the interactions
    - How they seemed during the interaction experience
    - How long the participant spent with MARIO
Results (Participants)

✓ Liked Mario for the company
✓ Liked his appearance
✓ They would like to use Mario again
✓ No problem reading text on the screen
✓ Especially liked music and playing Simon game
❑ Some difficulties with using the touch screen
Results (Researcher’s observation)

• Timing of repeat prompts to make a choice was too soon for users who were still reading the text on the screen
• Multimodal interaction – screen and verbal instruction- in some cases challenging so tendency to focus on just the touch screen
• Robot voice was accepted
• However limited speech recognition software capacity (especially with long pauses, words mixing, accents etc.)
• Touch screen problems like multi finger touch, holding finger on screen, etc.
Resultant changes to MARIO

- Default timing adjusted to longer period
- Touch only mode added as an option for configuring MARIO
- Devote more time to training and working with people with dementia showing them how to use MARIO
- Change MARIO’s instruction wording from “Touch my screen” to “Tap my screen”
- Multimodal interaction must be carefully adjusted and customised based on stage of dementia
- Speech recognition software needs work
Limitations

• Small sample size
• Presence of researcher may have influenced people with dementias reaction to MARIO
THANK YOU!

Tweet your impressions using #MarioProject

Find out more at http://www.mario-project.eu