Collaborative and Connected Robots for Assisted Living – Intelligent Sensing and Human-Robot Interaction

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Problems with assistive technology

• Difficult to adapt to the changing needs of the person

• Approximately 30% of people abandon use of their assistive technology

• Difficult to personalise

• Difficult to interact with if you have a range of accessibility needs
Ageing is a temporal process

**8 Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

**4 Vulnerable** – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being “slowed up”, and/or being tired during the day.
Multi-morbidities at higher frailty levels

Tag Cloud showing conditions occurring in 20 TSC Customers
Typeface size and weighting represents frequency of occurrence
Supporting Independent Living and Active Ageing
Addressing the Effects of Ageing in a Collaborative and Positive Manner

- Memory and Cognitive Decline
- Sensory and Physical Impairments
- Lack of Motivation due to Ill Health
- Medication Reminders and Guidance
- Nutrition, Hydration, Mobility and Dressing Support
- Exercise and Rehabilitation Coaching

By 2020 we will face a shortage of up to 2 million health and social care workers across Europe
Assistive Robotics Technology

Socially Assistive

Physically Assistive
Potential for Cognitive Support
Connected Assistive Technologies – Ambient Assisted Living Architecture

- Health and Social Care Hub
- Smart Home Hub
- Open Ecology of Smart Devices and IoT
- 3rd Party Service Providers
- Community Care Providers
- Risk Stratification
- Middleware AI Services Integrating Data
- Primary Care Providers
- Hospital Record Systems

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Learning Patterns of Activity


IOT Connected
Developing assistive robots with contextual intelligence

- Leveraging existing smart home technologies
- Real-time response to sensors linked to a dynamic knowledge base

Hello,
Remember to …..
A Connected and Collaborative Socially Assistive Robot
Ambient Assisted Living Ecosystem

Cloud-based Services for Carers, Medical Experts, Relatives, Service Providers

Wireless sensors in the physical environment

Smart Home Automation and Communication

Physically and Socially Assistive Robots

Smart devices for monitoring heart rate, breathing, balance and temperature

Ambient Displays
Intelligent and multimodal support
Efficient visualisation of the information for care providers -

How “busy” has Alice been in the last 9 hours?
Telepresence Robots for Remote Visits and Support

1. Access for specialists or care staff to call in remotely
2. Move around the service user’s home
3. Utilise past and present information regarding health and well-being to support consultation
What are the challenges?

- Achieving Safety and Reliability - Standards
- User Acceptance – Embodiment and Usability
- Staying Relevant - Personalisation and Adaptation to Changing Needs
- Sustainability of Solutions – Cost and Maintainability (Design for Manufacturing)
- Integration with Healthcare Infrastructures
- Ownership, Liability and Ethics
Out of the lab and into the real world

Who are the gatekeepers?
How will these technologies affect existing care pathways?
What are the likely regulatory issues?
What are the likely legal issues?
What are the organisational constraints?
What logistic barriers are we likely to face?
What skills will the future care workforce need?
What social issues might emerge?
What ethical issues need to be considered?