



# 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!**

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