The ageing population: can engineering support healthcare in later life?
Projected increase in the UK population 2008-2033

2008
Extra by 2033

Government Actuary’s Department
Increase in hospital admissions from 2000/01 to 2010/11

NHS – The Information Centre
Cost of providing healthcare for older people

Nearly 3/4 social services expenditure

Nearly 2/3 hospital expenditure
• Support for fallers
• Support for people with dementia
• Support for stroke survivors
Support for fallers
• Falls represent the most frequent and serious type of accident in the over 65s

• About a third of people in the age group estimated to fall at least once a year

• Between 5-10% of these will sustain a serious injury

• These accidents result in around 650,000 A&E attendances and 200,000 hospital admissions a year

• The healthcare cost approaches £1 billion annually
Annual cost of dementia to UK economy

- Dementia: £25 billions
- Cancer: £15 billions
- Heart disease: £10 billions
- Stroke: £5 billions
Autonomous smart homes

Communication network

Sensors

Support devices

Care staff or outside help
Emulating carer actions

**Carer detects problem**

- Carer prompts user to act
  - If no response, carer intervenes
    - Carer reassures user

**Sensors detect problem**

- Home prompts user to act
  - If no response, home intervenes
    - Home reassures user
Communication bus

PIR

Reminder unit

Level sensor

Tap sensors and water control
Night time support

Lighting control

Movement sensing

Toilet support

Support in kitchen

General prompts and reminders

Appliance usage

Support in bathroom

Wandering support

Restless at night

Gone outside

Had to turn cooker off

Call for help
Before turn on

Days

Hours
sleep

Before turn on
User behaviour

- Get out of bed at night
- Wander for a while
- Wander for >10 minutes
- Get back into bed
- Still wandering after 15 mins

House reaction

- Light fade on
  - “I’ve turned the toilet light on for you dad”
- No action
- “You should go back to bed now dad”
- Light fades off after 3 mins
- Care staff alerted

- Bed occupancy sensor
- PIR
- PIR
- Bed occupancy sensor
- PIR
After turn on
Support for stroke survivors
• 150,000 cases per year in UK
• Most cases over 65
• 3rd most common cause of death after cancer and heart disease
• Occupy around 25% of long term hospital beds
GENTLE/s
Funded by European Commission
Scientific co-ordinator - University of Reading
University of Bath
Sheffield Hallam University
University of Essex
University of Ulster
The Stroke Association

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EPSRC EQUAL programme
User-led design

Understanding user needs

Guiding the design process
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