Appendices for
Designing online social interaction for and with older people

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1 Appendix for chapter 2

1.1 Databases, journals and centres of research addressing older people and design

Databases such as ACM digital library, the Arts & Humanities Citation Index, IEEE explore, summon and the web of science were the first port of call, followed by web based sources such as Google scholar and EU commission dissemination portal.

In the early stages of my research I found these journals relevant: ACM Transaction on Computer-Human Interaction, Ageing and Society, Behaviour and Information Technology, Computers in Human Behavior, Educational Gerontology, Experimental Aging Research, Gerontechnology, Human Factors: The Journal of the Human Factors and Ergonomics Society, Interacting with Computers, International Journal of Human-Computer Studies, Journal of Aging Studies, Journal of Applied Gerontology, Journal of Technology in Human Services, Telematics and Informatics, The Gerontologist, Universal Access in Information Society.

From the library I borrowed relevant books and handbooks in disciplines such as psychology and sociology in order to get an improved overview of the topic of older people (Harwood, 2007; Johnson, Bengtson, Coleman, & Kirkwood, 2005; Tinker, 1997; Ziegler, 1992). In 2008 I considered the centres for (systems) design research and research with older people at:

University of Dundee (Alan Newell, Vicki Hanson), York University (Andrew Monk), The University of Sheffield (Alan Walker), City University (Panayotis Zaphiris), Oxford Brookes University (Mary Zajicek), Surrey University (David Froehlich), Goldsmith College (Bill Gaver), RCA Helen Hamlyn Centre for design (Jeremy Meyerson), University of Cambridge (Joy Goodman, Clarkson, Roger Coleman).

In America CREATE (Centre for Research and Education on Aging) was leading. CREATE consisted of collaboration with the Georgia Institute of Technology (Wendy A. Rogers, Arthur D. Fisk, J. Sharit, N. Charness) and University of Miami (Sara J. Czaja).

During my PhD journey I also found that it was more effective to follow certain journals and specific authors rather than working with Zetoc alerts based on keywords.

Now having arrived at the end of my PhD journey I place my research into the fields of interaction design, design research, HCI and participatory research. Whilst I still review a significant number of the journals as listed above, key journals such as Design Issues, Design Studies, CoDesign, Artifact and MIS quarterly need to be added. Further relevant resources are the PDC conference proceedings website (for PD projects), interaction-design.org (useful resource and discussions on interaction design), research gate and academia.eu (to find specific academics and their papers), the PhD design discussion list (on design research related issues), Design Research Society Newsletter (trends in design research), the Age Platform Europe (EU wide strategies and projects addressing 'age'), the age action alliance.org (to find relevant topics & organisations), Age UK reports (reports e.g. digital inclusion reviews) and the British Society for Gerontology (BSG) newsletter (to follow issues addressed within gerontology and sociology).

In regards, to centres of research (and this list is by no means complete, but to provide a brief overview) I now include Bath University and Designability (Richard Orpwood / Helen Boyd), FieldLabs Eindhoven (Tilde Bekker), Swedish interactive institute (e.g. Daniel Fallman), The Danish Design School (Eva Brandt, Thomas Binder), IT University of Copenhagen (Tomas Sokoler), CultureLab (Patrick Olivier, Stephen Lindsay, John Vines, Peter Wright) and Sheffield Hallam University (Andrew Dearden, Helena Sustar). In the gerontology world there are for instance very active collaborative research centres at the Open University's health and social care department (Sheila Pearce), Swansea University's centre for innovative ageing (Judith Philips), Manchester Institute for Collaborative Research on Ageing (Chris Philipson), Lancaster's Centre for Ageing Research (Christine Milligan), Kings College's Institute for Gerontology (Anthea Tinker) and Oxford's Institute for Ageing (Sarah Harper).

1.1.1 Physical abilities

In regards to physical abilities our motor skills and mobility change insofar that we become less coordinated, lose flexibility and become decreasingly mobile

(Czaja, 2003 p.3). A large number of older adults are affected by arthritis and Parkinson's disease, which can result in some older adults being wheel chair bound.

For adults over 65 years, a reduction in coordination and mobility can mean that they have trouble operating the mouse or pressing keys when using the computer. Being connected to the Internet, however, can be an invaluable information and communication resource for people who are unable to leave the house (Newell, Dickinson, & Smith, 2006).

1.1.2 Vision

In 2009 the Royal National Institute for the Blind (RNIB) in the UK estimated that 15.8% of people aged 65 to 74 years, 18.7% of people aged 75-84 years and 45.8% of people over 85 years are affected by eyesight decline that significantly affects daily living (Lawton Henry, Abou-Zahra, & Arch, 2009).

Eyesight decline can include (Fisk, Rogers, Charness, Czaja, & Sharit, 2009):

- Loss of peripheral vision
- Decreasing ability to focus on near objects
- Pupil shrinkage (which means the person needs more light to see)
- Changes in colour perception and contrast sensitivity - for example, it gets harder to distinguish black from dark blue (Stuart-Hamilton, 2006)

Eyesight decline means that older people can have difficulties reading from the screen, for example when the text is small, the light too dim or the colour contrast too poor.

1.1.3 Hearing

Hearing difficulties can occur for various reasons and environmental factors of noisiness and previous exposure to loud noise play an important role. In 2009 Lawton Henry estimated the percentages of the older UK population who experience moderate to profound deafness as 18.8% of people aged 61 to 80 years and 74.7% of people over 81 years (Lawton Henry et al., 2009).

With the rise of severe hearing difficulties people find it more difficult to interact socially and therefore could become withdrawn and might experience a loss of self-esteem (Hamilton 2006, p.38).

It seems that there might be an opportunity for older people to use social media sites[1] that don't rely on hearing information in order to interact with others socially. I have however not managed to find any statistics on whether those adults over 65 years who use social media sites are more likely to have a hearing impairment than other users.

1.1.4 Cognitive abilities

With growing older we get slower in reaction times and accessing our short-term memory, but our long-term memory usually still functions well (Stuart-Hamilton, 2006). Older adults frequently perform worse in IQ tests than young adults, but it depends on how the IQ test is designed and what is actually measured (Fisk et al., 2009). Another way of looking at intelligence is by applying fluid and crystallised intelligence theory. Crystallized intelligence is the ability to use acquired knowledge, skills and experience. Fluid intelligence is the ability to think logically and solve problems in new situations, independent of previously acquired knowledge. An older adult is believed to be strong in crystallized intelligence and can practice the use of fluid intelligence (P. B. Baltes, Sowarka, & Kliegl, 1989).

Moreover, adults over 75 years of age are more likely to develop dementia (Stuart-Hamilton, 2006). Lawton Henry estimates the prevalence rates of dementia at 1.4% for people between age of 65-69 years, rising to 23.6% for people over 85 years (Lawton Henry et al., 2009).

However, not all older adults will have dementia. Some might experience mild cognitive impairment (MCI) or subjective memory loss. Common characteristics of MCI are (ibid.):

- Having trouble remembering the names of people you've met recently
- Difficulty remembering the flow of a conversation
- A greater likeliness to misplace things

[1] I define what I mean with social media sites in Thesis chapter 2.3.3.

The cognitive impairments of an older adult are likely to affect their computer use or the use of other digital devices. The interfaces can be too complex and too varied in order to remember the steps required to achieve their goal. For example, the navigation of a website can be too complicated and users can get lost on the site.

1.1.5 Older people and disabilities

According to Newell approximately 50% of people over 65 years have a serious disability (Newell 2006 p.4). However, disability has no 'scientific' or commonly agreed definition (Pfeiffer 1993; Langdon & Thimbleby 2010). A major problem lies in the confusion over terminology.

The International Classification of Impairment, Disabilities and Handicaps (ICIDH) defines disability as "any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being" (cited in: Hill Country Disabled Group n.d.).

Results of the survey of disability in Great Britain (1985 - 1988) showed that for private households musculo-skeletal complaints were the highest in proportion, i.e. arthritis, followed by hearing and visual impairments and diseases of the circulatory system. For those living in communal housing, cognitive impairment, especially senile dementia was mentioned most often. The majority of adults, almost all of those living in communal housing, had more than one type of disability (Martin et al. 1988).

The Disability follow-up survey (1996/97) updated the findings from the survey of disability in Great Britain. They confirmed the sharp rise in sensory capability loss (vision & hearing) for those over 50 years old. Those over 75 years old were five times more likely to experience cognitive capability loss and ten times more likely to experience motion capability loss than people age 16-49 (Keates & Clarkson, 2003 p99ff).

However, it remains difficult to establish the exact numbers of older people with impairments, since affected individuals may not always be aware of their diminishing capability (e.g. hearing loss) and find ways to work around it (e.g. turn up the volume of their TV) before they accept that they can't do something anymore (McCreadie & Tinker, 2005).

2 Appendix for chapter 3

2.1 Early ideas for the modified CDR model

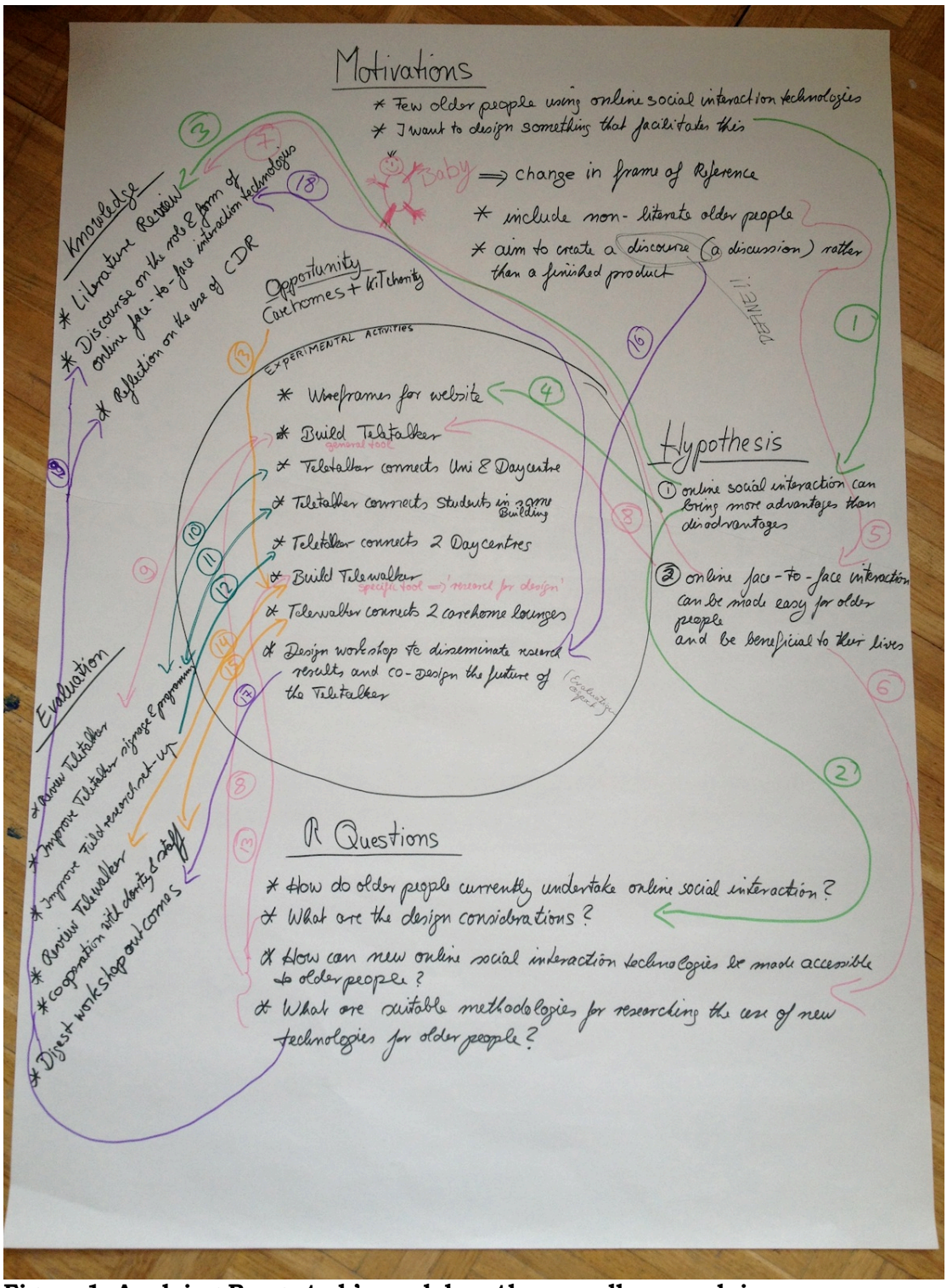

Figure 1: Applying Bang et al.'s model on the overall research journey

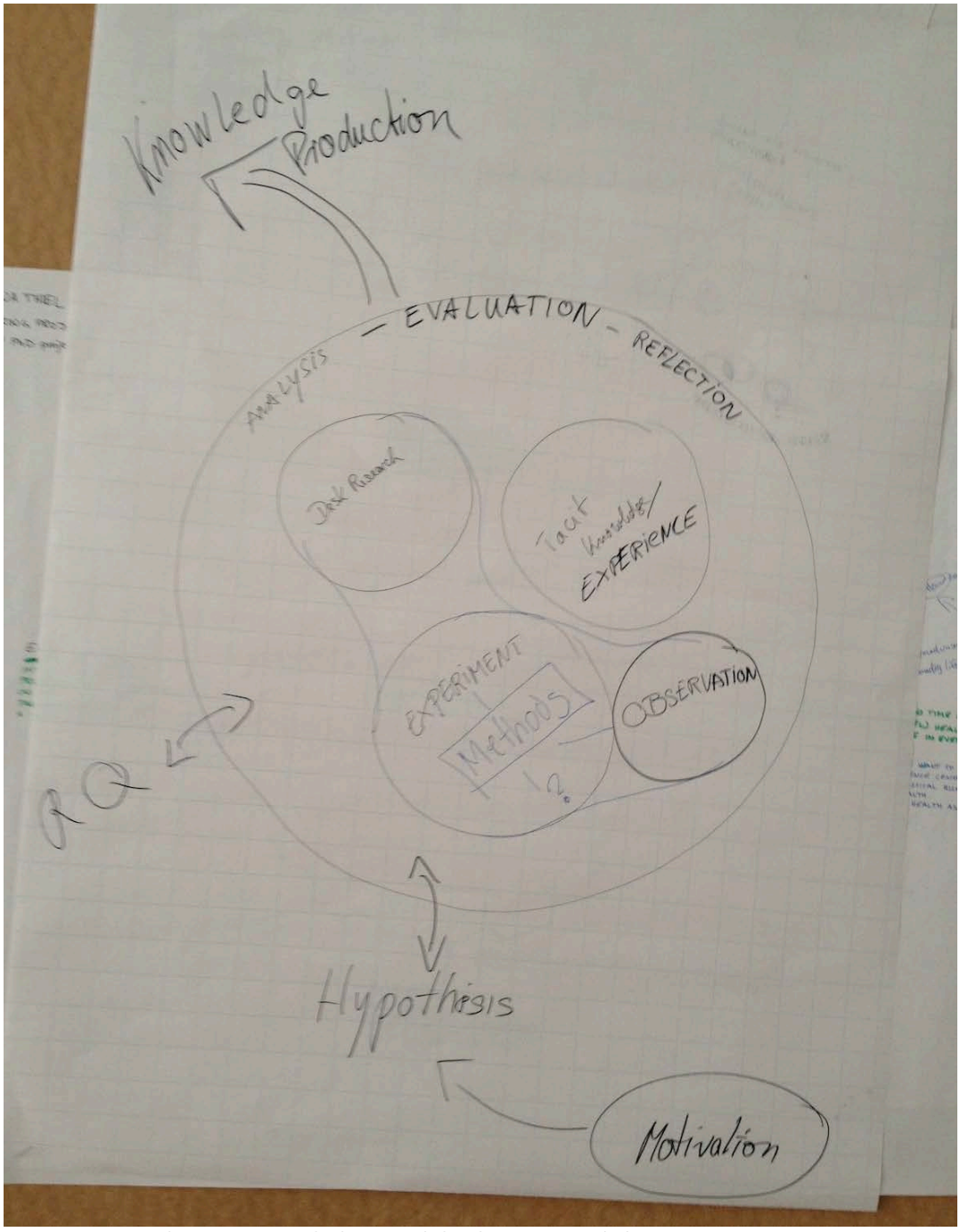

Figure 2: Early version of the modified CDR model

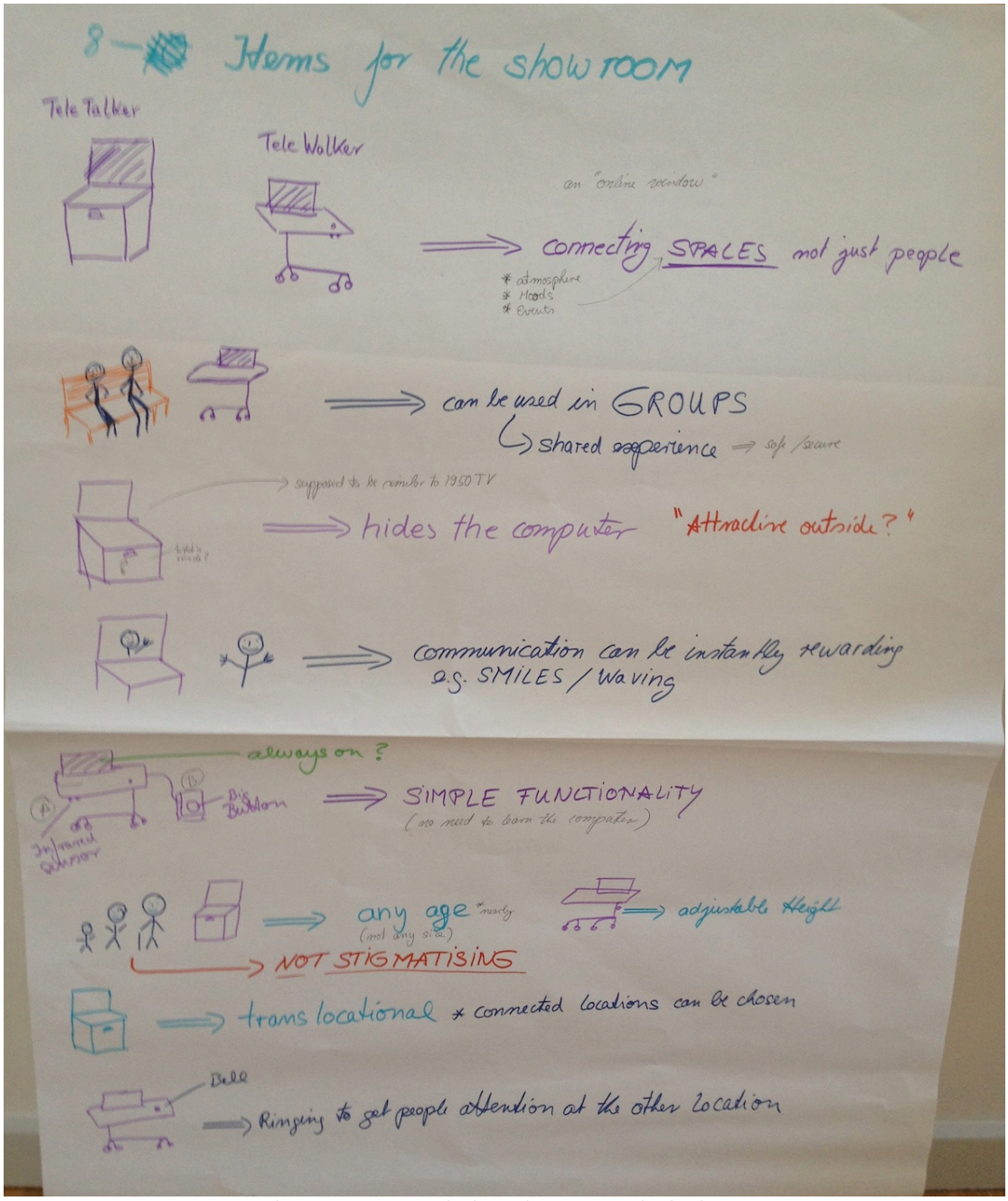

Figure 3: Reviewing the TT research for the extended showroom

3 Appendix for chapter 5

3.1 Situation analysis: literature review

3.1.1 Research around older people in HCI

Since my design interest was around older people being "online" that assumed the involvement of a bespoke system or the Internet, it meant that I focused in particular on HCI and Interaction design literature.

Literature research in 2009 using the terms "older people" or "older users" on the ACM (Association of Computing Machinery) database (including the ACM guide to computing literature) produced few results that appeared to be relevant to my research interests[2].

The majority of research projects involving the design of technology addressed older people from the 'impairment compensating' point of view and provided general guidelines (Fisk et al., 2009; Zaphiris, Ghiawadwala, & Mughal, 2005) or investigations into specialised input devices (Czaja, 2003; Hollinworth, 2009; Zajicek, 2001). There was literature around older people's learning styles when acquiring computer skills (Graf, Li, & Mcgrenere, 2005) or more to the point the lack of interest in adopting the computer (Carpenter & Buday, 2007; Morris, Goodman, & Brading, 2006; Selwyn, Gorard, Furlong, & Madden, 2003). A useful overview of research related to older people's computer use is provided in Wagner et al. on page 872 (Wagner, Hassanein, & Head, 2010).

With the 3rd wave in HCI the focus shifted towards ubiquitous and pervasive computing incorporated into the human surroundings (Carroll, 2013). A number of research projects in HCI and interaction design addressed elderly people with cognitive impairment or living in care homes with ambient, ubiquitous and assisted design solutions. These research projects ranged from smart homes

[2] While writing this thesis I have reproduced the search on the ACM database by applying the time period filter. In 2009 the ACM database (including the guide) had a total of 1,682,932 entries. When searching for the terms "older users" it produced 13,033 results. At the point of writing ACM database (including the guide) has a total of 2,228,983 entries, which means it had an increase of a third of entries in the last five years. Repeating the search now it produces 24,190 results, which indicates the research outputs involving older users have nearly doubled in the last 5 years. This has possibly to do with research programs such as the NDA (see thesis chapter 2.1.3) have come to an end and are now disseminating findings or as Wagner et al. describe with the ageing researchers who are now interested in this topic.

(Perry, Dowdall, Lines, & Hone, 2004), to mobile phone applications (Massimi, Baecker, & Wu, 2007; Mikkonen, Väyrynen, Ikonen, & Heikkilä, 2002), to virtual gardens for emotional interaction (Sustar & Zaphiris, 2007).

EU's Ambient assisted living joint programme has funded since 2008 a considerable amount of research exploring technological solutions for health care and ICT in support for the notion of ageing well (AAL, 2008).

The majority of the research was based on user centred design processes with varying degrees of involvement by older people in the ideation as well as in the evaluating activities. The methods employed ranged from focus groups, in-depth interviews, persona creation and user feedback on the prototypes. The sensor-based smart homes acted as research labs to conduct experiments.

All these research projects demonstrated the complexity of aspects that needed to be considered when designing for such a diverse group. It became apparent that research and designs were strongly context dependent (location, user group, application, technology) and that there was never a one fits all solution when designing for older people.

The projects also brought out that assumptions and expectations around technology use and acceptance needed to be held in measured ways and that even a simple form of interaction such as choosing a button to select a meal can be a challenging task for an elderly person (Häikiö et al., 2007).

The Georgia Institute of Technology's Centre for Research and Education on Aging (CREATE) was a leading research centre in 2009 and dissaminated a number of projects supporting aging in place (Jones, Winegarden, & Rogers, 2004). Their project ranged from communication systems (e.g. Jitterbug mobile phone), memory aids (e.g. the memory mirror as medication reminder) to life enhancing systems (e.g. the digital family portrait). Jones et. al emphasied that the needs of older people as well as their peceptions had to be understood and researched from a multi-disciplinary perspective.

The aesthetics of the technology also played an important role in technology acceptance by older people.

3.1.2 From user centred to *inclusive design*

UCD had become the norm when developing new systems and involvement of the end user was promoted (Thimbleby, 2008). As highlighted in the section above

UCD entailed a range of methods for user participation, from direct involvement with users (e.g. user interviews, focus groups, usability evaluations), to mediated and represented user involvement (personas, marketing profiles, data usage trends). For a useful overview of design methods see Hanington on page 13 (Hanington, 2003).

Whilst UCD placed the end user in the middle of the design process, inclusive design increased the notion of the user to 'the receivers of the designs' to the widest audience possible.

Inclusive design has been an expression of the "international trend towards the integration of older and disabled people in the mainstream of society" (John Clarkson & Coleman, 2013 p.1). Inclusive design is also known as "Design for all" in other parts of Europe and in America as "Universal design", but for this thesis I use the term *inclusive design*.

In 1994 Coleman at the RCA introduced the term *inclusive design* academically.

> *"Inclusive Design is neither a new genre of design, nor a separate specialism. It is a general approach to designing in which designers ensure that their products and services address the needs of the widest possible audience, irrespective of age or ability." (John Clarkson & Coleman, 2013, p.1)*

This approach did not imply that always one product or solution was the best outcome, but could mean that a genealogy of products might be the result when considering the widest possible audience.

Inclusive design has become a guiding standard for the W3C consortium, which promotes the accessible the development of websites providing access to public information, goods and services. The W3C's web content and accessibility principles and guidelines are described in section 3.1.5 (W3C Web Accessibility Initiative, 2014) (ANEC, 2014a), alongside with North Carolina's State Universities principles for Universal Design and the commission for Architecture and the built environment (CABE) principles for the built environment (Flechter, 2006, p.7ff).

These principles are a useful reminder for the designer (and other people involved in the process) to consider a larger and diverse audience. However, the challenge lies with adhering to those principles depending on the specific development context and its constraints.

While inclusive design principles have been around since the mid 90s and resources and tools have been offered such as the population cube in order to calculate 'design exclusion' (Clarkson, Coleman, Keates, & Lebbon, 2003), not many previous or current design projects explicitly refer to being based on inclusive design principles[3].

This might be because designers nowadays have experienced greater awareness around accessibility issues during their education and might consider inclusivity as 'standard' in their design thinking without labelling it that way. Other reasons might be, as discussed in the paper by Lee et al., issues around measuring the outcomes or successes of inclusive design, issues around educating the principles correctly and tensions around understanding inclusive design as a problem solving or process-focussed activity (Lee & Denny Ho, 2010).

3.1.3 Ethnographic and theatrical approaches for *inclusive design*

Dundee University was particularly active in exploring novel approaches for technology design for and with older people (Dickinson & Gregor, 2006; Goodman & Syme, 2003; Hanson, 2008; Newell et al., 2006). Under the framework of *user sensitive inclusive design* (Newell, Gregor, Morgan, Pullin, & Macaulay, 2010) they used ethnography and theatrical approaches such as the *forum theatre* (Rice, Newell, & Morgan, 2007) in order to gain insights from and active involvement by older people. The *forum theatre* meant that situations seen as challenging in an older person's life were acted out by actors and this "play-back" invited for discussion.

Similarly, in industry Intel's Digital health group conducted research for the design of technology for older people with cognitive impairment. They used a range of methods (usability studies, ethnography) in order to gain feedback from their target audience including the use of over-emphasised dramatic scenarios (*focus troupe*) to elicit reactions to concepts (Lundell & Morris, 2006). The over-emphasisation was important since it begged for reactions by the participants who might not otherwise engage with the ideas.

[3] A search on the term "inclusive design" in the ACM database in Spring 2014 does not return any current design projects based on inclusive design principles. Instead it produces a number of results where the effective implementation and education as well as the business case for inclusive design is discussed.

In northern Europe ethnographic approaches (Sokoler & Svensson, 2007) were employed to gain insights into older people's lifestyles and places of social interaction. Sokoler and Svensson found that much social interaction was integrated in daily activities such as gardening or shopping. They called for *ambiguity* in design in order to avoid stigmatisation of older people as lonely or frail (Sokoler & Svensson, 2007). So rather than being over-explicit they worked with not fully explained concepts in order to invite people's reaction. They subsequently developed design concepts that aimed at older people's needs such as social TV *with buddy mode* (Svensson, Sokoler, & Svensson, 2008), which could be used by any TV viewer of any age.

3.1.4 Tools for accessible website design

In order to create an accessible website with a positive user experience, there are several helpful tools, standards, best practice and guidelines. There are standards such as the usability standard ISO 13407 for Human-centred design process for interactive systems (ISO, n.d.), which has been superseded by ISO 9241-210, standard for Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems in order to clarify the role of iteration, Human centred design principles and design activities (ISO, 2010).

The World Wide Web Consortium (W3C) offers web accessibility and web content guidelines on their website to ensure websites are developed inclusively (W3C Web Accessibility Initiative, n.d.). Zaphiris et al. issued 'improved' guidelines by reviewing them empirically with a card sorting exercise (Zaphiris et al., 2005).

The inclusive design principles and examples of best practice are offered by Clarkson et al. (Clarkson et al., 2003; Keates & Clarkson, 2003). The inclusive design toolkit developed by inclusive design researchers at Cambridge University provides information on user capabilities, tools such as simulators for colour-blindness, inclusive guidelines and further information on how to apply the approach (University of Cambridge, 2013).

The RNIB offered the Tiresias website, containing a repository with information to guide developers and designers for accessible product design (RNIB, 2009)[4].

[4] However, since October 2009 the content of the website has not been updated due to lack of resources at RNIB.

Although guidelines are useful they do not always represent the reality of how different people use technology in different contexts. For example, Sayago et al. found contradictions for the WCAG 2.0 guidelines, where the “click here” label was useful for older web users in regards to understanding where they had to click (Sayago, Camacho, & Blat, 2009) but guidelines suggest not using the label since it is more confusing for people using a screen reader.

3.1.5 Inclusive design principles

The following are W3C WAI Design for all principles:

> **“1. Principle: Perceivable** - Information and user interface components must be presentable to users in ways they can perceive.
>
> 1.1 Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
> 1.2 Provide alternatives for time-based media.
> 1.3 Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
> 1.4 Make it easier for users to see and hear content including separating foreground from background.
>
> **2. Principle: Operable -** User interface components and navigation must be operable.
>
> 2.1 Make all functionality available from a keyboard.
> 2.2 Provide users enough time to read and use content.
> 2.3 Do not design content in a way that is known to cause seizures.
> 2.4 Provide ways to help users navigate, find content, and determine where they are.
>
> **3. Principle: Understandable** - Information and the operation of user interface must be understandable
>
> 3.1 Make text content readable and understandable.
> 3.2 Make Web pages appear and operate in predictable ways.
> 3.3 Help users avoid and correct mistakes.
>
> **4. Principle: Robust** - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.
>
> 4.1 Maximize compatibility with current and future user agents, including assistive technologies.”

For CABE’s Inclusive Design (ID) principles I have summarised the principles’ description in brackets (Flechter, 2006):

- ID places people at the heart of the design process (designed spaces as a basis to form strong communities for people)

- ID acknowledges diversity and difference (consider a wide range of people and their needs e.g. wheelchair users, mothers with buggies, people with learning difficulties)
- ID offers choice where a single design solution cannot accommodate all users (high standard for all designed solutions)
- ID provides for flexibility in use (places need to be designed so they can adapt)
- ID provides buildings and environments that are convenient and enjoyable to use for everyone (levels, signage, lighting, visual contrast)

The Centre for Excellence in Universal Design in Dublin lists North Carolina's State Universities principles on their website (The Center for Universal Design, 1997):

Principle 1: Equitable Use
Principle 2: Flexibility in Use
Principle 3: Simple and Intuitive Use
Principle 4: Perceptible Information
Principle 5: Tolerance for Error
Principle 6: Low Physical Effort
Principle 7: Size and Space for Approach and Use

3.2 Early research activities – collecting empirical data

In the period from 2008 to March 2010 various methods were applied to get to know the user group of older people and to understand their world. The methods were informal interviews (Kvale & Brinkmann, 2008), contextual inquiries (Holtzblatt & Beyer, 2013), disclosed observation (Rugg & Petrie, 2006) to creating an online survey (Kumar, 2011; Moser & Kalton, 1971; Oppenheim, 1975) in order ascertain my assumptions and recruit participants for future activities. Contextual inquiries and observation can be understood as forms of immersive and emphatic research (Koskinen, Battarbee, & Mattelmaki, 2003) since not only people's conscious answers and opinions were collected, but also their actions and natural surroundings were observed.

3.2.1 Informal interviews

In May 2008 I conducted informal interviews with 9 people between 62-83 years to gain an insights in their lifestyle, interests, technological capabilites and online activities (if any). These were informal interviews, and the question sheet was only used as a guide. I understood the interview under the metaphor of the traveler, where the researcher "wanders together with" the interviewee in their world (Kvale & Brinkmann, 2008, p.49). A summary of the interviews notes can be found in the section 3.8.

I further spoke with Marie Holdt, a representative from the organisation called Contact-the-Elderly (CtE) and Sarah Read, (CtE) volunteer and designer, who developed a set of reminiscence cards about the introduction of online connectivity into the lives of the oldest old. They both viewed the introduction of a computer (or a web interface) for online connectivity for the elderly as very challenging.

On 11th September 2009 I telephone interviewed Patricia Wright, see section 3.12. Mrs Wright was the care home manager at the care home where 104 year old tweeter Ivy Bean lived. Ivy Bean died on 28th July 2010 age 104 years old and was famous for being the oldest Facebook and Twitter user. By the time of her death she had 56.000 Twitter followers (Trowbridge, 2010).

In Mrs Wright's view it depended very much on the care home management whether new technology was introduced and how involved the residents were.

According to Mrs Wright care home residents had the advantage of staff being around to help them with computer use. In her view, older people who were living alone would find it harder to try out online technologies since they might not have help from a large (and institutionalised) support network.

3.2.2 Designing an online survey

In the latter half of 2009 I had created an online survey in order to explore older people's living circumstances and online behaviour. The responses captured mainly validated my assumptions about online activities and the use of social networking sites (see section 3.9 for my assumptions sheet). It also served the purpose of getting contact details for older participants who would be interested in taking part in further rounds of research when the design activities had started.

I chose to create an online survey over a paper-based survey because I had decided to concentrate on older people who were computer literate. At the time I wanted my research not to be about teaching older people computer literacy skills, but to aim for those who were already online.

The main outcome from the survey was that "not having time" was a frequent answer by older users. I was curious about this answer, considering that the majority of older people were free from constraints of a paid working life. This outcome from the survey led me to investigate further the issue of growing older and having time and this is where I found the socio-emotional selectivity theory applicable (SST), see section 3.2.3.

3.2.3 The socio-emotional selectivity Theory

The socio-emotional selectivity theory (SST) is one of two widely accepted lifespan approaches[5], which look at successful personal development with age and how this determines the person's activities and behaviour.

SST sees the perception of time as fundamental in a person's selection and pursuit of social goals. SST distinguishes between two types of goals: knowledge acquisition and the regulation of emotions.

The assumption is, if there is the perception of having plenty of time, the knowledge acquisition goals are seen as more important, if there is the perception of little

[5] The other theory is the Selective Optimisation with Compensations model (SOC) developed in 1990 by Baltes et al.

time left, the emotional goal, i.e. to make yourself feel good, takes priority (Carstensen, Isaacowitz, & Charles, 1999 p165). According to this theory older adults are more present oriented, less willing to spend their time in unpleasant activities and less interested in investing time in tedious ways for a future goal e.g. learning how to use a computer, when they don't perceive any benefits in doing so (Melenhorst, Rogers, & Bouwhuis, 2006).

Carstensen et al. also point out how the distinction between knowledge acquisition goals and emotional goals is not clear-cut since there is an emotional component to all goal-directed behaviour. However, the theory emphasises how the perception of time is crucial to the motivation for prioritisation of social goals.

I see this theory as a possible explanation on why older users chose not to use websites, where they don't perceive any benefits for signing up or invest time in learning a new technology, when they can achieve the same goal with their current ways.

3.2.4 Observation of a computer class for older learners

Although I had mainly concentrated on the experience, behaviour, attitudes and context of existing older web users, I considered it as also important to have a look at beginner web users.

On 14th January 2010 I sat in the back of the computer class held at Age UK East Finchley for beginner computer user over 65 years old. I observed the teacher interacting with 2 pupils. My notes from the observation can be found in section 3.14.

The main outcomes of this activity were insights into the language and metaphors used by the educator. For example, the URL was described as "a postcode".

I also witnessed the participants' physical struggle using the computer, in particular keyboard and mouse (Newell et al., 2006; Sayago & Blat, 2009) and their attitude towards computers. The wording "necessary evil" brought home how little excitement there was about the technology, but how they saw it as a means to an end.

3.2.5 Contextual inquiry

Going to a person's home has the advantage that the designer can understand the full *work practice* of this person and its context (Holtzblatt & Beyer, 2013). I classify two on my empirical activities as contextual inquiries.

One was a home visit to 74-year old computer user G, in Cambridgeshire on 8th December 2009. The other activity was shadowing Jeremy Morris, chairman of the charity Keeping In Touch (KIT), who introduced an easy to use computer system into care home lounges. The full summary of the two visits can be found in the sections 3.10 and 3.14.

The main insights I gained from the home visit were twofold: firstly, the importance of peer activities in regards to computer uptake and secondly, the 'hidden' social networking features on sites such as *ancestry.com*.

G. took up computer use in his mid 60s, mainly because a friend of his did so too. G. insisted that he had little interest in using Facebook and was only on there to please his grandchildren, who lived in his native Australia. However, being an avid *ancestry.com* user, like some of his friends, he paid the premium subscription level and he used the online instant chat functionality with (unknown) people all over the world in order to find lost relatives and build his family tree.

On 30th March 2010 I met Jeremy Morris at the Wellesley Road, Home for Older People, in North London. I was interested in the KIT system and Jeremy's activities with the care home residents to involve them in the use of the KIT computer system.

It was my first visit to a UK care home for older people and on reflection the memory of this visit remained in my mind longer than any other visit to an elderly person's environment. This had most likely to do with the fact it was a new experience and I had to digest the impressions I gained. At the time the most important insights I gained from Jeremy's behaviour towards the elderly residents. First he checked how the resident felt (e.g. asleep, unwell, comfortable, grumpy or in good spirits), before inviting him / her to the lounge. Jeremy insisted how one cannot **mention** the word "computer" otherwise they would not be interested.

As I was already working on externalising concepts for a website idea, I interpreted the impressions gained from the visit at the time as a confirmation to

concentrate on computer literate older people, but not on those who still needed to learn how to use the computer.

3.3 Early research activities - Reviewing websites and systems aimed at older people

3.3.1 My approach to reviewing

Since my background has been working in usability, user experience and evaluating websites and other systems I reviewed the following websites not with a specific set of heuristic guidelines (Nielsen, 1993), but from the viewpoint of my experience and judgement of what might work and what won't work, considering older users.

Through my professional experience I found guidelines or heuristics useful, when designers or reviewers are inexperienced, in order to provide a baseline to form judgements.

However, in most cases, reviewing with set guidelines (Preece et al., 1994; Rogers, Sharp, & Preece, 2011; Shneiderman, 1997; Smith-Atakan, 2006) still demands for judgement calls and consideration for exceptions. Especially, since websites vary extremely in their proposition, layout, architecture, features, target audiences and integrated functionality.

Reviewing a website while concentrating too closely on the guidelines, may result in not taking in the holistic experience of the user journey. The following section reports on my review of social networking sites and systems aimed at older (beginner) users.

3.3.2 Social networking sites for older people

In 2009 there were two major American social networking sites aimed at older people. At the time of writing this thesis they have ceased to exist. These two websites were: Boomj and Eons.

Figure 4: Screen shot of Boomj taken on 21. Jan 2010

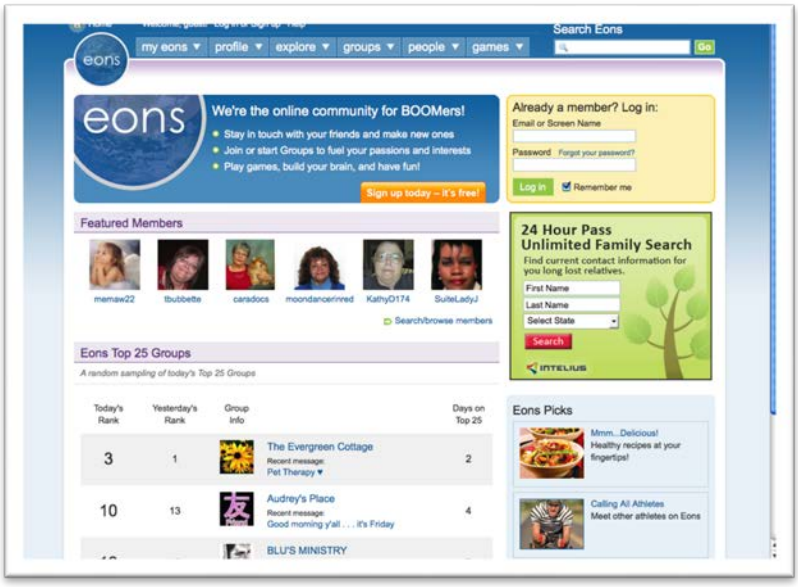

Figure 5: Screen shot of Eons taken on 21. Jan 2010

Boomj and Eons targetted the baby boomers (people born post World War 2 - between 1946-1964). In the UK there was no website (to my knowledge) aimed at baby boomers at the time and a direct comparison was not possible.

The closest website to the American social networking sites was the forum on the Saga website. Saga is a British company providing products (travel packages, magazine) and insurance services for the needs of people over 50 years old (Saga website, 2010).

Figure 6: Screen shot of Saga Zone forum taken on 22. Jan 2010

Looking at the similarities of the 3 screenshots (mainly blue, white and orange colours) it becomes apparent that the design was not too different from other social networking websites or Web 2.0 tools such as the MSN messenger in 2009.

Figure 7: Screen shot of messenger logo and use of MSN messenger in 2009, accessed on 6.3.2014 courtesy by (Mcdonough, 2014)

Nor did these websites appear particularly well-adjusted to the potential needs of the older population. The WCAG guidelines were not closely followed.

For example, none of the sites offered an easy option to increase font sizes. The language employed terminology such as “privacy settings”, “profile”, “blogs”, “chatting”, which was identical with social networking websites aimed at younger

audiences, without offering any additional explanation to what these terms meant[6].

Another example of an unsuccessful UK website that aimed at subscribers based on a minimum age of 50 years was *Heyday*. *Heyday* had been launched in 2007 as a £26 a year subscription-based website and magazine with the aim to rival Saga. However, despite strong PR back up *Heyday* failed to attract enough subscribers, leaving the founders realising that products & services based on age alone did not work (Clews, 2009). They closed the website in March 2009 (Wikipedia, 2014).

3.3.3 Screen interfaces and systems aimed at older people

Another interface and system development aimed at older people were operating systems for PCs with reduced options, which made it easier for novice users to become familiar with computer use.

The most well-known system in the UK was promoted by celebrity Valerie Singleton (a TV presenter born in 1939) in order to entice older people to take up computer use. In November 2009 SimplicITy was launched.

SimplicITy was a computer system, which had an operating system based on Linux. At the time the main interface showed 6 squares in order to access all functions needed. These were: email, browse the web, chat, documents, about me and video tutorials (Greere, 2009).

Figure 8: Screen shot of the SimplicITy hardware and interface, 2009, accessed on 6.03.2014 (Greere, 2009)

[6] In recent years the Saga Zone forum had updated the look and feel by offering more photo realistic imagery. However, on 26th Feb 2013 Saga Zone announced the closure of their social networking forum due to unmanageable offensive and racist comments by members (O'Brien, 2013).

The PC was equipped with monitor, keyboard, speakers, and mouse. The interface has since changed to an envelope offering 5 options to start with.

Figure 9: Screen shot of the SimplicITy interface 2014, accessed on 6.03.2014 (SimplicITy, 2013)

The charity Keeping In Touch (KIT) started in 2009 promoting their computer system, which included a simplified operating system called “Big Screen live” and trialled those systems in care homes. Jeremy had set-up email accounts for the residents, who were willing to take part. In weekly computer sessions he would show the care home residents how to retrieve their email and respond to it.

Figure 10: Big screen live (photo taken on 20.04.2010)

The computer system included a keyboard with larger keys, which helped residents with vision impairments and unfamiliar to keyboards to find the letters to type their messages. Despite this Jeremy had to help residents immensely with the computer use, which meant reading out emails aloud, typing emails for them

and identifying their preferences for video clips or music and to search for these on Youtube.com.

Since my visit in 2010 the number of care homes where KIT offers their services has more than doubled (personal email communication 24.04.2014). In 2013 I joined Jeremy again for several care home visits (see design journey TW in thesis chapter 7). I noted that the previous ambition to teach residents using the KIT system themselves had transformed into a KIT volunteer providing group entertainment by playing music and video clips on Youtube.com in one of the lounges.

3.3.4 Proof of concept – a touch screen as a social networking interface

Another interesting idea was proof of concept by Middlesex's BA Product Design student Ben Arent. He exhibited his prototype of *Jive* at the Middlesex degree show in September 2008 (Arent, 2008). *Jive* was an online connected touch screen system onto which family members were able to place an image – i.e. a friend pass - of the person they wanted to contact with written messages.

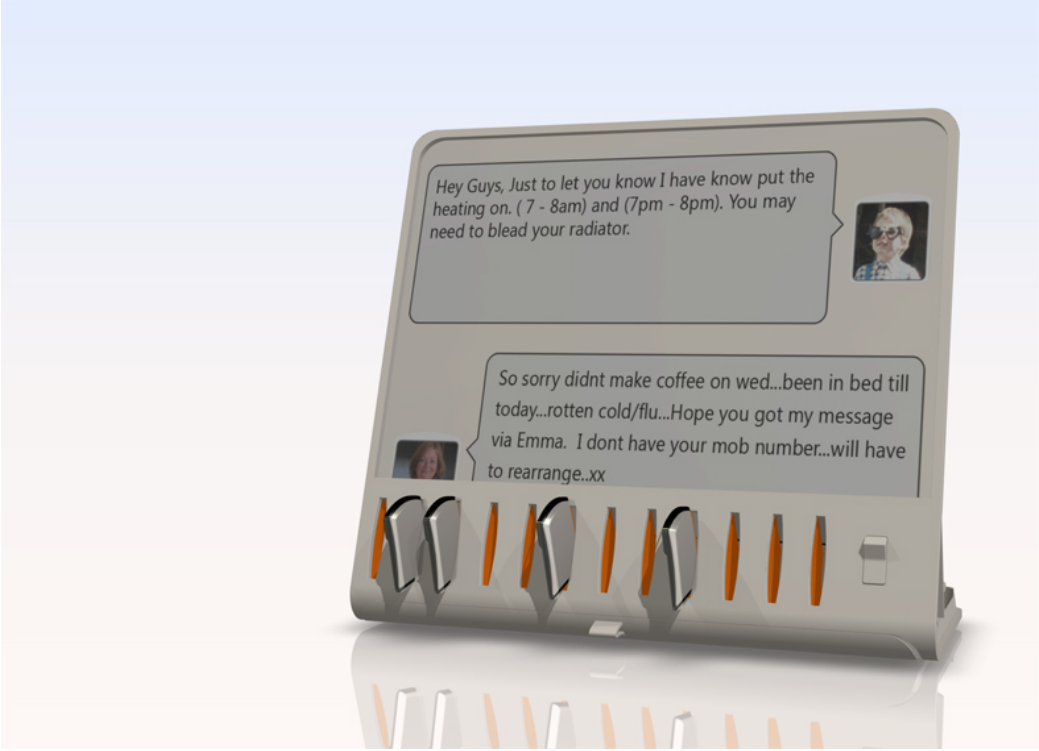

Figure 11: Screen shot of the Jive prototype by Ben Arent (Source:*http://jive.benarent.co.uk/*) Website accessed on 04.April 2010

In 2009 *Jive* was renamed to Bettie (http://www.bett.ie/). It still aimed at older users who were not familiar with computer technology. Bettie's simple display and touch interface was attractive to me, though the size of the keyboard to write messages raised concern on my behalf for those who were not familiar with keyboards.

3.3.5 Conclusions for screen interfaces and systems aimed at older people

The websites in 2009 aiming at online social interaction for older people did not appear to consider the needs of older users in any particular way. The language employed had not been altered, nor additional help or guidance provided. The colour schemes applied did not demonstrate greater colour contrasts, which might help when reading with a vision impairment, than any other website aimed at a young audience. The option to increase the font sizes on the pages was missing.

On the other hand there were computer systems considering beginner and older users by offering specialised interfaces and hard ware. The developed systems can be aligned to assistive technology, which places the user in a specialised category and the acceptance rate might be lower due to the stigmatising qualities.

Also, whilst a novice user might use the SimplicITy interface, the majority of websites she or he might access appear to remain designed without inclusivity in mind. Bettie, in contrast, might be a novel interface and is a stand-alone connectivity system for non-computer literate older people. However, whether the proof of concept will develop into a product that is accepted and not superseded by tablets or large smart phones will remain in question.

3.4 Ideas generation – Synthesis of information, assumptions and imagination

3.4.1 Early ideas

During my enquiry I tried to be as open minded as possible, but it is unavoidable to have ideas for solutions or at least preferences for directions in your head. The relationship between enquiry and solution formation is a dialectical one.

From my first conversations with older people I got ideas for technologies that connected people. The radio, writing letters and the telephone were popular communication channels.

At the time I was 'jokingly' thinking about a type of baby monitor, into which you could talk at each location and be heard at the other (this could have been an early indication for the TT idea later).

From the *Heyday* failure story it became clear that finding mutual interests between people was key and a potential entry point for older people to be involved in technology and social interaction. Popular interests with my interviewees were gardening, TV watching, home making and genealogy.

Another interesting aspect I discovered through my interviewees was the impression that older people did not necessarily want to connect to people in the same age. I searched for the topic of friendship and social relationships in literature.

3.4.2 The mechanics of befriending

Literature does not provide one coherent explanation for the mechanism of friendship and befriending. Amichai-Hamburger et al. provide a description of friendship after reviewing literature in psychology, sociology, philosophy, anthropology and describe friendship as *"a dyadic, co-constructed phenomenon characterized by reciprocity, closeness and intimacy"* (Amichai-Hamburger, Kingsbury, & Schneider, 2013, p.34).

Lester et al. describe the key concept for social relationships as *"based on social support with structural and functional characteristics, which relate to the number and intensity of the social ties as well as to the provision of resources, such as*

advice, physical and emotional support" (Lester, Mead, Graham, Gask, & Reilly, 2011, p.309).

The principles of befriending seemed to work most effectively when people are of similar background and with similar interests, although this does not need to be the case as long as empathy is experienced.

The mixing of age groups can work well, in particular when a befriender has not witnessed the "decline" of the older person. In this respect a new befriender will help the older person to maintain "efforts for a more positive sense of 'self'" through narratives and dialogues (Lester et al., 2011, p.321).

Sarah Read, who I met on 14th September 2008, developed a set of reminiscence cards in order to facilitate communication between the visitor (befriender, friend or family member) and the older person. The *Chatterbox cards* show images from the 1940s and 1950s on A5 size cards and offer a written explanation and questions on the back. The images on the cards aimed to help the older person to reminiscence about the times they grew up in.

3.4.3 Reminiscence as a connection point

Reminiscence has been a tool in therapy and in work with people who have dementia (Coleman, 1986). The reminiscence bump is a phenomenon, which was investigated by Rubin et al. in the late 1980s and 90s (Rubin, Rahhal, & Poon, 1998).

The bump implies that with increased age a person is more likely to remember and account for positive events during the formative years (10-30 years) rather than events during later adulthood. However, reminiscence can have the downside of possibly activating traumatic memories, which an older person rather had forgotten (Coleman, 1986; Glück & Bluck, 2007).

In this respect reminiscence activities would need to be carried out with care and consideration by the visitor or by a professional therapist. Read suggests to use LADDER when using the *Chatterbox cards*. LADDER is an acronym and stands for (Read, 2009):

- **"L**ook directly at the person, notice the colour of their eyes – let them do the talking – and Listen well

- **A**sk questions - assume that they are interesting because they have fascinating stories to tell
- **D**o try not to interrupt their train of thought if you can help it
- **D**on't change the subject before they are ready
- **E**mpathise with their feelings, explore the difference of your experiences, exchange stories, be enthusiastic and enjoy their company
- **R**elate and Respond to them, both verbally and non verbally, with open body language"

I found the LADDER tips (without the cards) useful for my interactions with care home residents in design journey 3 (TW).

3.5 Synthesis: reviewing websites for possible solutions generation

In order to get further inspirations on how online social interaction could be performed under topics such as reminiscence, or the social use of museums' collections I reviewed two existing websites and their propositions. The websites I reviewed were BBC's memoryshare and Creative Spaces.

3.5.1 BBC's memoryshare

I wanted to understand how the BBC had executed the *memoryshare* interface design as a place to connect for memories and whether this might be an incentive worthwhile to go online.

BBC's *memoryshare* was launched in 2007 with the aim to create a living archive with memories from 1900s (Birmingham Post, 2007). Anyone who was registered with bbc.co.uk was able to contribute to the archive. In the description of the archive the BBC explained that:

Memoryshare is of value to people across the UK and internationally, and may be used as a source of programme content for the BBC (BBC, 2007).

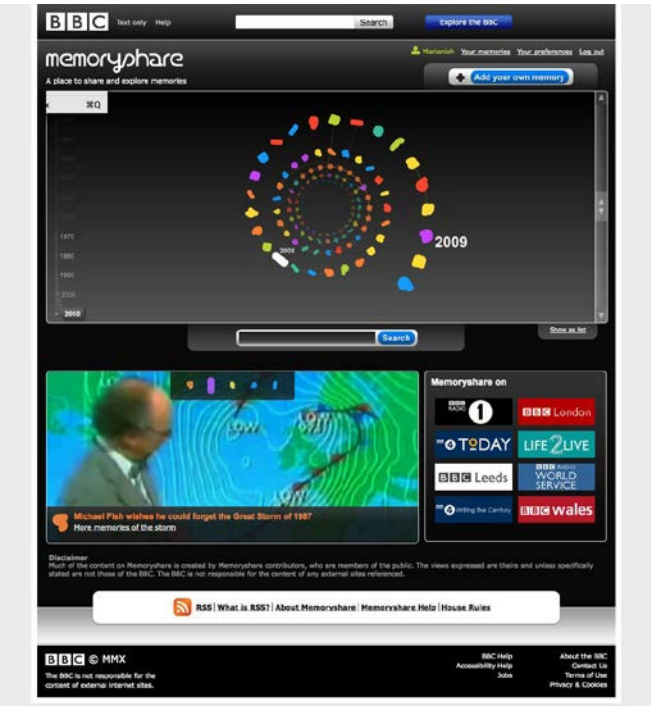

Figure 12: Screen shot - BBC memoryshare entry page, accessed on 23rd Jan 2010 (BBC, 2007)

Most notable about the *memoryshare* tool has been the swirly entry interface in order to travel back into time. This entry point was different to the usual ways of displaying information, although not without drawbacks.

My interest into the memories of the others was not awoken, firstly because it was unclear what to expect when clicking on the coloured dots in the swirl and secondly it depended on the editorial style of the person to trigger an interest (in me). Some entries just read “I was born”. Without knowing who it was it had little value to the site visitor. I added one memory, but was unsure whether I wrote it in the most appropriate style.

The site also offered a list view of the reminiscence wheel, which made access to a specific event easier. However, the functionality could have been easily missed since it was represented by a basic text link underneath the ‘swirl’.

Then, in 2009, there was a ‘small’ amount of memories in the *memoryshare* tool. I judged the concept of the site as a good idea, but felt that the execution left users with little incentive for offering their memories and lacked guidance on how to contribute editorially effectively.

As the site was presented it did not seem to be particularly user-friendly for an older user, who may be less Internet savvy than myself. The BBC brand had the advantage of being a trustworthy institution and in this respect I could imagine

that *memoryshare* had attracted older users who were happy to share their memories publicly[7].

3.5.2 Creative Spaces

In January 2010 I reviewed *Creative Spaces*, a beta website launched in March 2009 by National Museums Online Learning project and which was set up by 9 UK national museums (Coughlan, 2009). *Creative Spaces* aimed to offer an online scrapbook where online communities were created around the interest in a collection. Registered site visitors were able to explore and comment on collections, upload their own content and build and share their collection with others.

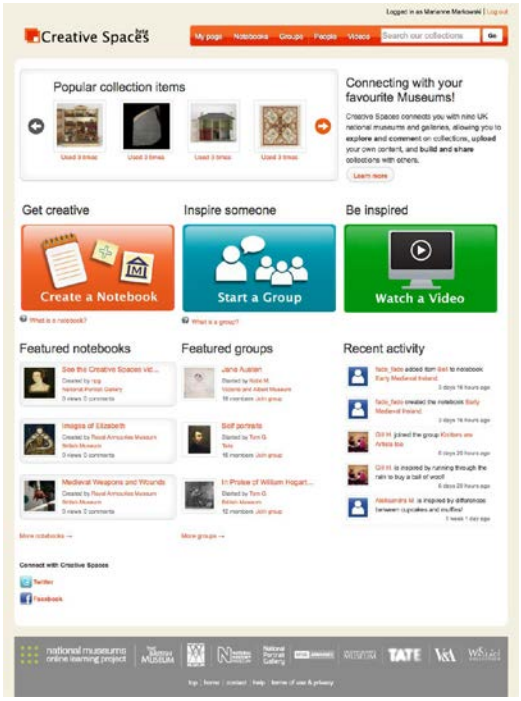

Figure 13: Screen shot - Creative spaces entry page, accessed on 23rd Jan 2010

Creative Spaces had a promising proposition and was of interest to me since I was considering the l use of visual content by Middlesex's Museum of Domestic Design and Architecture (MoDA) for the *Bridge* Idea.

[7] While I am writing this dissertation I have re-visited *memoryshare*. The first noticeable aspect was that I have no easy way of retrieving the memory I entered at the time. In addition, I expected the number of memories stored to have gone up significantly because it has been 5 years since I entered my memory. However, stepping through some of the memories now, not much of major public interest has been added. There were plenty more memories of "I was born", which may be of interest to the person who entered this, but not to the majority BBC website users.

However, my review of the *Creative Spaces* website resulted in the judgement that their site's proposition was not clear enough and the execution too complex. The calls to actions on the pages were not standing out enough. It was unclear how to search for specific collections. Even though the website offered help and guiding video tutorials, these were not obvious to select.

Overall the website was difficult to use by myself, so I could not imagine to be suitable for an older user unfamiliar with online social networking, even when following their instructions. The concept to build your own collections and to share these seemed attractive, but since there was little searchable user generated content[8] at the time, the site felt sparse, empty and uninspiring.

3.5.3 Conclusions

The two websites reviewed dealt with concepts I was exploring for a web solution. They incorporated Web 2.0 social interaction features such as building communities and sharing memories. Both websites demonstrated that it was already a challenge to design an attractive experience for the 'typical' Internet user. In both cases the experience felt disjointed and disorientating rather than memorable, playful and enticing for continued use.

3.6 What is intuition?

Intuition is frequently (mis)understood as a "quick and ready insight" (Merriam-Webster, 2013) and depicted as a light bulb. However, recent design researchers do not subscribe to a 'mystical view' of ideas suddenly appearing (Lawson, 2005; Schoen, 1991; Sennett, 2008). They believe that ideas are actively emerging by conceptual bridging between problem space and solutions space and by working on the problem framing (Cross, 2007).

Literature about intuition does not provide one coherent definition, but indicates that intuition is a modus operandi accessing unconscious thoughts (Dijksterhuis & Nordgren, 2006) and feelings during creative problem solving.

[8] While I am writing this dissertation, I found out that the Creative Spaces website has ceased to exist. I contacted the design company Milo, who originally put the scrapbook platform together in 2008, and learnt that the museums individually were supposed to continue maintaining Creative Spaces. The museums must have struggled with this task, possibly due to financial and resource reasons, since none of them maintained the site.

In Cross's perspective intuition is "*a short hand word for what really happens in design thinking*" (Cross, 2007, p.33). The designer has some form of medium to create external representations such as sketches of the dialogue that is going on inside his brain. Those half formed ideas are considered, revised, developed, rejected and returned to, which is a reasoning process, which not deductive, not inductive, but "*abductive*" (ibid.). Trotto et al. support the view that intuition "*is an indispensible component in design; it is the tool that empowers us to make choices in the iterations of a design process*" (Trotto, Hummels, & Restrepo, 2011, p.2).

Even though there seems to be two camps intuition can be placed in: one sees intuition as a feeling (Dijksterhuis & Nordgren, 2006, Sennett 2008), the other sees intuition as a tool (Cross, 2007; Lawson, 2005; Schoen, 1991; Trotto et al., 2011), I conclude that these two camps do not exclude each other. I understand intuition as the 'voice' of the unconscious to support decision-making that this 'voice' can be accessed and listened to or ignored.

I decided to listen to my intuition rather than continuing with my original approach. I decided to reframe the design space.

3.7 Informal interviews

In the time period of 2008 to 2009 I held 8 semi-structured interviews with people between 63 and 83 years of age. Half of the interviews were conducted over the phone the other half face-to-face.

The questionnaire was created based on my professional experience and key points of interest after reading Coleman's inclusive design handbook, which was concerned with conditions for exclusion (Clarkson et al., 2003). The questionnaire was used as a prompt sheet for the interviews and which was held and filled in by myself.

Not all questions were asked verbatim. Depending on the information gathered during the interview I made a judgement call on which questions to include or not.

3.7.1 Questionnaire for the informal interviews:

Name: ---------- Age: ----------

Gender: ----------
Work (previous and currently)
Family connection
Living alone – with partner or children? Ownership or rented accommodation?

Major illnesses or disability? E.g. depression

Do you drive a car? ----------

Do you use public transport? ----------

What are your daily routines (if you have one)?

What are your interests / hobbies?

How do you keep informed about what's going on in society?

What role does technology play in your life?

What items of technology are you currently using?

Internet
email
computer
telephone
mobile phone
TV
teletext
Interactive TV
Touchscreen kiosk to buy tickets
ATMs
Informational kiosk
Other

Internet in your own words:

Which website do you use regularly? (e.g. yell or tfl)

What technology did you use, but stopped using it and why?

What technology would you like to use, but can't? Why or why not?

Have you heard of social networking sites such as Facebook / MySpace?

Thinking about your situation right now, what are the areas you could imagine where technology could help to improve your life?

Some researchers have established dimensions in regards to the quality of life in old age and social exclusion:

1. Social relationships
2. Cultural activities
3. Civic activities
4. Access to basic services
5. Neighbourhood exclusion
6. Financial products
7. Material goods

Tell me about your social relationships – how do you stay in contact? – How frequently do you meet your friends?

Tell me about cultural activities – What types of activities do you do? How frequently? - If not, why not?

Tell me about your activities as a citizen – how do you feel it?

How do you feel about access to basic services (doctors, dentist, what do you think basic services are…for you) – how do you get there

Your neighbourhood – are you in contact with your neighbours?

How do you feel about the financial product offering? Do you feel that this offering has changed? How about health insurance?

Material goods – how do feel about material goods? Do you think the meaning of material goods has changed for you with age?

On a scale of 1 – 10 – how would you rate the 'quality of (your) life'

If you think about yourself when you were 20years younger and compare this to now – what are the main changes in your life?

What could be done to offer a major improvement in your life?

The following is the write up of the interviews. The names have been changed in order to protect identities.

3.7.2 Ruby – interview at her house

Ruby, 83 years, retired nurse and secretary. Has 2 children (1 lives in Oz), 4 grandchildren (2 in Oz), 1 sister (Germany). She lives alone in her house in Muswell Hill, London. She has no major illnesses.
She holds a drivers licence, but uses public transport only – buses and tube. She has her **routines** to keep her mind active. She gets up when she feels like it, but goes out of the house most days in the afternoon – mainly for shopping. She cleans the house usually on Thursdays or Fridays. In the evening she likes to watch Holby city.
Her interests are gardening and indoor plants – cacti and orchids.
Ruby listens to **LBC** as she likes the talk and watches BBC news.

There **isn't much technology** in her life. She has **no email** as she hasn't got a computer. In her view she doesn't need email since she can phone her daughter with a cheap calling card. She is not interested in interactive TV, but uses teletext from time to time for the TV program and news and weather. She doesn't use ATMs, but gets her money from the counter. She hasn't used any technology to buy tickets, she usually goes to the counter or asks a travel agent. She used to use and love her typewriter, but now she doesn't need to write letters anymore.

She mentioned that she would like to learn using the computer, but thinks that she has to buy one and learn it. She hasn't heard of the UKonline centres.

She has never heard of social networking sites – MySpace / Facebook.

There aren't really areas to improve her life except **"rejuvenation".**

Ruby is part of the **Muswell Hill Haringey pensioners action group** who meets once a month. The group invites guest speakers to talk about relevant issues e.g. further education, writing a will.

Ruby's **friends** are getting less. Several have already died; others are "losing their marbles". Ruby still visits some friends by bus, but it's not frequent. She told the story of a friend, who had problems with her knees and Ruby went to see her. But this friend turned out to be able to go shopping in Muswell Hill, so Ruby was annoyed that she always had to come to her. Ruby also stays in contact with **Christmas cards and phone calls**.

Ruby used to go to **concerts and theatre** with a friend, but now she can't be bothered. She would go, if someone else organises it. But she doesn't like to stay up late and doesn't feel safe getting home in the dark since her handbag could be stolen.
At the institute where she worked as a secretary they used to have social gatherings.

Ruby has lived for the last 50 years in the house. She knows most of her direct **neighbours**, but she doesn't speak with them everyday.
In the past neighbours and herself used to organise street parties where you got to know your neighbours better.

Ruby still votes, but was **never very active as a 'citizen'**. Ruby thinks that services such as doctors and dentist are going downhill. She found the staff terrible and unfriendly. She hasn't noticed any change in financial offerings, but she's also not interested in investing.

Ruby rates her **quality of life as 5 of 10** – the middle, neither marvellous nor bad. She's quite enjoying her life, health and travel. Nothing much has changed for her in the last 20years.

3.7.3 Claus – interview at a friend's house

Claus, 76 years, retired engraver, no children, lives in a sheltered estate (70 people – only one person has a computer) in a rented flat – London Wood Green. He has no major illnesses. Never drove a car, but uses with the "Freedom pass" tube and bus.

Claus gets every morning a call from the warden; they check that people are ok (and alive). His **routines** are: Mondays Lidl and Thursdays Aldi.

He was interested in music, but it's not so important now anymore and he lost his interest in reading fiction. He sees himself as **a loner, but not lonely**. He's fit and independent.

His **interests now** are healing and alternative medicine. He offered other people in the sheltered accommodation to show how reflexology works. He put a note up on the notice board, but had no interest. He wonders why people don't have interest: "*Maybe they don't believe that it works and there is also the language barrier*" (he has lots of Turkish neighbours).

He listens to the radio – **BBC world service** and watches TV news.
He is an active library user. He uses the computer in the library to find books, but doesn't really use a computer. ***"I have technofear!"*** *"I wouldn't buy a computer because of the fear that I wouldn't understand how it works. Technology was simple in the 1950s, maybe if I had been 60 years old."*

Claus knows what emailing is, but **hasn't got an email**. He describes the Internet "a method of communication to everybody from everybody". Thinks there is a danger in making friends over the Internet.
He owns a mobile phone – his niece bought it – he switches it on from time to time and uses it only to call his niece or Liz (a friend). He doesn't give his mobile number out, because he doesn't want to be contacted.
He uses teletext for the weather, but is not interested in interactive TV, or touchscreen kiosks. He doesn't use ATMs (fears people behind him), but goes to the post office. He know how to use a video + DVD recorder.

He has heard of **Facebook** from TV, but is not interested. He'd like to learn the computer if they **offered classes in his house**, as there wouldn't be a need to travel and he doesn't need to be 'on time'.

Social contacts: visits niece or sister, and has brothers in Billericay. He usually calls them and from time to time he visits his brothers to listen to some music. He sees a friend every 3 weeks to talk about healing.

Cultural activities: self-taught, language (German, Japanese, Spanish) + travel + photography, musicals (when he had money), now reading and studying

Citizenship: he votes, he watches the news, he's a shy person, so prefers writing to the council. He doesn't go to demonstration, as he doesn't like crowds.

He doesn't like going out after dark. He has contact to his neighbours, but there is a language barrier. Usually he sees them and waves.
He hasn't got anything to do with financial organisations.

He appreciates the possession of tools, radio and TV. Wouldn't buy items for looks and price.

Claus rates his **quality of life as 7 of 10** – he would like more space and more money. 20 years ago Claus went out more, he had more money, but was also working. "Physically or mentally I'm still like 20 years old ☺".

A major improvement for him: Government to learn the causes of the illness – we suffer a spiritual illness (who we are, identity and our place in the universe) – there are psychic ways of healing.

3.7.4 Jessica – telephone interview

Jessica is 64 years old, married, 4 children, working as a nurse in Devon. She is mobile, independent, working and in good health. She drives a car.

She's been using the computer for the last 20years. She uses the Internet a lot, **emails daily**, has a computer at home and at work. **"*It's the younger generation that helps us*"** - her son Tom needs to come if there is a computer problem.

Jessica uses her mobile phone to talk and to send sms frequently. She doesn't use teletext, but her husband is. She uses ATMs, and touchscreen kiosks. She is not familiar with ipods or can't record with a VCR. She describes herself as **60 – 65% Internet savvy**.
She describes the Internet as a "useful tool for getting info quickly and lots of info". "*You can spent more time on the Internet than you want to, it advances the world*". Also, it should to be treated with caution (gambling online and credit card fraud).

She uses the Internet for information. At work she uses NHS website IMIS. At home: yahoo email, amazon, travel (trainline, book flights, hotels etc.) and banks online.

She has looked at Facebook – but she thinks the site is dangerous for youngster and paedophiles.

She thinks that more computer courses should be run and also advertised in the surgery. She learnt on the Tesco website lots about diabetes- thinks it's useful.

3.7.5 Sharon – interview in a café north London

Sharon 63 years old, no kids, lives alone and works as a visiting tutor. She has no major illnesses. She uses her car and public transport.
She usually gets up at 7am and in the evening she watches TV to unwind and goes to bed around 10:30pm.

Sharon has lots of **different interests**: visual arts, gardening, music, cinema, theatre, pottery. She keeps herself informed and up-to-date by listening to **Radio 4 (most of the time)** and by watching TV, Sunday newspaper, Internet – BBC, Guardian Online and Time Out.

Sharon thinks that 'technology' is good to retrieve information and for instant communication. But she likes to make phone calls.

She **uses the Internet + email for the last 9 years** and perceives herself as an **intermediate user.** She has a friend who she can call who knows about explaining computer and Internet questions and problems in '"easy terms".

She **makes use of online banking**, though she had a 'physing email' and is cautious. She's been using a computer for the last 25 years, but feels that the language on the computer is 'American'.

She has had a mobile phone for the last 20 years and feels comfortable using any mobile phone as she has worked out the structure – though she mainly uses Nokia. She sends a text message at least once a day.
She is not interested in interactive TV and only uses teletext sometimes. She still has 5 analogue channels and knows that she needs to switch to digital, but still unsure about the options.
She is happy using touch screen kiosks to buy tickets or at exhibitions. She also owns **a digital camera**, an ordinary camera, CD player, tape, but not an ipod. She's interested, but explained that she needs a young person explain it to her.

The Internet in her own words: "vast amount of information, but taken over by fraud – you need protective software"

Websites she regularly goes to: Google, ask, BBC schools, Galleries e.g. Tate Gallery, trainline – but she usually calls TFL

She thinks it's useful to have a phone from which you can access the Internet. The moments she finds technology irritating is when something goes wrong with the computer – "the warnings are too technical". Or when she comes back from holiday and she's overwhelmed with mail, email, phone calls.

Websites such as **Facebook or MySpace** don't appeal to her. She finds the young people's **obsession of being constantly available "creepy".** Privacy is important. She might warm to the idea of having a space e.g. mini website with a picture, maybe for someone with family to use.

She can't think of how technology could improve her life. She finds it difficult to keep up. Advertisers don't use an easy language **"What's the difference between a blackberry and an ipod?"**

She stays in contact with her friends by phone and meeting them. Sometimes she sends emails including attachments. She knows her neighbours well. She also knows lots of people through her free-lance work for the local paper.

20 years ago she was living with her partner and working fulltime. A major improvement in her life would be a substantial amount of money ☺

Sharon rates her **quality of life with a 9.**

3.7.6 Miriam – telephone interview

Miriam, 64 years old, retired teaching assistant working with autistic children. Lives with husband who has MS (wheelchair and can only use one hand), no children, in Devon. She has no major illnesses.
She drives a car – public transport is rare. She has **a breakfast and wash routine** with her husband, lunch around 12 – 12:30pm. In the evening they watch TV or visit friends, dinner around 6pm. Thursdays her partner goes to the pub. She's a member of a sewing group.

Her interests are gardening, sewing, knitting, cross-stitch and cooking.
She keeps informed about society by listening **to the radio**, in particular local radio, BBC TV news in the evening, no newspapers.

She **doesn't use the Internet** – if she wants to know anything she goes to a friend, or she has two nieces to ask. She **hasn't got email** – she hasn't got the time to learn. She prefers phone and letters and can't see any benefit to email. Though she still likes to learn to use a computer, but there is no urgency. She has a landline and an old Nokia phone, which she keeps in the car. She has it for emergencies. She sends text messages about 3-4 times a week. She doesn't use the dictionary, but receives messages from her nieces and she proudly learnt the language i.e. how to abbreviate.

She uses sometimes the teletext of their TV for the lottery, local football results, the weather, recipes and the price of oil. She doesn't need interactive TV. Feels that Freeview has too many channels.
She has used a touch screen kiosk in the bank. She doesn't like using ATMs but does so when she has to, she prefers cash back from the supermarket.
She enjoys her **digital camera**, which simply plugs into the TV and the DVD player.
Miriam describes the Internet as a place that provides information on any subject. She has never done any online shopping, but likes the ability to see products. Told the story about a friend ordering online shopping and received far too many potatoes.

Miriam thinks "people use computers too much". There are always problem with computers – viruses and theft. Her brother lost money from the bank account.
Miriam would like to use the Internet if she had the time and the money for the equipment and broadband. She explains that she might be **more attracted to the Internet if the use was incentivised**. She compares this to her Goldfish card where she gets points for Marks&Spencer vouchers. She thinks that with age you're slower in learning and you have to keep on using the things. "Always afraid that I'm doing things wrong."

Miriam has **heard of Facebook and MySpace** and also a story about bullying using MySpace on the TV news**. "Writing a diary for the public to read"** – no idea why people do this.

The mobility shop in Bidingfield where she buys e.g. knife and fork in one is very helpful, but it's normally not technology that improves their life.
Miriam and her husband attend the village's Sunday lunch offers where they know most of the people. Overall, they are **very content with their life**; their strategy is to cope with everyday problems and to take the days as they come.

3.7.7 Max – telephone interview

Max, 64 years, works as a service advisor in a garage. He looks forward to retirement. He has no major illnesses. He lives with his wife in a house in Devon. His 2 adult daughters have moved out. He drives a car.
Currently, he has **no proper routines** except for work; maybe he develops them when he is retired.

He keeps informed about society by scanning the newspaper, TV and listens mainly to the **local radio** in particular for traffic news.

His interests are: Gardening, DIY, Grandchildren, vintage barn engine (1922).
He is comfortable with technology. But **"the older you get, the longer it takes to pick it up."** "What happens if I push the button?" He's more cautious (maybe fearful), thinks the younger more ready to push buttons.

He has broadband and uses the Internet frequently: eBay, amazon, Google, BBC website, does his banking online, used the web to find out about bugs in his garden, trip advisor website (flights + car hire). He **uses the computer daily** at work and at home to stay in contact with his extended family via email.

He learnt to use the computer at work. He taught himself about the Internet (Played around with it) 7-8 years ago. Though **he calls his son in law when he has a virus problem**.

He has a mobile phone, mostly for calls, but he also text a little bit, usually about 2-3 words – he lacks practice.
They have a Freeview box and he uses teletext all the time to see the weather forecast. He has used touch screen kiosk and regularly uses an ATM. He owns a digital camera. Uses **sat nav** when he needs it.

He sees the Internet as a "wonderful way of contacting people".
He has heard of **Facebook and MySpace**, but perceives it as **a "younger person's thing"**. Heard stories about people loosing personal details. He uses FriendsReunited, but hasn't logged in for a while.

20 years ago he didn't use a computer or mobile phone. He feels that it has expanded his knowledge being able to use it now and couldn't manage without it.

He rates **his quality of life with an 8-9**.

3.7.8 Niles – telephone interview

Niles, 75 years old, lives along in his house in Devon. He has 2 daughters living in Hertfordshire. He's retired from working as a technical representative for a French company 20 years ago. He describes himself as in pretty good health – "I do whatever I want whenever I want". He drives a car and uses public transport.
He has **no real routines**, he's available when someone asks for him. Mondays he usually does the garden. He likes going to the supermarket – it's like a social event.

His interests are: Voluntary work in the hospice and gardening to earn some money. He keeps informed about the society by listening **to the radio (local)** from 7am-9pm. He sees the TV as an insult to intelligence, but buys the cheapest TV paper to select the programs he's like to watch and watches only these.

He doesn't have a computer – he doesn't need one, but his daughters have. He **hasn't got an email** address, because people can get hold of him in other ways if they need to. Cost worries him and therefore he doesn't want to get a computer or deal with broadband. He hasn't got a mobile phone, but a landline. He doesn't use teletext, is not interested in interactive TV. He doesn't use ATMs, but goes into the bank. He thinks online banking is too dangerous. He hasn't got a digital camera as he isn't a photographic person.

Tells the story how he went to a petrol station to buy a paper and couldn't buy one because the computer was down. He found this strange.
He doesn't think he is not "a dinosaur", but he **uses "the same for the last 30/40/50 years – mind, legs, pen and paper".**
He's happy receiving postcards. Doesn't think much of the language of texting.

His daughters want him to get a mobile, but he doesn't want one. He's happy though that they have their mobiles, "in particular girls should have one (when coming home late at night)". But he rarely calls them on their mobile.

He sees a **benefit with the Internet** in finding out about price comparisons e.g. cheapest flights, but he doesn't think he needs it.

He wouldn't be tempted by a free computer course – why watching all the pictures on the screen. If he **were housebound**, then he'd get a computer for Tesco home delivery. **"It's necessary then and not a question of motivation."** If he were to learn now how to use the computer, he'd forgotten by the time he'd needs one.

Niles has heard of **Facebook and MySpace,** but thinks it's dangerous and heard scary stories about chat room where youngsters are groomed by paedophiles and suicide packs can be made.
He doesn't want to use those sites and doesn't need to.

Niles thinks that younger people feel bereaved when they don't have a communication device. "Kids call each other when they are only 15 yards away. We're becoming a lazy society, people don't want walk to friends anymore, but walking is good as we need oxygen for the brain."

His friends in Canada and USA have email. He can't see how technology could improve his life – "technology can't plant potatoes". If **he had a business**, then maybe yes.

Niles rates his **quality of life with a 10.**

3.7.9 Lynn – interview at her home

Liz, 62 years lives alone in her house in London – Highbury, is a retired nurse. She has no major illnesses. She has one son who has left home and she rarely has contact. She drives a car and uses public transport – “freedom pass – wonderful”.

Liz is a very **active person**. She has an 8am start, goes dancing 3 times a week. She gives weekly 1 hour structured reading lessons to 2 kids.
She went on 3 computer courses at the Islington adult community college and has signed up for a 5 hours course on how to use a mobile.

Her interests are: Line dancing, gardening, pilates, cinema (once a week).
She keeps informed by listening to **Radio 4,** TV and newspapers on Fri / Sun.

She used a computer for the last 5 years at work. Since a week she’s set up with a computer and email at home. A friend’s son set it up for her. She **has 2 email addresses** since 5 months. She has a landline and a new Nokia 6300 mobile phone with camera and Internet. She just started texting and but is still slow. The computer course has made her confident to try out new technology i.e. the mobile phone.
She has Freeview and occasionally looks at teletext for weather, lottery, football, but is not interested in the red button.
She doesn’t like using ATMs, but does when she has to and is not interested in online banking. She did a course where she used a digital camera and enjoyed it.

The Internet in her words: “ a tool for gaining information and you can find out everything and being able to email people”. She **sends emails with picture** attachments to her brother in New Zeeland.

She **uses regularly** BBC, John Lewis, Yahoo, Google, TFL routeplanner or website when she plans an away day.
She’s not interested in learning how to use an ipod.

After retirement she felt she got her life back. She selected the course and the course gave her the confidence to try out more. “**I have given up the ‘I can’t do this’ attitude”**

Liz has heard of **Facebook and MySpace**, she actually saw a young person’s profile. But she sees no value in it for her. She doesn’t know anyone using it.
She stays in contact with her **friends via the phone** and meets them weekly.
She has a good contact to her neighbours. For her lost of change happened in the last years, she thinks it was a slow revolution, but now she is confident with technology and flat pack furniture (since her husband died she had to do things herself).

She rates her **quality of life with a 9**.

3.7.10 Gill – telephone interview

Gill, 68years, lives alone in London in her own flat. She has one son. She's a 3rdyear PhD student and works as a free-lance journalist. She hasn't got good eyesight and needs to increase the font sizes when working with the computer.
She hasn't got a car, but relies on public transport.

She describes herself as **not very good with technology**. But she uses her laptop (which she got from university sponsored since she has dyslexia), the Internet, email. She has a telephone and a mobile phone, which she uses for calling and texting. She also uses a digital camera.

She went to typing school when she was 16 years old and worked as a journalist. She **had computer lessons** through the dyslexia society only in the last 10 years, when she studied economics.
She doesn't know about wireless technology. She uses PAM (?) and Skype and Craig's list. Websites she visits frequently: Google, Wikipedia, Google news, Athens. She doesn't use an electronic diary. She finds not finding contact info on website very annoying.

Her son has set her up on Facebook. She never goes into it, only when she is prompted. She describes herself as a "passive user". She has enough friends and tries to hide from people.

She has her own website.

She feels that a computer is not visual; it's very complex. But she **loves email** and her laptop and feels that it has made her life easier.

3.8 Survey assumption sheet

- Frequent computer users over 65 use the computer daily and then at least an hour for emailing, those are in regular email contact with at least 10 people
- Others use it less often – likely to be in contact with less than 10 people
- People over 65years use email, website for travel info and other info. Some for banking, little for picture sharing and or music download.
- Only few people over 65years use social networking sites (MySpace, Facebook, Friends-reunited)
- Those who use it, find it difficult to use
- Most don't use MySpace / Facebook because they don't want to put their personal information on the web
- Most don't use Friendsreunited, because they don't want to get in contact with lost school friends
- Most don't take part in discussion forums because they don't trust information from people they don't really know
- Older people's interests: Cinema / theatre / gardening / - great variety … is there any pattern?
- Is there a connection between living conditions (with or without others, suburbia or countryside) and computer use?
- Computer use is existing, but not necessarily web savvy-ness
- Most use the Internet from home most frequently
- Only few use adaptations for their computers
- Most frequently used websites (the term website can be ambiguous) – is Google the main one?
- Only a small percentage of people will be wheelchair users – I expect that the sample will mainly include people who are fit and mobile, so they can be a volunteer for Contact-the-Elderly

3.9 Home visit

Meeting with Garth age 74 years (08.12.09)

Last week I met with Garth (name changed by me) to have a chat about how he uses Facebook and any other social networking sites. I also ran my early design concepts (verbally) past him to gather some initial reactions.

Garth was exposed to using a computer in his 50s for work, but then never again. His friend inspired him saying it was so easy, so Garth also enrolled in a computer class at the age of 65 years. He had a bit of a fear using the computer and maybe pressing the wrong button, but what really helped him was when one of the computers broke and the teacher had to open up the computer unit. He then realised that all the pieces just slotted in and it was like a simple jigsaw. Proudly he explained how he had fixed the fan of his current computer since.
Now he hasn't got a fear any more, but feels frustration or anger when the computer doesn't do what it's supposed to do. Garth doesn't mind loosing data. He keeps the most important things on his USB stick, so if ever anything happens he'd be all right.

He's an avid user of ancestry.co.uk. He has 6 grandchildren, by his two daughters who live in Australia. It's his hobby to research about the family and he keeps them up-to-date *(though to his disappointment his grandchildren don't show any interest in his family research).*
His friends on Facebook are mainly his grandchildren. He sees pictures of them 'having a good time'. He feels close to them because he virtually sees them when they are relaxed and happy. In some ways he thinks it's nicer to get a message from his granddaughter than meeting her face-to-face. *(There is a notion that face-to-face is more controlling and this way the grandchildren can just be as they are and they don't hide anything).*

When he writes to his grandchildren he only writes 3-4 lines so it doesn't “bore or scare” them. He usually uses the comment box. He always writes back to them as soon as possible when they have written to him. *(I noticed that he didn't distinguish between messages and comments and I think he only uses comments and didn't even know about messages or any of the other features).*

Overall he disapproves of Facebook and he only does it for his grandchildren. He doesn't like seeing all the pictures of his oldest grandchild drunk at a party. He also wondered why the friends of his grandchildren would invite him. He thinks that it must be “the cool factor” when he accepts it because they'd have a friend from another part of the world.

He doesn't use Skype yet. He plays solitaire or "free cell" quite a bit, well lots! but he is not interested in multiplayer games - maybe when he's lonely one day, but he doesn't feel that way now.

He wouldn't know what to do without a computer. He loves his computer so he can be in contact and research his family history. He uses the message board in ancestry quite a bit, where people you don't know can email you because they found a something of interest in your family tree. But it seemed that he didn't perceive it as anything similar to Facebook where you can connect with people.

I asked him what elements a website should have so he likes to be in contact with his grandchildren and other friends. He said lots of pictures, emails (for letter writing) and comments for 2 line messages and images that you can view in a slideshow. I explained the ‘weather idea’ to him. He wasn't too interested since the weather is always nice where his relatives are in Australia and he has mostly rain. He was more interested in understanding the time differences at a glance.
He very much liked the idea of showing visuals that could trigger memories. He continued telling me about a pressure cooker his sisters used and he will never forget how it looked before and after. He would like to be able to write about his memories and could also imagine expressing them in different ways. *(I ran out of time to ask him in which other ways)*

Weekly updates of ‘memory reminders’? He wasn't sure about the weekly timing. Garth thinks that he might use it at the beginning but then it might become tedious in the long run. *(Here I got the impression that it's really important to allow people to choose the time frame they like to browse in).*

3.10 Chat with Sarah Read

This chat with Sarah Read took place on 2nd April 2009. Sarah has previously worked as a brand manager for design strategies and now she’s running her own company "Many happy returns". She’s a volunteer for CtE (Contact the Elderly) and drives her 3 older ladies to the monthly tea parties. She also writes her own blog on older people and their place in British society.
http://theagepage.typepad.com/the_age_page/age_rage/

In my telephone interview with her, she described how she has 3 elderly women she looks after through CtE. One is 99 years old; the other 96 and the third lady is in her Mid-80s.
Sarah thinks it’s very challenging to design something for them based on a computer. She confirmed the notion of ‘social pruning’ for the 3 women. They still live independently but friends have moved away, no or only few relatives that live far away, so people locally are important. They take part in CtE to have contact with other people. She explained that the elderly women never call her. She always has to call them. She said their reasons are that the women think that they interrupt Sarah and it would be too expensive to speak.

Sarah explained that she runs workshops with children in the kindergarten and where she tells them to imagine how it was when people were born in the period from 1910-1920 – no electricity, no running water, shower, bath etc.

Sarah described the elderly women's generation: Respect for the authority, very private, doing their duty, don’t want to be a burden, hard grafters, women wouldn't go into a ‘public house’. They are used to face-to-face meetings. She explained how a vast majority of seniors from this generation don’t claim benefits (for which they’d need to fill in the form).

Items that make life easier were introduced throughout the 1960s, so this generation was already 50 years old. Computers are commercially easily only available for the last 12 years, so it’s understandable that the update it very low.

Sarah has a 92 year old auntie who uses a laptop. Sarah explained how money is very important. Some of the women from CtE only live on about £90 a week. It would be difficult to afford a computer, broadband and accessories.

Sarah also mentioned the example of an older and well-educated man (GP). She was in frequent contact with him and he saw her using her laptop. At the beginning he seemed to have been terrified of her laptop, but became eventually interested in trying out the laptop. However, just typing took him such a long while that he became frustrated and stopped being interested. Sarah also mentioned how eyesight is an important factor for computer use.

3.11 Interview with Patricia Wright

Patricia Wright is the care home manager where Ivy Bean the 104-year-old tweeter used to live at the time of the interview, which took place on Friday, 11th September 2009.
I telephoned the Manor Hill Care home because I wanted to find out whether there were any care homes in London, which were similarly proactive about getting their residents involved in online activities.

I spoke to Patricia Wright who was the care home manager. She appeared to be a very passionate woman who loved her work. She joined the care home 7 years ago and turned lots of things around.
"7 years ago they were just sitting there and watching TV" Patricia explained. She had to motivate staff that things can be different and also the residents because they didn't know that it could be any different. *(This reminded me a bit of 'learnt helplessness'*) She started a series of activities such as culture nights, exercise classes, scrabble nights, news paper discussion, a beautician coming in, the over 75years Olympics and more.

She introduced the computer to have more options to do for the residents. Patricia's view was: "I don't see any reason why they can't use computers". The care home currently has 1 laptop and staff and residents share it. Ivy loves Facebook and Twitter. Another woman likes looking at the website for the Vatican, another man who goes to his photography class uses it to upload his photos and other person just enjoy playing games on it. Some of the residents (e.g. Ivy) can use the computer by themselves, but there is always a member of staff nearby who can come and help when they get stuck.

Patricia explains how the care home would need 3 laptops, so more residents can join in.
In her view it must be harder for older people who live by themselves to use a computer because the fear factor ("I have broken something") would be greater. The care home with staff is a safe place in that respect.

The Manor Hill care home is partly private, partly DSS funded. They have 19 residents and 17 staff of which 4 /5 people are always on shift. Patricia has so many staff because she runs a training program for carers sponsored by Help the Aged. She also said she couldn't do all these things (Olympics etc.) if she hadn't got a highly motivated team of staff.

The telephone interview took place on 11.09.09 between 12:00 - 12:30pm. I would like to thank Patricia for all the information provided.

3.12 Observations of the computer class at Age UK

On 14.01.10 I observed the computer class held at Age Concern (now Age UK) at the Ann Owens Centre in East Finchley.

Due to the snow and weather conditions the turn out to this class was rather small. When I arrived at the class I met Robert (in his 50s), the course leader, Vic (possibly in her 70s), who was there for her last session of the beginner's class and Harry (possibly in his late 60s, early 70s), who was a first timer and complete novice to using the computer.

Robert has a soft voice and speaks very articulate. He explains the options of the right mouse click and talks about the 'file extension'. I wonder how much Harry can follow him, but I notice that Robert doesn't dumb down his language to explain these words, but he provides Harry and Vic with explanations. For example, Robert describes 'sites' in the Internet as 'they live in the computer out there' pointing outside the window.
Robert sets Harry up to play Spider solitaire, so he can practice the eye-hand-mouse coordination. Harry is surprisingly good at using the mouse and is clicking in the right areas, but he didn't know solitaire before and has trouble understanding the rules of the game.
Robert asks Vic to check her email in Googlemail. Vic comments that mobile phones are much simpler to use and that she sees the computer as a "necessary evil". Vic continues explaining that she has no affection for computers. In her opinion "computers create young people that are neurotic". In the future she thinks that rather than being isolated at home, people will be isolated at home with an "all-seeing machine".
Robert explains 'email' to David and that he will need a browser to access 'http'-places, which work like postcodes. Robert opens Internet explorer and shows Harry how to set up his homepage. Robert continues: "As soon as you type 'http' you're looking on the world wide web and not inside the computer." Harry wonders: "So if I want to send an email to my wife, I type here…" and points to the URL entry field. Robert stops him to explain about the 2 forms of email, one stored on your computer and one that you can access from any computer because it's stored on the World Wide Web. Harry looks a bit puzzled. Robert suggests that he should start with an email that can be accessed from any computer such as googlemail.
For this they go to Google. Robert points out how Google had changed the first screen, so that the links to email on the top left only appear after the mouse hover over the screen. He explains that this has confused many other participants because they thought they had lost their email link.
Robert and Harry set up Harry's email account. Vic is listening with great attention – she doesn't mind that this is a repeat for her. They have trouble finding a unique email for Harry since his full name has already been taken.
Harry wonders about the security questions and Robert has to explain CAPTCHA.
Finally Harry is in his email account. Robert deletes the welcomes messages straight away. Harry asks with concern: "Is this spam?"
Vic is supposed to log in and to send an email to Harry. She has trouble logging in because her computer has timed out and she needs to log on as a user again. However, she confused her email password with the windows password and gets stuck.
Once in her email Vic goes to compose email and sees the blank screen. But when she types in the email address she types it into the search box at the top rather than the 'to' field.
Harry in the mean time is supposed to send an email to Vic. He's amazed by the keyboard. Robert explains to him the uppercase - 'shift' and the carriage 'return' buttons.
Harry receives an email from Vic and is supposed to reply. Typing a short sentence takes him a very long time. Vic receives his email, but when she tries opening it, she just clicks on the check box to the left and thinks that she had opened and read

Harry's reply. This was partly due to the fact that she was able to read his short answer in the one line preview.
Robert reminds her of needing to click onto the subject line to see the full email.

This description of this lesson shows how complex just opening and sending an email can be for beginner users. It was Vic's 6th time at the computer class and she still had trouble to open her email. She says that she won't use computers in the future. But Harry explains that he has to because he's still in business with his son and his son is insisting on him having to use email.

I would like to thank Age Concern for allowing me to observe the computer class.
Please note, names have been changed for confidentiality reasons.

3.13 Observations of KIT at a care home

On 30th April 2010 I met with Jeremy from the KIT project. KIT stands for "keeping in touch" and is a project investigating how computer use might help older people in care homes to stay in touch in friends and family. Jeremy is the man who road shows the KIT equipment& functionality in older people and care homes and gets the residents to try it out.

I meet Jeremy at the Wellesley Road Home for Older People in North London. He leads me into the communal area where KIT is set up. I see a colourful keyboard and a monitor showing 8 big buttons on the left-hand side (see photo). The 8 big buttons are the main activities you can do with 'Big Screen live', which is the software for KIT. Big screen live allows you to do the most important computer activities and has removed all other additional functionality to avoid complexity and distraction when an older person is using the system.
Jeremy demonstrates the system to me. The residents of the home have an email set up on the system and their inbox is represented by a number rather than by their names in order to maintain privacy. He also points out some niggles of the system, such as having to click into the message field when composing an email rather than the cursor appearing automatically or the use of the word "store" instead of "save" which had caused some confusion in the past.

I had seen other 'simplified' computer systems before, this one seemed to be similar to SimpliCITy (see section 3.3.3), but it was even more interesting for me to learn from Jeremy how he got the residents involved.

Jeremy takes me on a tour in Wellesley Road. We walk past the corridors and various communal kitchens, single rooms and hallway seating areas. I'd guess that the people I see are roughly around 80 years and older, some are more healthy than others. While moving through the home I see people walking around, some resting, some watching television, some having a cup of tea and some are in their rooms with the door ajar. I notice that the conversations I hear are mainly care personal speaking to an older resident or Jeremy greeting or chatting to the residents, and there is very little interaction or conversation between themselves.

Jeremy shares his experience of getting older people interested in trying out KIT. He points out how it's important to have a chat with the person first, to build up a relationship and to know their interests (e.g. movies, gardening etc.). On the second visit you introduce them to the 'machine' playfully, by showing them something that would be of interest to them e.g. a movie on YouTube with their favourite actor.

"There are 3 challenges when working with older people - you need to ask:
1. Are they asleep?
2. Do they feel alright?
3. And then: Do they want to come to the communal room and …
Never ever use the word computer!… say: do you want to watch a little movie?"

Jeremy's experience was if you used the word computer, they switched off and were not interested.

He further explained that once you had got their interest and they were sitting in front of KIT you could show them how to send messages. Sending and receiving photos was particularly enjoyable for them.

I observed the try-out of the system where Jeremy 'drove' the system and had two female residents watching him. They didn't really want to get their hands onto KIT but enjoyed what Jeremy showed them.
Jeremy explained that when a resident gets an email address of a relative becomes easier to show the benefits of KIT, but getting the email address takes some time. The KIT system usually stayed for 2 weeks in an older people home before it was either purchased by the home or moved to another site for trying out.

I would like to thank Jeremy for allowing me to join him on his demonstration and I would like to thank the residents of Wellesley Road who took part.

3.14 Invitation letter for the story telling workshop

Can you help us make the internet a better place for older users?

Researchers at Middlesex University - in collaboration with Age Concern Barnet - are looking for internet users aged 65 plus, who are willing to share their experience of using it. We would like you to tell us about your good and bad experiences of communicating with friends, family and other people using computers.

What we would like you to do
Come to Age Concern Barnet's Ann Owens Centre, Oak Lane, East Finchley, N2 8LT at 2:00pm on Tuesday, 13 April and take part in the discussion for two hours (with a break for refreshments in the middle).

With your permission, the discussion will be recorded and put on a public website. This is to help other people think about how well or badly the internet works for older users and what might be done to improve it. (We will ensure that you are able to review your recording and

you are fully happy with it before placing it on the website.)

What's in it for you?

- £30 cash will be given to each participant.
- Free refreshments (tea and biscuits) will be available.
- The opportunity to share your stories with a small group of people who are interested in these issues and hear what they have to say.
- In the long term, you are helping to make the Internet a better system for staying in touch with other people, especially for older users.

What kinds of stories are we interested in?

- Perhaps you use a social networking site like Facebook, MySpace, Friends Reunited or Saga.
- You might be active on a discussion forum such as local politics, transport users, friends of the local library or health related issues.
- Maybe you have used a site like ancestry.com or genealogy.com and have exchanged messages with someone you didn't know previously.
- Have you used Skype or another video messaging service to communicate with your relatives in a different country?

We would like to hear about your good and bad experiences of communicating with other people in these ways. We want you to share those experiences with a wider audience.

What you need to do next

If you want to participate in this, please contact Marianne by 31 March 2010 by email at marianne.markowski@mailprovider.com or by phone on 07974 256 XXX.

Your questions answered

Q: Will I definitely get a place in the discussion if I apply?

A: We have a limited number of places, which will be allocated on a first come, first served basis. We cannot guarantee that everyone who applies will be able to take part. There may be future occasions when you can help us and we will stay in touch to tell you about those opportunities.

Q: What does "recording" mean?

A: We plan to make a series of very short films to put on a website. Ideally, you will appear in one of these little films telling us about your bad and good experiences of using computers to communicate with other people. If you do NOT want to appear in the film, we may be able to use your story without you being seen. Please let us know if you would like to do this. Otherwise we will assume you are happy to appear in the film.

Q: Will I have any control over what appears on the website?

A: Yes, we will show you the video before we make it public. You can pull out at any time.

Q: Will my contact details be used for any other purpose?

A: Your contact details will be kept secure and only ever used in connection with academic research at Middlesex University. They will never be passed to another organisation or used for commercial purposes.

Q: Will the information I give be used for any other purpose?

A: Yes, your story might be used as part of presentations at academic conferences about older users and the internet. It will never be used for any non-academic or business purpose.

If you have any further questions please contact Marianne at by email at marianne.markowski@mailprovider.com or by phone on 07974 256 XXX.

4 Appendix for chapter 6

4.1 Literature & technical reviews of projects involving online video connectivity

4.1.1 Video Conferencing systems

Conferencing systems using analogue video have been around since 1960s, but the technology was still too expensive and too large for a consumer household (Guide Video Conferencing, 2014). With the introduction of video standards teleconferencing for business use became more widely used during the late 1980s. PictureTelCorp was one of the first companies to offer video conferencing to businesses in 1984. In the 1990s video connectivity was possible through the Internet protocol and higher video compressions were possible.

Teleconferencing became also a subject of research in particular in area of CSCW (Gaver, 1992; Grudin, 1994). Euro PARC was Xerox research facility established in Cambridge as the European satellite research facility. Euro PARC built on the Mediaspace model and employed a 'video tunnel' to keep connected with the main office in the US (Buxton & Moran, 1990). One of the early problems with video connectivity were issues around the reciprocal gaze (Buxton & Moran, 1990; Gaver, 1992).

In the 2000's video conferencing was possible and available free of charge for the average household with a video enabled PC that had Internet connection. However, the uptake of video conferencing by a significant number of households only started towards the end of the decade with the popular hybrid peer to peer software Skype. Skype was founded in 2003 in Estonia and allowed people to video call, chat and voice call. In 2011 Microsoft bought Skype and phased out their instant messenger in favour of Skype's offering. At the time of writing this thesis there are several offers of software for video connectivity, which can be used from various devices (PC, mobile phone, tablet) such as Skype, Oovoo, Googlehangouts, Facetime and Talky.io. Skype with 299 million connected users is the largest in use (Swider, 2013). In the ONS report in 2009 (see thesis chapter 2.3.4) it was notable that the difference between activities on

the Internet by age group was the smallest with the activity of 'Telephoning or making video call (via a webcam) over the Internet' (ONS, 2010, p.10). 30% of the 16-24 year olds make telephone or video call over the Internet, while 15% of the 65+ age group did so too. The more equal popularity of phone and video calls over the internet in all age groups could possibly be due to the 'generation connecting' communication flow between children, parents and grand parents.

The most recent Ofcom report shows that the trend to online video calling has remained at 26% for all adults in the UK for the last two years (showing the group 65 years + with a slight reduction in use in comparison to the previous Ofcom update) (Ofcom, 2014). In addition, there is now a greater variation in the type of device through which the video call is made; and more people over 65 years now own smartphones and tablets compared to the previous years (Ofcom, 2014).

My research into the video conferencing systems demonstrated that for now it was the easiest to start with Skype in order to build the TT, as it was the most common and accessible software.

4.1.2 Video and presence robots

One step further from offering a video calling facility is the integration of a mobile remote presence (MRP) in a robot. The Oxford dictionary defines a robot as "a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer" (Oxford Dictionaries, 2014) Research into robots to help with the care of elderly people in care homes has been around for more than a decade (Pollack et al., 2002).

Figure 14: Antonio Espingardeiro with the elder Care robot P37 S65. Photo courtesy by (Kelly, 2013)

EU initiatives are also supporting the directive of 'ageing in place' by introducing robots in people's homes to maintain their independence by providing everyday assistance. For example, 94-year-old author and grandma Lea currently lives with a GiraffPlus system Robot in Rome. She enjoys the company of 'Robin' as the robot makes her feel safer at home and she enjoys writing about him on her blog (European Commission, 2014).

Not every robot system has a video system integrated. For example, in Italy researchers have developed a robot collecting rubbish and dirty washing to be used in care homes. The seal-like sociable robot Paro (Turkle, 2011) was built with the aim to address lack of companionship and loneliness found with older people.

Willow Garage produced the Texai robot with MRP in 2010, which was in focus of academic research. Beer from Georgia Institute of Technology worked with Willow Garage to investigate older adult's views and usage scenarios for such a MRP system, as well as the perceived benefits, concerns and possible acceptance of such a system (Beer & Takayama, 2011). The acceptance of

novel technologies by older people, even though they may bring advantages to the current life situation, has been challenging for the Telehealth industry and movement (Eccles, 2013).

Beer et al.'s small qualitative study found that the perceived main benefits of the system were to be able to "visualize" the other location, to reduce travel time and reduce isolation. The most common concerns were confusion around the etiquette for refusing or ending the call, issues around privacy as well as that the use of the system could result in less personal face-to-face contact or misuse / overuse of the system (Beer & Takayama, 2011).

Figure 15: Photo of a Texai next to a person – courtesy by Erico Guizzo (Guizzo, 2010)

For more than a decade robots have been built to address older people's needs (also younger people's needs), but there are acceptance issues with the technology. The example of the Texai robot brings out that the new communication channel i.e. the video visit, needed to develop its own etiquette in human communication. Since I plan to have the TT constantly on I did not expect the issues of ending or refusing a call to occur.

4.1.3 Examples of Telecare employing video connectivity

With the growing number of older people fears arose that the demands on the health services as they currently are will be too high in order to be working

effectively. One view on solving the issue of more people needing health support is by introducing Telecare. Telecare can be defined as "*the use of Information and Communication Technology (ICT) to support health and social care remotely*" (Barlow & Hendy, 2009).

The Telecare Services Association also provides a definition for Telehealth (Telecare Services Association, 2014):

> *Telehealth is the remote exchange of data between a patient at home and their clinician(s) to assist in diagnosis and monitoring typically used to support patients with Long Term Conditions. Among other things it comprises of fixed or mobile home units to measure and monitor temperatures, blood pressure and other vital signs parameters (and the answering of targeted questions) for clinical review at a remote location using phone lines or wireless technology.*
>
> *Telehealth uses technology to provide services that assist in the management of long-term health conditions, including Chronic Obstructive Pulmonary Disease (COPD), Chronic Heart Failure (CHF), Diabetes and Epilepsy. Telehealth enables individuals to take more control over their own health, and becomes an intrinsic part of the individuals care pathway, with information about their health condition being monitored regularly to flag up issues before they become 'care critical'.*

Telehealth promotes the concept of empowering patients to take control of their own health by providing a regular information exchange with the medical staff through technologies.

Telecare is a collective noun for a whole range of different technological interventions to help managing a person's health. Telecare technologies range from "low tech" forms such as pill dispensers, to "more service related" such as pendants for fall alarms (if triggered a carer will contact the person in need), to "high tech" devices and integrated systems such as smart houses equipped with sensors and video connectivity.

Since 1998 the UK, other European countries and the EU have pushed research to investigate the use of Telecare technology. By 2011 over 9000 Telecare pilot projects had been conducted (Barlow & Hendy, 2009). When I attended the ISG conference in 2012 a domineering topic was that Telecare still had major hurdles to overcome, in particular with technology acceptance by the patients (Bouwhuis, Sponselee, & Meesters, 2012). Recently, in April 2014 I attended the

AKTIVE conference, which reviewed the latest developments and findings in Telecare. The conference brought out how complex and nuanced the individual circumstances for the introductions of Telecare options were and how acceptance of the technology can only be achieved by involving stakeholders (patient, carers, family members) much earlier in the process. Telecare makes use of live video technology in different forms such as video entry systems, video monitoring of the environment and video consultations with medical staff.

One example that is considered as successful is the KOL brief case (Danish: smoker's lung briefcase). The KOL suitcase contains a sphygmomanometer, an inhaler and a computer with a video telephone. When the measuring devices show concerning values, the patient can contact health staff directly through the video phone in order to receive advice whether to seek further help or not (Wadhwa, 2011). The introduction of the KOL briefcase led to reduction in amputations (ibid.) with this patient group in Denmark. However, overall it is hard to measure the success or effectiveness of Telecare due to the great variety of pilot projects, where set-up cost are initially high (Eccles, 2013).

In 2008 Laurea University of Applied Sciences in Finland conducted research into using TV to develop 'client driven' Caring TV. Using action research they developed together with the recipients of the TV channel and other stakeholders (i.e. health professionals) the concept and content for Caring TV(Raij & Lehto, 2008). Caring TV addresses elderly people living at home and in care homes. The municipalities are responsible to buy these channels, which in return offer the recipients guidance and support, co-authored content and a virtual clinic where they can connect with health care professionals (Helen, 2010; Raij & Lehto, 2008).

The novel aspect of this research is that the Laurea University assumes the 3 different roles in this project (researcher, technology developer and content provider), which put Laurea University in a flexible position to react swiftly to "client demands" and implement changes.

The TV has been used in other instances to deploy Telecare pilot projects for the last decade (V-connect, 2014), but it appears that set-up cost and configuration for the different TV systems are still a hurdle for greater take-up of the TV and video based services (personal telephone communication with Ian Stobbart at Redembedded on 24.10.2011).

There are plenty of examples for using the TV as an interface in Telecare, but not many were success stories. The greatest challenge is to provide a reliable service and which is accepted. The different systems and interoperability of those makes it difficult to pilot existing Telecare systems on a large scale. Although Telehealth is an important area where online video connectivity can contribute positively I did not intend the TT to be used as a means for Telehealth. In contrast I wished for the TT to be playful, a possible communication channel rather than monitoring people's health states.

4.2 Constructing the TT

Each TT kiosk was equipped with a 27inch iMac with built-in cameras and speaker.

I worked with Medium Density Fiberboards (MDF) to build the shell.

The TT's kiosk dimensions were:

- 1600 mm at the highest point
- 1200 mm height for the bottom box (onto which the iMacs was placed)
- 690 mm width
- 480 mm deep

8 pieces of MDF were cut of 2 sheets and glued together to form the kiosks' shell.

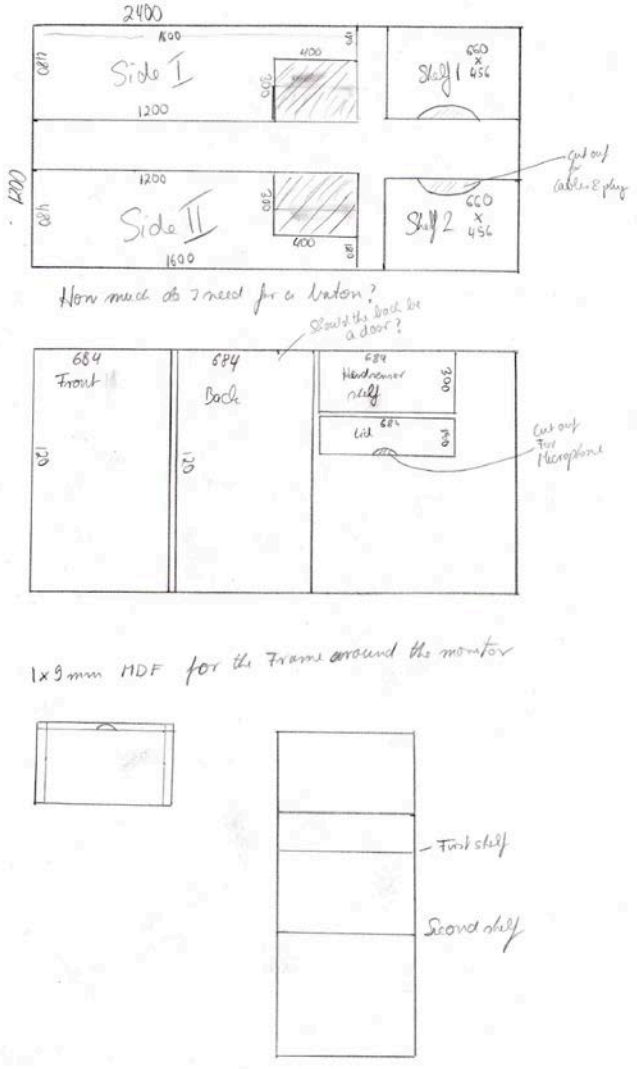

Figure 16: Cut lines for the 8 pieces of MDF out of two sheets

4.2.1 Choosing the volume mechanism

In my notebook I brainstormed different mechanisms for turning the volume on (see fig. 17).

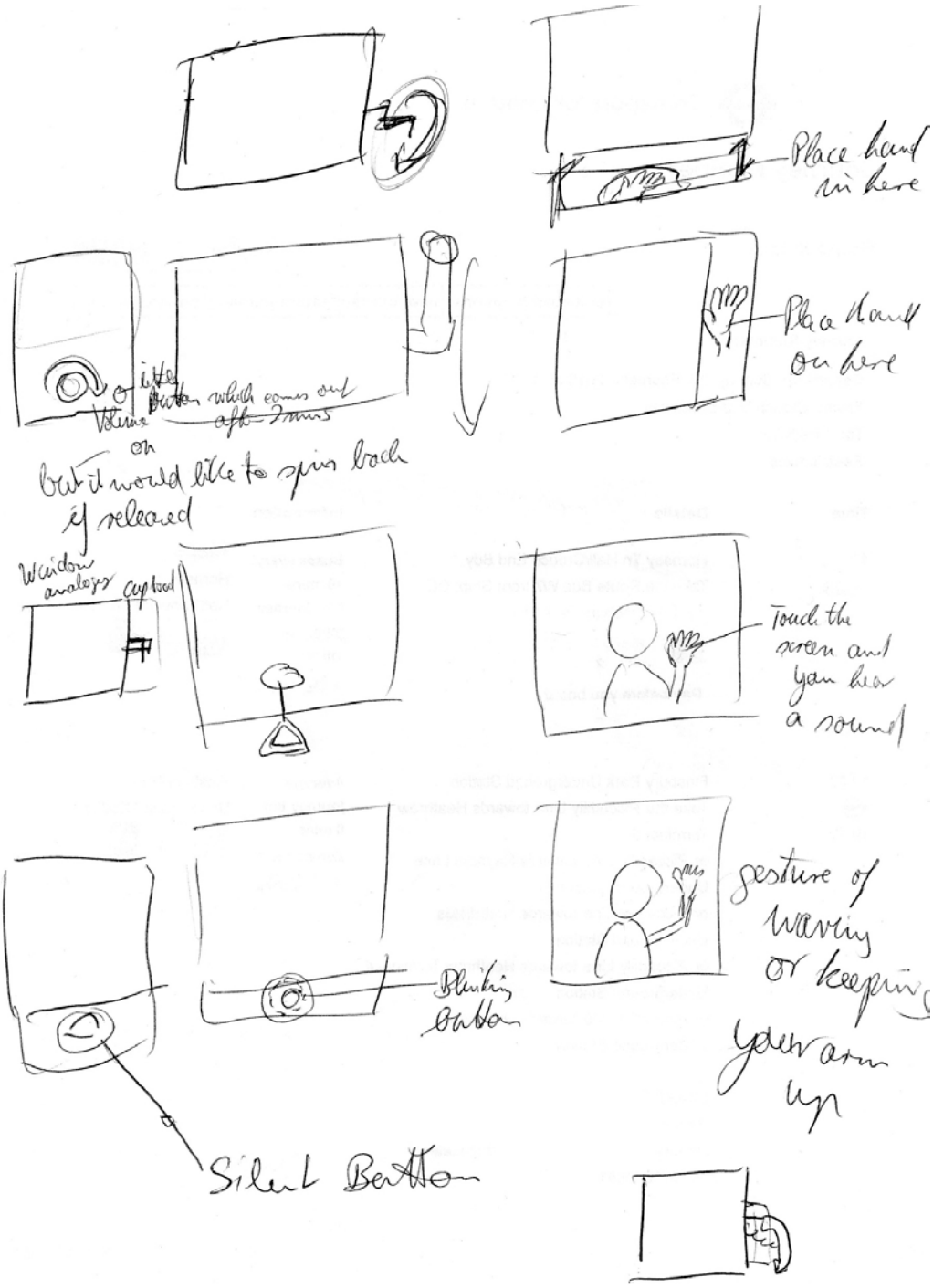

Figure 17: Rough sketches of different types of volume on mechanisms

The ideas ranged from a handle for a hurdy gurdy, a handle for a fruit machine, a touch area, an 'old style radio' volume button, touch screens, a gesture-based

mechanism (using Xbox kinetic-technology), a frame to open (similar to a window frame), a blinking button, a telephone receiver to a wind-up toy mechanism.

In discussion with my supervisors we considered the feasibility and attractiveness of the various mechanisms, whilst keeping the capabilities of an older person in mind. For example, the hurdy-gurdy handle intrigued me. In order to keep the volume on, one had to turn the handle. This meant that the participant had to be very physically involved when they wished to speak through the online connection. Admittedly, the movement of turning a handle while speaking is very impractical and is particularly difficult for someone older with restricted locomotion[9].

In the end I decided to work with an *Arduino* board connected to a light dependent resistor (LDR). Covering the resistor with a person's hand (or a piece of paper) changed the values the LDR read and a signal was sent to the main computer in order to turn the volume on. The volume was set to be by default off. I decided for a LDR because no physical strength was needed to cover the sensor. In this respect this respect it was ideal for people with restricted arm movements and reduced strength.

I intended to place the sensor underneath the first shelf in a 3mm hole. Only the 3mm hole needed to be covered by a hand (or something else blocking out light) to turn the volume on.

4.2.2 First Design Iteration - Placing the shelves

The first shelf was placed at the height of 1200mm since the monitor (i.e. the iMac) was supposed to be as high as possible to ensure a good view onto the screen and from the camera. The design followed guidelines offered for public access terminals to place functionality in reach (National Disability Authority, 2014). The guidelines specified 1200 mm as a maximum height for wheelchair users to reach (Gill, 1997, p.13). However, when the kiosk was built, the first shelf appeared to be very high even for myself.

[9] In general, moving your arm higher than your shoulder is more strenuous with age.

Figure 18: TT before the hand mechanism was placed in the hole

Lisa Dubow from Age UK Barnet and Sascha, a technical volunteer in his 70s, came on 29th May 2012 to review the TT kiosk in its form and basic functionality. Both were positive about the simple hand mechanism, where they just needed to cover the LDR to control the volume. However, they were also concerned about the height of the shelf at 1200mm and where I originally intended to place the LDR. Resources were not available to re-build the TT kiosk.

As solution a crescent-shaped hole at the height of 1050 mm was cut to provide an opening to a second shelf[10]. By placing the hand into the hole and covering the 3mm hole inside, a person activates the LDR sensor and switches the volume on.

[10] The arduino board was fixed underneath the second shelf. None-heat LED striplights (as used in kitchens or bathrooms) were fixed to the inside of the top shelf in order to illuminate the inside of the TT and to provide a constant value for the LDR. As soon as a hand (or an item e.g. thick paper) covered the 3mm hole, the LDR measured lower values and a processing script told the iMac to switch the volume on. The back of the TT was left open to access the equipment and to avoid overheating.

Figure 19: A person demonstrating the height & use of the hand mechanism

To finalise the “retro” feel of the TT kiosk I painted the outside ‘bitter chocolate’ brown to match the colour of the Baird T5.

Figure 20: TT kiosk set up for social interaction (photo taken on 12th June 2012)

4.3 The technical set-up

The two 27inch iMacs run Skype, an *arduino* sketch and *Processing* (a Java based programming language). Attached to the computer was the *arduino* board, to which the light dependent resistor (LDR) and a 270-ohm resistor (red violet brown) were connected.

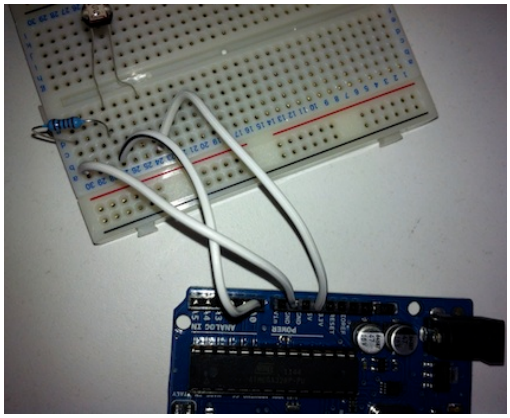

Figure 21: Photo showing the arduino board connections

The analogue sensor, the LDR, constantly took values, and the *arduino* sketch fed values to *Processing.*

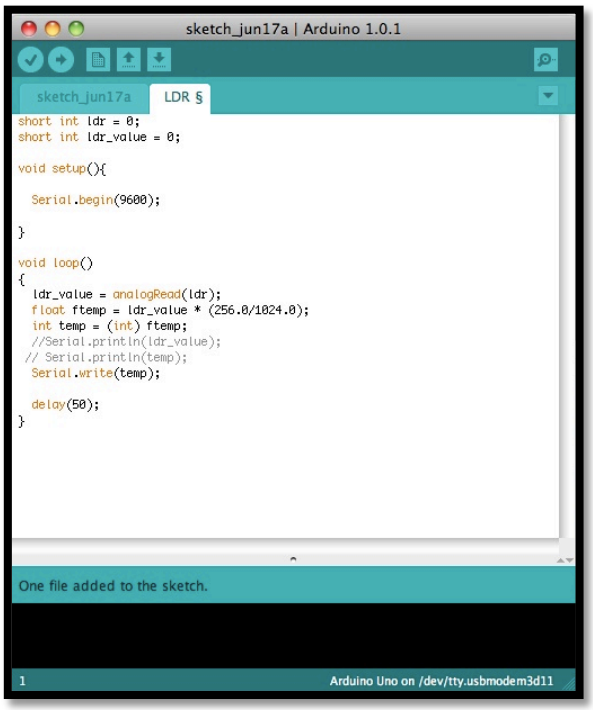

Figure 22: Screenshot of the arduino sketch taking the LDR input

Processing received the LDR values and ran the ProcessBuilder function in order to establish whether the volume needed to be switched on or off.

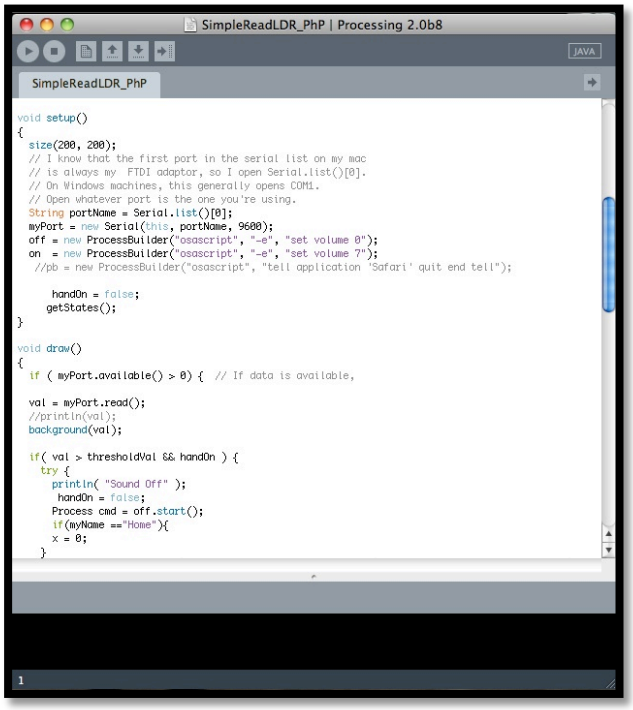

Figure 23: Screenshot of Processing's function to mute and unmute the volume

However, at the time I was only able to mute and switch the volume on the local computer. One iMac was labelled *home* and the other iMac was labelled *away*. Both computers constantly checked the values from the LDR locally and when the values had gone lower (i.e. the sensor was covered) than usual, *Processing* told the Mac operating system to unmute the volume on the local computer. This meant that when Skype was running, people were able to communicate with their voice through Skype as usual.

However, controlling the volume only locally meant that the first script had an interesting side effect. When the computers were in two different rooms, a person was able to place the hand over the sensor and “listen in” to the other room. The other person was only able to notice the “listen in” happening when she / he paid attention to the screen. This side effect was dealt with during the first in-the-wild experiment by ensuring that one of the kiosks was always manned, so the TT could not be misused.

The next technical iteration fixed this side effect successfully. As it stood the TT was ready for its first experiment in-the-wild.

4.3.1 The technical development

In order to control the volume on the *away* computer the specific IP address of this computer was needed. At university this was difficult to retrieve due to Middlesex University's WI-FI set-up. As an alternative, PHP scripting was used and hosted on the Teletalker.org domain to check each computer's input state. The GetStates() command in *Processing* checked the states.

However, using http as a connection path meant that there was a time delay. This time delay was impossible to predict and the volume control became erratic.

In October 2012 I consulted Roy Thompson, my neighbour and a software developer, for a better solution. Roy introduced me to TCP sockets.

TCP sockets entail a persistent connection established by the client (i.e. the TT kiosks' computers) to the server. This connection remains open for all communication between server and clients. Instead of polling the server during the draw loop, the client starts a new thread, which is continuously reading from the server. The read function is "blocking" in that it will wait until something is available and gets the data immediately. The read and write happens over the same connection, which makes it much faster.

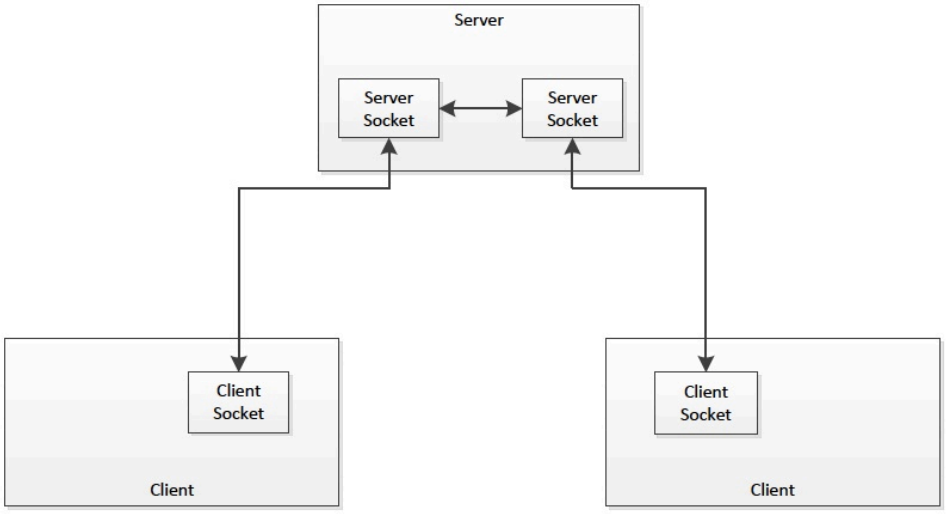

Figure 24: Diagram of TCP sockets connection

It turned out that Streamline.net, provider of Teletalker.org's domain name and space, did not support server side java, which was needed to run the server

script for opening the TCP sockets. Roy volunteered to host the server side java script on his own server using port 80.

The updated *Processing* scripts, opened the TCP sockets, took the values of the LDRs and sent it to the server, whilst they were asking whether they needed to turn the volume on. Using the TCP socket connection meant no time delay in turning the volume on and off.

To avoid any further sound problems with Skype, alternatives were investigated. However, Google Hangouts and Oovoo did not offer a full screen option in the same way as Skype did.

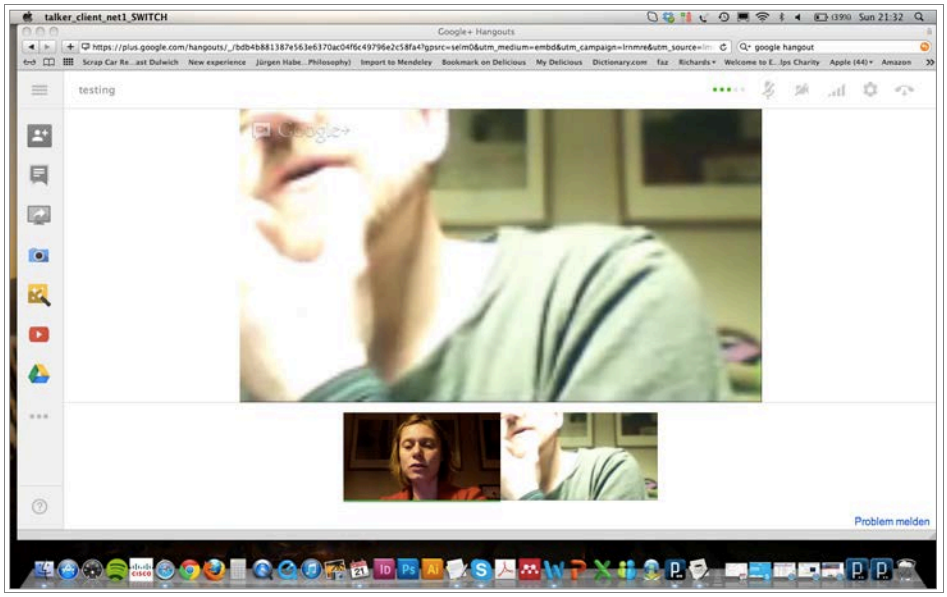

Figure 25: Screenshot of Googlehangouts - full screen mode

Since it was important to the TT concept to provide a 'large' window into the other space and not to distract with other functionality or unnecessary background space (which would make it look like a computer) I continued to use Skype for the next experiment.

4.3.2 Hardware iterations

Middlesex University needed the 27 inch iMacs for teaching and I was given two G5 Mac towers and two 25inch monitors. Due to the change of equipment I also had to make adjustments to the TT kiosks. I added a step inside the kiosk to place the towers securely. I had to build a frame to cover the gap between monitor and kiosk's side. I drilled holes into the kiosk to indicate where the speakers were

placed. I also created new instructions in order to inform people on how to use the hand mechanism and where the TT connected to.

Figure 26: TT with holes for speakers, instructions and an orange sticker to mark the hole

4.4 Preparations for the third experiment

4.4.1 Notice for research

Despite being in two different locations clients & staff of the Meritage and the Ann Owens centre can wish each other festive greetings face-to-face.

On Tuesday 18th December, the Teletalker will be connecting the two daycentres audio-visually through a live on line link.

The Teletalker kiosk is similar to a TV showing the other/a different location, where you can speak to people at the other end by using a simple hand mechanism.
Marianne Markowski, PhD student at Middlesex University, looks at how technology can be made more accessible for everyone, but in particular to older people. Please join us on 18th December in sharing festive wishes over the Teletalker and to help Marianne with her research via feedback on your experience.

Figure 27: Notice of research by Age UK Barnet

4.5 Transcription of the TT conversations

[05:50:51.12] Conversation between P & A (D & M assist in background)
D: start again P: hello M: Hello A: hello P: My name is Patrick what is your name? (Lots of hubbub) A: Nick? P: Amir - how are you Amir? (inaudible) P: are you having a good time? P: Oh yeah no problem, what are you doing at the moment? are you playing bingo? (too noisy) P repeats: are you playing bingo? A: no I'm not I'm a ....(inaudible) P: what do you think of the Teletalker? A: Yes, (inaudible) it's all right P: great… Where abouts are you from Amir? (answer inaudible) sure P: Now you're at home in Camden? (answer inaudible) P: Really 45 years, you must have seen a lot of change in that time A: yeah lots of change P: how many people were in the access centre today? (answer inaudible) P: have you made quite a few friends there? (answer inaudible) P: sure. …Do you tend to go there to play cards, to read the newspaper or to catch with your friends? A: news papers

P: Ok
A: one (inaudible), and I have been shopping (inaudible)
P: which newspaper do you read?
A: the mail, the express
P: Ok. .It's very good talking to you. It's a great invention this isn't it?
A: it needs to know your ISP or something
P (not really listening): Yes, indeed, alright take care
A: (inaudible)
P: cheers bye

[05:52:31.00] Conversation between G and J (M to assist in background)

G: hello
M: hello
G: Hello how are you?
M: I'm fine
G: Yes,
M: inaudible
G: Hello, hi - hello, how are you
J: Hello
G: Hello - can you hear me?
M: you have to put your hand in there all the time
G: Yes, It's in
J: I'm minding you (inaudible)
G: Yes, I'm Godfrey
inaudible - my name is Godfrey, what is your name?
J: John
G: oh you're my brother john (laughing)
J: inaudible
M: you're going home now?
G: bye
M: I'm still here

[05:55:32.15] Feedback from G on the TT to M

G: this is great I tell you because it's something it's something great, amazing, very amazing, because it's different from Skype like now you can talk by just putting your hand in and just talk, eh
(lots of background noise)

[05:58:29.12] Conversation between S and D (M to assist in the background)

S: hello Dominique - how are you?
D: hello, good how are you?
S: Good, have I met you before?
M: I think you have met each other
S: beginning this year it was
D: you have got a good memory
M: our daughters were both born around the same time
D: what do you think about this place here look? the art college - what do you think?
S: Nice, I have been only there once when I met Marianne - I didn't go around, I ….
D: no ?
S: it was called Hendon college 30 years ago –
D: oh yeah
S: inaudible…I remember think it looks nice, the outside at least
D: do you like art?
S: Pardon?
D: Do you like art?
S: well a bit, I like art
D: It's funny when I put my hand here it's like touching your hand

S: giggle
M: giggle
S: yeah
D: we can shake hands
laughing
S: ok thank you Dominique
D: alright - have a nice day

[06:02:48.13] conversation between D and P (M to assist in the background)

M: they are starting the bingo here, but here is one more person
D: hello -
M: put your hand in there and say hello
D: hello
M: just leave your hand in there
P: Oh I see yes
D: what your name?
P: Paul
D: Paul, yes? I'm Dominique
M: she's French
P: oh yeah - where are you ?
D: I'm in Middlesex University
P: ah ok, oh isn't that good - it's like a cafe
D: Where are you?
P: aw you see (M explains about the window) ah that's clever isn't it
P: nice to meet you Dominique, bye
D: bye bye

[06:07:10.05] Conversation between A and K (M to assist in the background)

A: I'm a student here
Illustration - I recently finished, just going back to the studios, going back to it in a couple of days, it's pretty sad - it's like the end of an era for me
M: I see, now serious life start,
A: lots of people feel the same now
M: yeah, I know, It's a funny transition when you finish your degree and you have to adjust to different phases in life
A: where are you calling from
M: I just have a question from Kaye
K: Will you get a job once you've finished university?
A: Will I get a job?
K: am just thinking difficult - will you get a job?
A: will I get a job - well - illustration is a freelance based career, but I'm planning to do some teaching afterwards
K: ah ah
A: So I'm going into teaching, I'm going into schools to teach arts and
K: ah – that sounds like hard work
M: Oh yes, you can xxx for many things
K; and it is right
K; there are so many things
A: How much I have been paid? freelance varies in illustration but they can go up to animation and it depends on your client and how much they pay - that's how the illustration career goes
K: some university's ..... just want money don't they
A: sorry you're not seeing my head here (too tall?)
A: I'm confident that I will get a job and start my teaching career
K: inaudible, we're doing the bingo now
A: ah bingo, have fun
M: bye bye - see you back at uni

[06:12:07.16] Conversation between R and K

K: Hello, aren't you tall?
joking laughing inaudible
R: are you having a good day? (people talking in the background)
K: m.... taking that
R: ah, ...
K: yeah, a camera photo (laughing)
K: very limited smile that is, I don't have much to smile about
R: fair enough - do you think (inaudible)...?
K: inaudible answer
K: it's balancing
R: aren't you ok, are you?
Tea being served - lots of noise
R: are you here tomorrow?
K: Tuesdays and Thursdays
R: Tuesdays and Thursdays
K: yeah
R: no am going back home tonight, I'm not living in London
K: Ahh
R: I'm living in France
K: oh you're lucky the weather is better there
R: whoa, in the north of France it's just like here, isn't it
K: ah (chuckle)
R: It's near Lille- have you been to Lille?
(inaudible) K: aw that's better
(inaudible)
K: sunny June, but I don't know what happened this month
R: chuckles
K: turned out all that horrible
K: Have you finished your studies now then?
R: I have finished my studies long ago, I'm an old man
K: haha
K: I started (.....someone offers biscuits)
inaudible
K: I have to go and get a biscuit
R: alright
K: safe journey home son

[06:15:33.05] Conversation between D and R

R: Hello
D: Hello are you alright?
R: hello - how are you?
D: Hello - what are you up to apart from talking to me?
R: I am reading
D: am I taking you away from your book am I?
R: it wasn't really a book, it was a paper
D: that's the thing in life, keeping you busy
R: yes, keeping you busy - exactly
D: All right
R: have you met Marianne then?
D: oh yes - she put me into this
inaudible
D: pretty blurry what happened to the picture

R: you should look at your glasses - maybe they are blurry
D: oh you don't know how lucky you are
talking
R: I'm too tall that why you can only see my .... quite noisy where I am, they are doing some building work over in the campus
D: oh yeah, I have just been called to do my bingo
R: all right
D: so I have to get back to my tea and biscuits, nice talking to you
R: ok, see you later then
D; bye

[06:18:12.11] Conversation between R and N

R: Hello
N: hello
N: what is your name please
R: My name is Ralf
N: My name is Neville,
R: Hu
N: Neville
R: Eye Eye Neville
R: Do you have a good day at the centre?
N: pardon?
R: Did you have lots of fun
N: yeah, yeah
R: did you play a game of bingo
N: yeah, nice
R: did you get the numbers right
N: no, no how is you? how are you
R: where I am ?
N: no, how is you? You well
R: I'm not very far, pardon
N: are you well? well well? Are you ok?
R: yeah, I'm ok, thank you
N: You're very nice to talk to, very nice to talk to, very nice to talk to
you are very nice to speak to
R; that's very kind of you
N: good luck sir, bye bye

[06:19:39.13] Conversation between M and R, then N and R (M to assist in the background)

M: did the sound keep on cutting out?
R: the sound was very bad
M: aw that's a shame
R: I can't really hear....
N: Next time I come and talk to you
M: next time Neville I come and talk to you
M to R: He asked me what he should speak with you about and I said ask him about his art work
R: aww
M: but Neville didn't ask you about that, did he?
R: it's difficult to describe the art work
N: yeah
M: yes
M: it would be easier to show things
[06:20:24.10]
M: do you know where Neville is from originally? Have a guess
R: from Germany

M: no (giggle). it would probably be quite cold there wouldn't it
N: I come from a warm country, a very hot country
R: a warm country, Jamaica
N: Barbados
M: Barbados
N: I have been to Jamaica, once or twice, Barbados is my home
M: I'd love to go to Barbados
N: beautiful place it is.. inaudible
M: And Italy is where your wife is from, isn't it?
M: oh lovely Venice... do you play an instrument?
N: no (inaudible)
M: oh cricket
lots of noise
R: how long have you been in the UK?
N: I left Barbados in 1960 and came here in (inaudible)
M: 52 years!
N: ..... my country is still warm and beautiful, beaches and beautiful girls... I ...
M: have you ever been to Barbados Ralf?
R: Have I ever been to Barbados,? no
M: what is the nearest you have been to Barbados?
Loud talking
R: Lisbon
M: Lisbon
R: that's as far as it goes to near Barbados
N: (in audible due noise levels)
R: just a little bit of water between Lisbon and Barbados
N: mmh?
M: yeah just a little bit of water
M: the whole of the south pacific or am I getting my seas wrong, anyway
N: nice to talk to you
M: yes
R: likewise, likewise
N: you see me next Friday
R: I hope they saved you some biscuits
M: Go for the biscuit
M: bye bye Ralf
R: bye

4.6 Collected returns

Observation Type / perspective:
Engineering (E) – comments, feedback, on the mechanism or functionality of the TT
Social Science (SS) – learnings around the people
Design (D) – aspirations and desires what to use the TT for, and suggestions on its form and look & feel
(Note: not all returns fall neatly into one or the other category)

1st in-the-wild experiment

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
Day 1	• I explain a helper of the research team, how the hand mechanism works. Although he listened, he thought that it worked like a switch where you put the hand in the hole to switch the sound on and you put the hand in the hole for a second time to switch the sound off.	E	Expected the mechanism to work like a switch (Not like a contact point where you had to leave your hand on there)
	• A member of the university staff learnt through a Teletalker conversation with M. (in her 70s) about the game "Hoy" – the member later explained that they had no idea what older people do in day centres and felt that he learnt and had a view into something new	SS	The older conversant was happy to share about hobbies / activities in her life University staff learnt what people do in day centres
	• Students were hesitant to put their hand into the hole – "I wouldn't put my hand in there, I expect to find a keyboard" "You need to tell me who it is connected to"	E D	The hole was not inviting as a mechanism Expectations were to have a keyboard for typing rather than speaking Ambiguity created a need for information
	• 3 women from the "Colindale club" specifically came to see the Teletalker after reading the announcement in the Age UK newsletter – their reactions were: "really easy to use", "really	E D SS	The kiosk, mechanism and concept were perceived as "easy to use" by active older people

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	simple". • They liked the idea and could see the "Colindale club" connected with the over 50s club or with the library. • They describe themselves as "still fit", in comparison to the clientele that has to go to the Meritage day centre.		Aspirations to connect places of social and public activity Attitude by active older people towards day centre visitors
	• At the Meritage centre **A.** (in her 80s, female) asked me quietly "Why"? • In her view students and older people didn't have the same interests and she would not know what to talk about. She was not interested in trying the TT.	SS	The concept of connecting (and speaking to) students was not attractive to all day centre clients Not enough commonality or reason to interact with each other
	• 3 daycentre clients tried out the Teletalker and held small talk with members of the researching team. I had to help with placing their hands over the hole for the sensor.	SS E	(Some) Interest in exchanging / trying out the TT by day centre clients Mechanism to switch the sound on and to keep it on was not intuitive
Day 2	• On Wednesdays a different group of clients came to the Meritage centre. A woman of this group complained that she had not been informed about the research (since she was on holiday) and that she was not interested in being involved. Although I tried explaining to her what the research was about and that she did not have to be using the TT or even be near it, she did not warm to the idea. She did not accept compromises such as moving the Teletalker to a different point in the room where she would not been seen. Her objection to the TT created negativity and suspicion from other clients towards the TT, which meant that I decided to keep the Teletalker switched off at the Meritage centre for the day.	SS	The day centre client, who felt not well enough informed about the research took an opposing position and was not prepared to make compromises. The dynamics in the day centre changed since this woman was opinion-leading. Her peers followed her suspicious attitude towards the research (In conversation later with Lisa Dubow I learnt how the clients have their preferences in seats and activities and how there were opinion leaders around the tables, which influence the dynamics around the tables.)

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	• Some people waved, but no one came to talk to me through the Teletalker.	SS	People were hesitant to try out the TT. The view attracted some interest
	• One student said after trying the TT "Not very hygienic to put your hand in there". She wanted a movable camera and to update the style of the kiosk. "It doesn't look modern". She would have liked to have the TT like a help desk service in an office.	E D	The hole deters people from using it. Form and style of the kiosk not attractive enough for a student Movable camera as added functionality Aspirations to use it as a help desk
	• One of the students suggested giving the TT the look of a jukebox as this would be something to connect young and old. Another student suggested having a switch to change locations for the view.	D	"Jukebox" as a connecting point for young and old Switching the view into different locations as added functionality
Day 3	• Jeremy Morris's initial reaction was disappointment by the TT: "It is chunky, in the open and what's the difference to Skype?" • He expected the TT to connect children by a hand push to their grandparents in a care home. • Lisa Dubow from Age UK defended the TT: "It's a very good way of introducing older people to technology – it's not about people staying at home."	D E SS	The form and functionality disappointed Jeremy (who had increased expectations since he had been in communication with me beforehand) He expected a simple video telephone with one button to speak Demonstrating the TT in the day centre is about bringing technology to places where older novice computer users are
	• A student looked all the way around the TT to see how it worked and he was impressed by the hand mechanism	E D	The novel / unusual volume mechanism made a student curious
	• Another student in favour of the TT suggested to connect different countries (e.g. India with the UK)	D	Aspirations to have a connection or view into a different country

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	• My supervisor conversed with 3 day centre clients through the TT. • One of them used it for the second time and became comfortable with the hand mechanism.	SS E	Maintained interest in interacting with people and trying out the technology Older person learnt how to use the hand mechanism
	• 2 young students went straight to the Teletalker. One said: “It's here where you can watch old people and speak to the old dudes.” The other answered: “how cute”.	SS	(Patronising) attitude by young people towards older people The TT was an event for them.
	• Two more women from the Colindale club came to see the TT, but problems with the sound quality made it impossible for them to experience the TT in the best light. They investigated around the TT to see how the connection worked.	D E	The TT was curiosity evoking A functional prototype with good sound quality was crucial to generate an enjoyable experience
Day 4	• (The TT was moved into the hallway of the Age UK day centre, near the reception desk) • From murmurs by the day clients, who sat with the woman who previously rejected the TT, I could hear that they were pleased that they weren’t overheard playing bingo and that the “ghastly thing”, the “big brother” thing was removed.	SS D	Negative attitudes towards the TT in regards of being seen and heard
	• **M. (**in his 70s) a volunteer for the Age UK reception desk, was also very sceptical of the TT. He did not really want to have the ‘thing’ near him. • I played “kleine Nachtmusik” on YouTube and demonstrated how the hand mechanism worked. This changed his attitude. He enjoyed being in control of switching the music on and off by simply placing his hand over the little hole, or as I showed him by placing a piece of paper there to black out the light. • He was a big fan of Mozart and used to play music himself.	SS E	Attitude towards the TT was changed by finding something, which interested **M.** The hand mechanism was attractive once he understood it. The tip with the piece of paper made the mechanism act like a switch rather than a contact point

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	• **M.** spoke through the Teletalker with a member of the researching team	SS	**M.** opened up to cross-generational interaction
	• Day centre client **J.** had conversation with a member of the research team**. J.** recounted a memory of the wartime (without being prompted to do so), where he had fallen into a coma. **J.** had to stop the conversation due to overwhelming emotions	SS	Interest in having conversations is there, but recounting memories from the past can bring up emotions which may be difficult to manage
	• A group of 4 business students were impressed by the TT. They suggested using it as a customer service desk in department stores such as John Lewis, or for train stations or for Mac Donald's drive-thru.	D	Aspirations to use it as a customer service / information desk
	• 3 women from a Thai Chi club (who were informed about the research through the Age UK newsletter) came to see the TT. • They spoke to **M.** over the Teletalker for a short while, before a connection problem occurred	SS E	TT attracted an audience that specifically travelled to the university to see it Technical problems dampen the experience
	• 3pm: Day centre clients started to leave. I waved through the TT at them and some waved back.	SS	Visual interaction was precipitated despite resistance / disinterest in trying the TT out during the day
	• Apart from **M.** and one day centre client, no one else of the day centre came to try out the TT. A Meritage staff explained that it had to do with peer pressure. Other day centre clients might have not wanted to upset the opinion leading day centre client(s).	SS	Peer pressure or not interfering with the opinion leaders was a factor to be considered in understanding clients' behaviour / actions

2nd in-the-wild experiment

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
6th Dec	• One kiosk was put into the Grove café area and it generated large interest with students. My supervisor observed how students were communicating non-verbally through the Teletalker, first with sign language, then by holding up signs spelling out messages. • The students had not read any of the instructions on how to use the Teletalker or ignored it since they enjoyed just the visual connection.	SS D	Students enjoyed the visual connection to another location in the building Students found their own ways of using the TT to interact with each other The instructions on how to use the TT were not noticeable enough
7th Dec	• I had 5 students who were curious about the Teletalker after I switched it on • One of them tried it out, but he found the hand mechanism confusing. He was not sure whether he had to keep his finger on the hole or not.	SS E	Curiosity in groups The affordance of the hand mechanism was still not clear although sign and descriptions were given
	• Another student of the group went to the second kiosk to be the conversation partner. The feedback I received from him about the Teletalker was that it was "pretty decent".	SS	The experience was seen as enjoyable
	• The students, as a group, suggested having a button or an area where one could touch rather than covering a little hole.	E	Use a button rather than a touch area
	• I sat in the Grove café near the TT, ready for any potential interaction. I could see students and staff glancing at the screen from the other floor, but hardly anyone stopped.	SS	Students were interested but hesitant
	• One student said hello into the TT from the other location, but he did not wait until I answered back.	SS	The student did not receive rewarding 'feedback' quickly enough to stop in front of the TT
	• A fashion design student commented on the TT's visual style as appropriate for its purpose of connecting to people, in particular older people. "It reminds me of the old radios 1930	D	Style seen as appropriate

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	style and those round clocks".		
	• In the afternoon a student came to see how the TT worked and looked around the kiosk.	SS	Curiosity around the kiosk
	• One student who saw me setting up the TT and who had come past the TT kiosk several times, said that it was a great idea and that it would be useful to "have them everywhere" around the campus.	D	Student is open to the idea of having several spaces connected on the campus
10th Dec	• Since there was no interaction generated through the TT by students spontaneously I decided to be pro-active: • I asked students to re-enact the potential use of the TT	SS	See thesis Chapter 6.7.4 for a full description
11th Dec	• A member of staff (a lecturer) praised the Teletalker on the second floor because it was a good way for him to check the length of the queues at the café.	SS D	TT has been used as a mean to survey the space and to inform decisions when to get the coffee
	• Another member of staff (a lecturer) was excited about the research and explained that the TTs reminded her of the "Hole in Space project".	SS D	The concept of the TT was attractive and reminded this person of another art installation
14th Dec	• A computer science student tried out the Teletalker and provided feedback. She was positive about the concept, but suggested using pressure pads on the floor to switch the sound on and to provide clear feedback such as "on air" lights to signal when the volume is and that conversation partners could hear one.	D E	Rather than a button, this person is suggesting pressure pads (acting like a button) and to provide better visual feedback for when the sound is switched on

3rd in-the-wild experiment

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
18th Dec	• Due to a persistent sound issue I decided to concentrate on the visual connection only. • The visual connection enabled daycentre clients and staff to wave to each other. Since both TT kiosks were placed in fixed positions the idea was to get people near the TT in order to wave and smile.	E D	N/A
18th Dec	• Some clients at the Ann Owens were not keen on interacting with the Meritage clients • I learnt through chats with these clients that there was some kind of competition with the Meritage centre regarding resources being allocated (exercise classes or similar activities) and these particular Ann Owens clients felt disadvantaged.	SS	There was a previous history, which made the connection between the two centre for some participants less enjoyable
	• Staff members were very pleased to wave and mouthed messages to fellow staff at the Meritage Centre.	SS	Staff were happy to have the visual connection
	• I learnt from one of my helpers, Nick, at the Meritage centre that two clients were disappointed that they could not use the TT with sound. They remembered Nick from the last round of field research and they had been patiently waiting for the opportunity to speak through the TT all morning.	SS	Two clients were patiently waiting to use the TT with sound, because they enjoyed using it the last time
	• Filling in the forms	SS	See notes

1st in-the-wild experiment with the TW

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
9th July	• Positive interest in the TW by several people in the communal room • First person liked the button size and the bell, but he did not take notice of the on air light (green LED)	D SS E	There was positive interest in trying the TW, possibly because it was smaller and got moved in front of the person (in comparison to the TT). Also, by then some of the clients recognised me and were more open to trying things out The on air light was too small or not in a prominent position
	• 13 people (out of 30) from the communal room spoke with Magnus. • At one point there was a small queue of people wanted to speak to Magnus through the TW	SS	The TW was popular, so was Magnus as a conversation partner. Magnus, in the middle of his life age-wise, may have had the advantage of being differently perceived as a conversation partner than someone younger
	• The big blue button was hardly pressed since the volume was already on when the next person joined (although I did my best trying to switch off the volume in between).	D	The idea of the bell was suitable for presence software, i.e. the visual connection is constantly there and one presses the bell only when one needs to get someone's attention This was not the case with the research set up
	• Clients enjoyed pressing the bell, although there was no real need to press it since Magnus was available for communication.	E	The bell mechanism worked well
	• The conversations were small talk, but appeared to be joy generating (smiles, laughter were observed).	SS E	People were able to communicate naturally and with both hands

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	• While Magnus chatted, I observed the interactions: people were able to use both hand when they were speaking		
	• A woman, who had arthritis in her hands, explained that she could not press the space bar on a computer, but she felt comfortable pressing the volume button and the bell.	E D	Confirmation was given that the arcade button and the bell worked as interaction mechanism for someone with arthritis
	• One client, who had never used a computer before, was pleased about speaking through the TW. Although the keyboard was covered, she understood that she had just been using a computer to talk to someone.	SS D	The availability of the TW at the location allowed the person to experience online connectivity. The keyboard cover may have helped to alleviate fears from touching keys or buttons by accident.
	• The volume level of the laptop was suitable for one person to listen & speak, but it was too quiet for a large room with several people.	E D	The volume level was suitable for quiet rooms, but the level of audio output or type of output needs to be re-considered for larger spaces
	• When the TW was in the entrance area, a woman with a woolly hat, who appeared to have mild dementia, walked around the TW and kept on pressing the bell	SS E D	The issue that someone with dementia might find it enjoyable to press the bell, while others might be disturbed, needs to be carefully considered for the use in care home
	• A retired French teacher explained that she was interested in the concept of online video connectivity, but found that none of her friends had Skype, so she had not bothered	SS	Person doesn't know anyone to use online video connectivity with
	• Two women, who I met at the last round of the TT research stated that they were not interested • When I probed they explained that they had it seen it before and why should they connect to the room next door when they could still walk there. • They did not realised that it was a demonstration of the TW and that it could connect to any	SS	The set-up of the TW was misleading, so that some people thought that the TW would only connect from one room to another. This time the day centre clients were only informed verbally and at short notice (which is an issues with the experiment set-up)

Day	Returns	Type: Engineering (E), Social Science (SS) Design (D)	Interpretation
	other place much further away. • They response was that it was like Skype, which they did with their grand children. They would have no need for the TW, but maybe someone else.		

5 Appendix for Chapter 7

5.1 Portability and movability of the TW

At the very beginning I played around with idea of having foldaway legs for the portable TT similar to a magician's table.

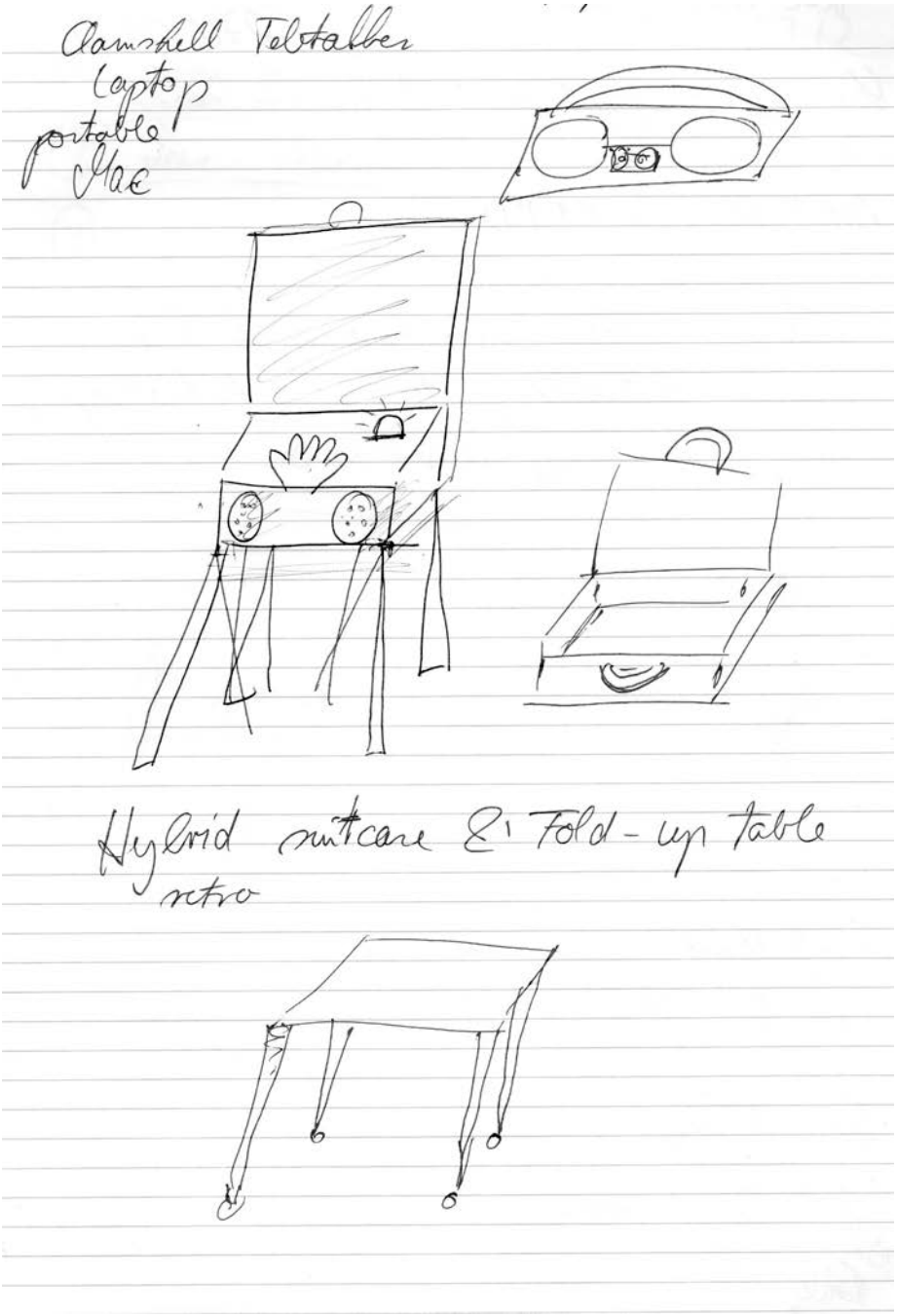

Figure 28: Sketch of ideas for the portability of the TW, drawn on 6th Jan 2013

Since Ingestre Road owned a trolley for the KIT equipment and residents were familiar with it, I came to the conclusion that wheels were the way forward. KIT's trolley included a plug socket and was fit for industrial purposes. However, it looked "chunky" and unattractive in a white grey.

I also decided on a trade-off between a large monitor and tower computer unit, which I needed to hide, in favour for a smaller laptop or battery-powered monitor. With the laptop or a battery powered monitor there would be no cable on the floor as potential trip hazard (particularly when moving the TW).

Looking for attractive equipment on wheels I did not find much to inspire me. Most items appeared to be aimed at either hospital use, where the colours white, silver and light green domineered or at office use, where blacks, brown and metallic colours were most prominent. For domestic use there were only a few; mainly small computer desks, TV stands and tea or service trolleys. The tea or service trolleys, in particular those from 1930-40s, were more attractive in style than the functional pieces of furniture such as TV stands.

Limits on time and financial resources prevented me from sourcing vintage tea trollies to re-purpose them for the TW. In the end I decided to buy from Amazon UK two black Lavolta laptop table desks on wheels, which were adjustable in height. First, I bought one to try out. I wanted to assess its sturdiness and quality and see how the laptop and volume mechanism could fit. I still had to think about a cover for the keyboard to hide the computer.

Figure 29: Laptop table with bespoke hand shape button

5.2 Interaction mechanism for the sound

As with the volume mechanism of the TT, I considered different possibilities whilst having an elderly person in mind. The interaction mechanism needed to be simple, intuitive; preferably something the residents were already familiar with.

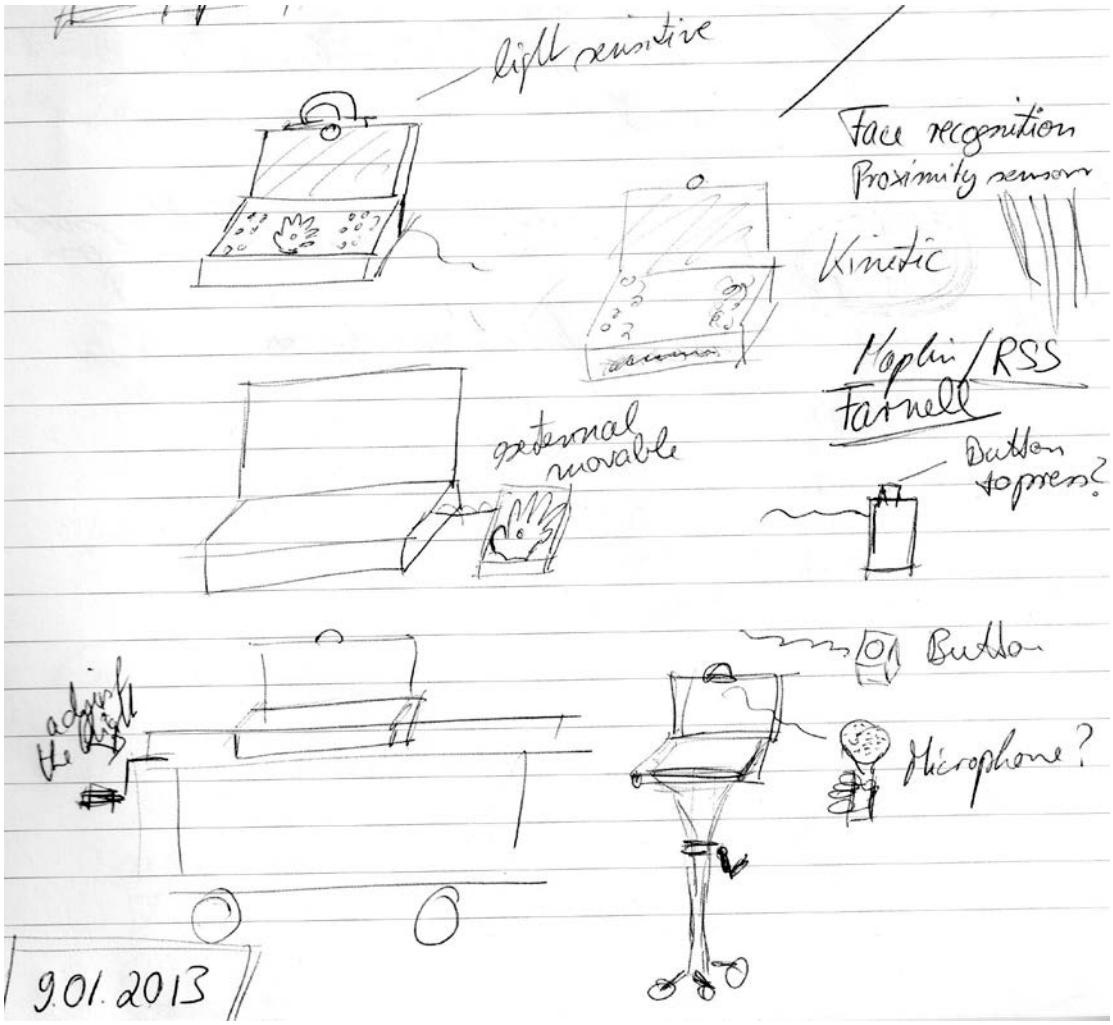

Figure 30: Sketch of considered interaction mechanisms

I investigated choices for different types of buttons, proximity sensors and face recognition. The websites Cool components, Maplin and Oomlout were helpful in reviewing choices. I also sought technical advice from various members of the technical team as well as the lecturer in physical computing.

Face recognition software turned out unsuitable because it could not recognise two faces at the same time. I looked into creating a bespoke button with 3D printing, but had to abandon the idea due to printer issues. The little red button, which I had previously used for demonstration, appeared too small considering the residents' abilities. Then I discovered large arcade dome buttons, which

included an LED light inside to indicate whether the button was switched on or not. I chose the blue 10cm diameter one.

Although the button seemed a suitable choice I was also intrigued by functionality of the proximity sensor and that the sound could come on without conscious interaction, which might have made it even simpler.

I decided to continue my experiment with two options. One option was the arcade button. The other was a proximity sensor, which could detect with infra-red whether a person (or a wall) was in front of the TW and switch the volume on. For this, I chose an infra-red sensor with a detection range from 20cm to 150cm.

5.3 Software development

Google Chrome's aapRTC was used to build a bespoke video connection, which ran over the chrome web browser. One of the computers needed to point at https://apprtc.appspot.com/. It generated a "room id" and displayed the link at the bottom of the screen. Accessing the link from another computer initiated the video app. The webRTC app took over the computers' built-in cameras. The video link was direct between the two clients (i.e. the laptops) and the app ran smoothly.

A basic page was programmed, which had buttons on the screen to switch the sound on and off. At this point the *arduino* inputs into the web page still needed to be integrated. This appeared to be possible by using arduino.js (JavaScript based arduino communication).

Since the availability of laptops for the TW research was still unconfirmed, the software development had to work cross-platform and with different operating systems. This made the investigation more complex. For the initial testing of the app and scripts we worked with a MacBook Pro laptop (from 2006) and an IBM PC. It turned out that the code had to be adjusted for the laptops that were allocated for the research.

5.4 First iteration of the TW design

On 27th March 2013 I met with Moji Olusesan, the care home manager at Ingestre Road and Jeremy Morris to demonstrate the development of the TW so far and to discuss next steps for the research. I brought along the movable laptop table, two laptops and the physical button. Moji was positive about the development of the TW, in particular about the physical button. Considering the future vision of the TW connecting two lounges like a window, she suggested integrating a bell in the system to get people's attention. I supported her idea and added the bell as a design requirement.

Moji also informed us that the merger of the two care homes had been pushed back to June. Considering the on-going preparations for the move Moji stated clearly that they could neither support the research financially nor with generous amount of time by staff. It was agreed that the residents would be gradually introduced to the TW by using the existing KIT equipment & Skype during the next months. Jeremy confirmed that KIT volunteers were available to support me with my research.

The following section describes the construction of the physical TWs.

5.4.1 The two TWs with interaction mechanisms

The two laptops for research were confirmed: a 15inch chromebook, running windows 8, and a 19inch MacBook Pro, running OS X10.6 Snow leopard. The laptops had different dimensions; so bespoke covers were made out of 2mm MDF using a laser cutter. The cover was supposed to hide the keyboard and to maintain a simple look of the technology.

Figure 31: TW with integrated infra-red sensor and cover for the laptop

The chromebook was used with the TW using the infra-red sensor as volume switch. Nick Weldin, from the Middlesex electronics department, helped integrating the infra-red sensor under the laptop table. A second hole was drilled into the table to include the button for the bell. A third hole was drilled for a LED light, which worked as a “on air” light to indicate when the volume was on.

Figure 32: Nick Weldin in the 3D workshop fixing the infra-red sensor to the TW

The MacBook Pro was used with the button & bell box as interaction mechanism. To integrate the bell, a second button was connected to the *arduino* board. This button was added to the buttons box together with the large arcade button for the sound control. Although the large blue button had an LED light integrated, it was too subtle in daylight. Therefore another LED light was added on to the side to act as an “on air” light.

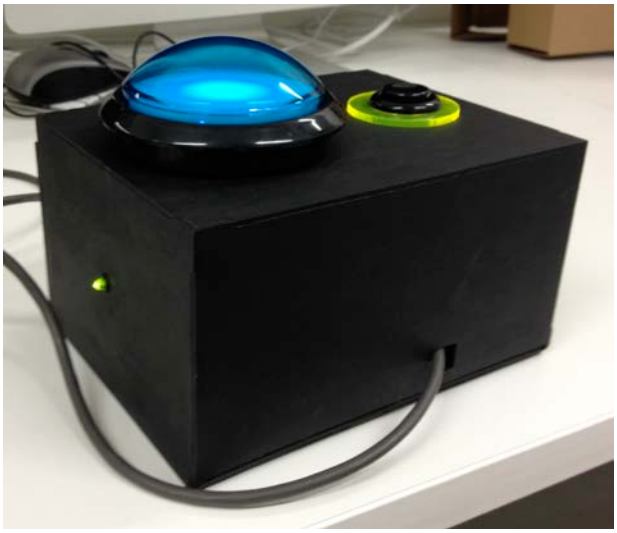

Figure 33: Button box, painted black with blue button LED light on and LED light on the side

Nick continued to be of immense support, in particular when *arduino* sketches stopped working or electronics broke down. For example, at the beginning of June a wire got lose inside the prototype, causing the volume not to come on. Dealing with the troubleshooting pointed out how fragile prototypes were despite sturdy appearances.

5.5 Developing the TT app

In the period between January and July 2013 Roy and I met approx. 25 times and exchanged emails as well as conducted ad hoc tests of the system during the day in order to develop an alternative to Skype.

On review it can be said that there were 3 major phases to developing the TT software:

Up to 29th April 2013

- Exploring the use of appRTC in a webpage that was able to integrate *arduino* input with Arduino.js

Up to 10th July 2013

- Investigation into the use of a Google app where the Google channel api was embedded and the embedded JavaScript was able to interpret the arduino input (see diagram fig. 34 – version C)

From 10th July up till now

- New approach by using a browser only approach. The chrome browser was used to access mdx-rhcloud.com (which had access to stun and turn servers

which allowed video connectivity). Later (from Dec 2013) when we continued our investigations with a focus on tablets and for this we had to use Mozilla Firefox as a browser to access mdx-rhcloud.com since there were compatibility issues involving the front and back cameras of the tablet. (See diagram fig. 34 - version B)

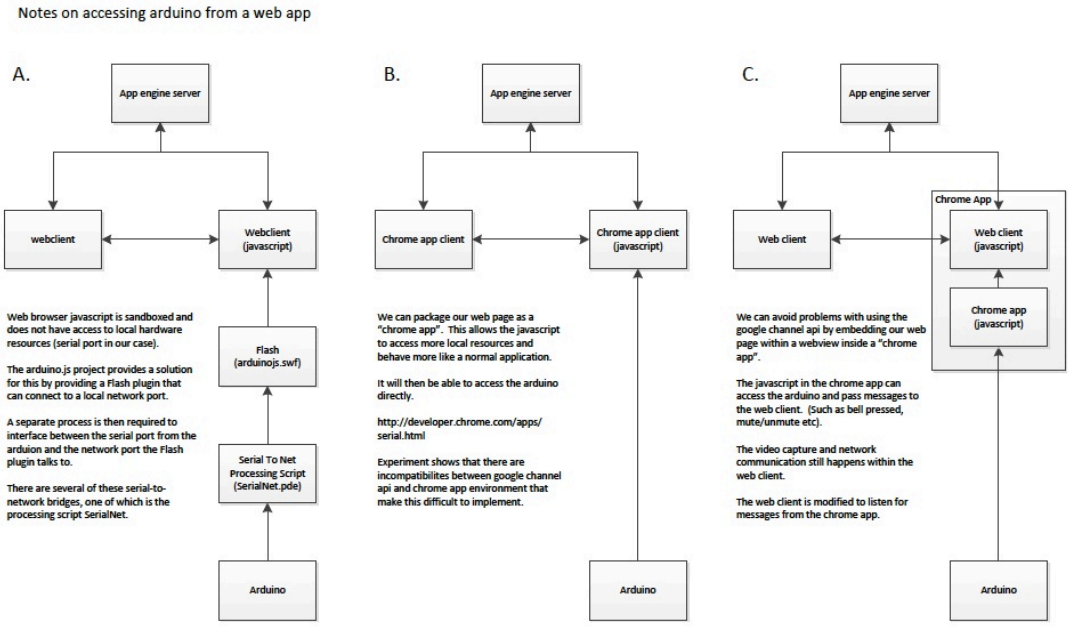

Figure 34: Diagram of programming structures made on 25th April 2013 by Roy Thompson

5.5.1 Specific challenges

There were many sources for issues and overall it was frequently difficult to determine where the actual problem lay. The issue could have been locally with the script on the client machine (PC or Mac), or with the connection to the server? Was it a problem with connection speed or a physical hardware issue? The following reports on the main challenges of the app development in the second phase.

5.5.2 The TT chrome app

By July we had worked on 16 releases of the TT Chrome app. To run the specific TT app the computer had to have the latest version of Chrome beta installed. When working with external cameras, the camera always had to be specified in

the Google preferences before opening the TT app. Once the app was added to the Chrome extensions, the app could be opened with a short cut. When the app was opened in the browser window, a dialogue box informed of connections to the camera and server and asking the user to connect to the other TW. The dialogue box was vital because as main tool to diagnose source of issues. However, the dialogue box was only to be seen by the person starting the TT app and not by the residents. I write more about the interface in following section 5.5.3

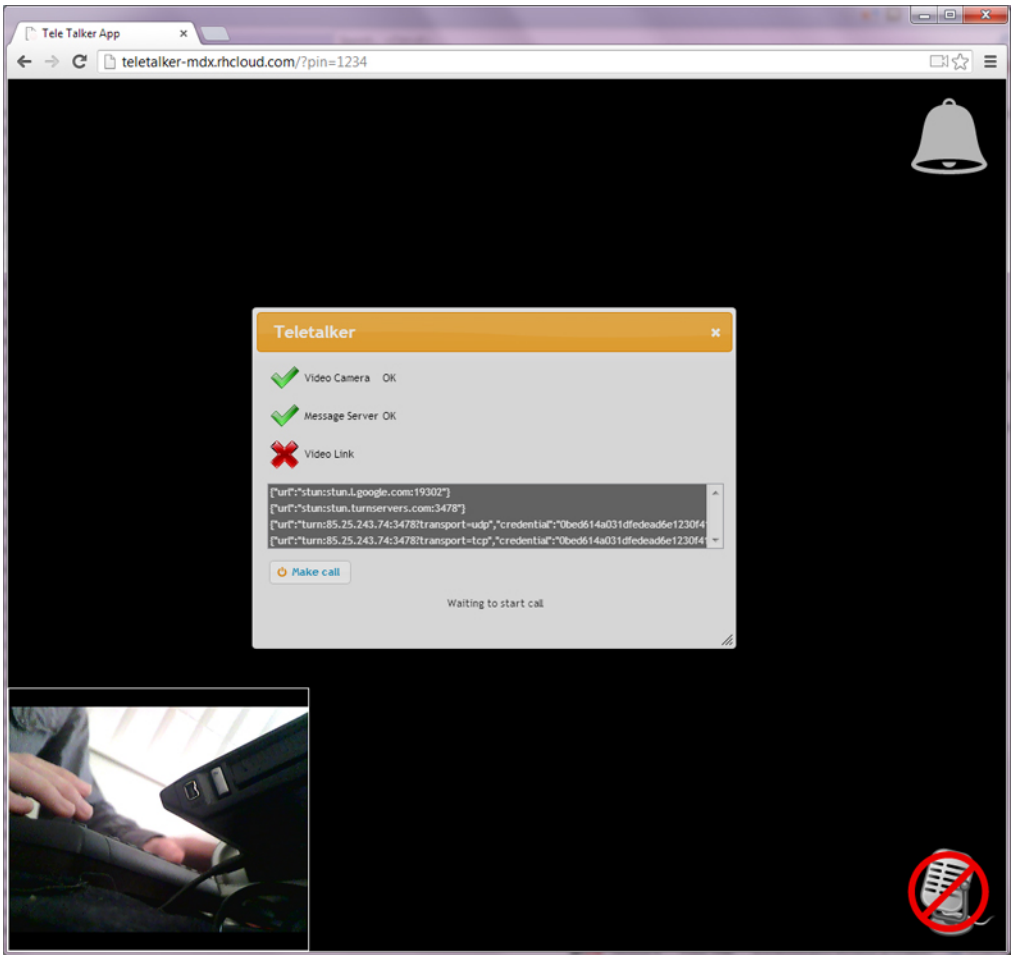

Figure 35: Screenshot of the TT app dialogue box taken on 24th July 2013

5.5.3 The app's visual interface

The interface was very simple. During a live video connection one would see the other location, a little window of themselves in the bottom left, the bell icon in the top right corner and the unmute microphone icon in the bottom left corner. The idea was to have the app full screen, so no other options were shown to the residents. The microphone icon was chosen, over a loudspeaker icon, to

indicate that one needs to unmute it in order to speak. The choices of icons and their visual treatment were preliminary, I wanted to use them as a proposition and assess whether the icons' size and literal meaning were appropriate.

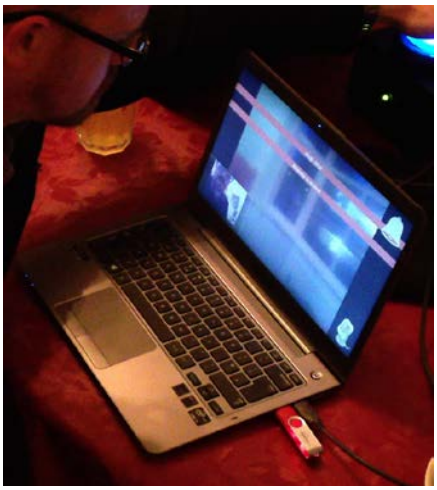

Figure 36: Roy tests the button box for functionality

After logging in the user saw the message bar saying "remote muted". Once the user clicked on the striked-through microphone icon, pressed the arcade button in the buttons box or stood in front of the IR, the volume on the other computer was turned on and the person saw a message bar saying that "remote unmuted". On the local computer the icon changed to a microphone without the red circle. When the bell was rung (either using the physical buttons or with a mouse click onto the icons) a second message bar appeared on the screen saying the words "ring ring" (see fig. 36).

The choice for the wording of the messages was preliminary at this point and the main aim was to get the technology working.

5.5.4 Distorted audio and noises

One of the greatest challenges during the development was distorted audio and noise. At times the speech transmitted sounded like "aliens talking" rather than a human voice. How badly the distortions were dependent on the type of computer, whether the person was using a built-in camera and microphone or an external one, the position of the speakers near the microphone and at times the order of accessing the video connection was relevant. Working with the Chromebook and MacBook Pro produced the least amount of audio distortion during the connection.

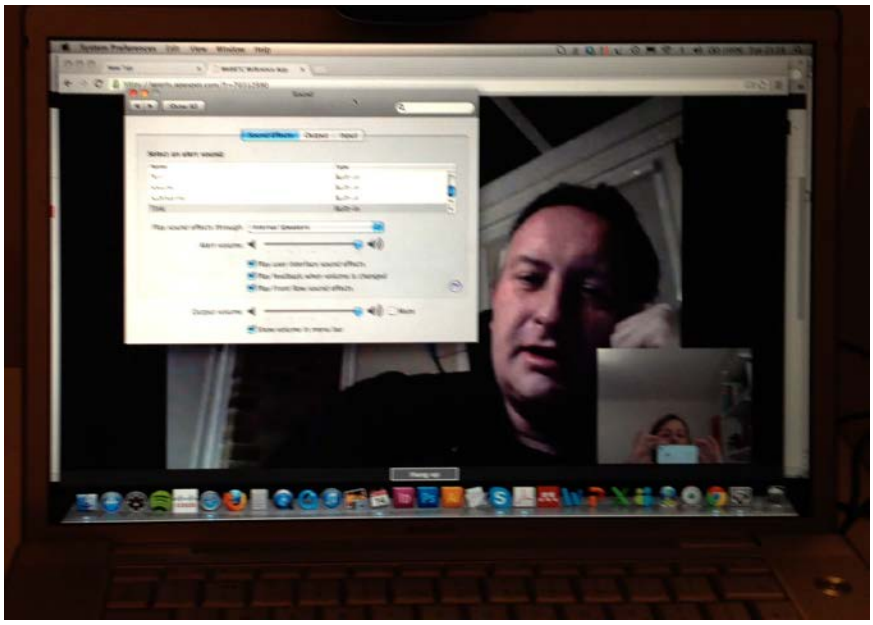

Figure 37: Investigation into sound distortions when using webRTC on 20th May 2013

This brought home that online video connectivity alone was not the most difficult challenge when programming such an app. Achieving clarity and synchronicity with the audio connection was the greater challenge. Both needed to work in sync to ensure a convincing and enjoyable experience. Although webRTC has been an open standard, there appeared not to be any tinkerers, who had reproduced reliable online video & audio connections[11]. Skype as well as Googlehanghouts, Oovoo, Facetime must have developed an intelligent algorithm. Their apps are able to distinguish between words spoken in front of the computer (phone or tablet) and words heard through the computer's speaker, which the algorithm suppresses.

5.5.5 Online connectivity using dongles

Another major issue was to ensure online connectivity at the care homes. KIT used a WI-FI connection specifically provided by Camden Council, but Camden Council did not allow any other devices to be added. I bought two 3G dongles (with 3 gigabyte of data) to create an online connection.

[11] I am not aware of any other video connectivity app based on webRTC other than talky.io. In October 2013 I tried Talky.io, a free video connection service for 6 locations. Talky.io suffered immensely under the sound problem, so that a proper conversation was impossible.

Since dongles did not use a publicly visible IP address (but a NAT), the use of the current server was permitted. It was, however, possible to use the openshift server by Redhat. The TT Chrome app only needed to include the line:

messageServer = "wss://teletalker-mdx.rhcloud.com:8443/1234"

5.5.6 Conclusions

The app development was challenging because of the many different factors that were involved. The most persistent and challenging problem was the audio distortion, which depended not only on software solutions but also on the very specific hardware set-up (i.e. nearness of the speakers to the microphone). This made it difficult to program or work towards a cross-platform and computer type independent solution.

5.6 The TW at Maitland Park

I visited the Maitland Park facility three times before I took the TW prototype for demonstration to the KIT volunteers (see fig. 38). Senior people in the care home management had changed, which meant that KIT had to re-negotiate their relationship with the new management including allocated times and resources for their visits. However, it was important to me that the KIT volunteers were informed about the TW's development and that it could be considered for research in the future.

On 10th July I took the TW to Maitland Park to demonstrate it to KIT volunteers. To avoid the connectivity issues, I used a router to create an offline network for a range of approx. 20 meters. Enough to cover the distance between the two lounges.

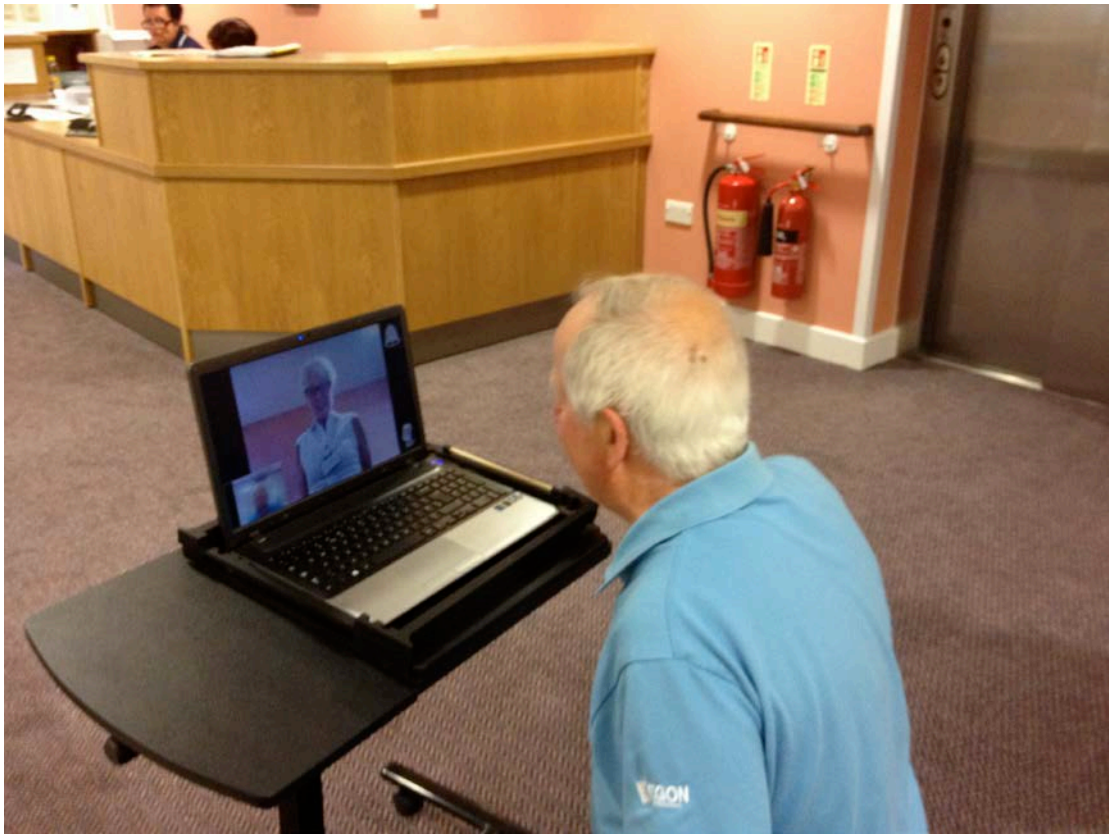

Figure 38: Jeremy tried out the TW on 10th July 2013 at Maitland Park

On that day KIT's afternoon was cut short by clerics preparing for a mass to take place in the lounge. This meant that residents were either taking part in the mass or had returned to their rooms. I demonstrated the TW prototype to Jeremy, a second KIT volunteer and a member of staff in the hallway next to the lounge. They enjoyed using it and were positive about the development. Due to the mass taking place, they had to be quiet and could not explore the bell ringing in its full potential to avoid noisily disruption.

6 Appendix for Chapter 8

6.1 Conducting a pilot workshop

On 19th June 2013 I conducted a pilot workshop with 8 MA Creative Technology students at Middlesex University. The pilot workshop was held to evaluate the flow and order of the group design tasks for the workshop. The pilot workshop was in total 3 hours long. The TW was set-up for students to try it out. In the first hour the narrative of the conception of the TT and TW was told and some highlights from the field research reported. This was followed by examples of uses for online video technology in different areas (at times specifically concerning older people). After presenting the examples students were asked to perform the "magical TT" task (see task description in thesis section 8.6.2).

The students' ideas were not very magical or original. They only suggested changing the colour or skin of the TT. This surprised me at the time, but students explained at the end of the workshop that the examples given reduced their ability to imagine something "magical", since the examples were very functional and based in the real world. (I addressed this for the stakeholder workshop by placing the 'real-world' examples after the magical exercise.)

After the magical exercise I asked them to imagine they were older and think of scenarios where the concept of the TT might be useful for them. Since there were only 8 students they worked in two groups of 4. All of the students were not originally from the UK, and possibly because of this the concept of online video connectivity was overall attractive to them. Their ideas ranged from social uses, such as contacting the family, a secure facility for visa renewals, help with shopping and other information service, as well as online video connectivity for lonely pets at home.

I asked them to prioritize their ideas, which formed the basis for 3 groups working on 3 ideas:

- Social connectivity
- Information and service ordering facility
- Passport and Visa renewal facility

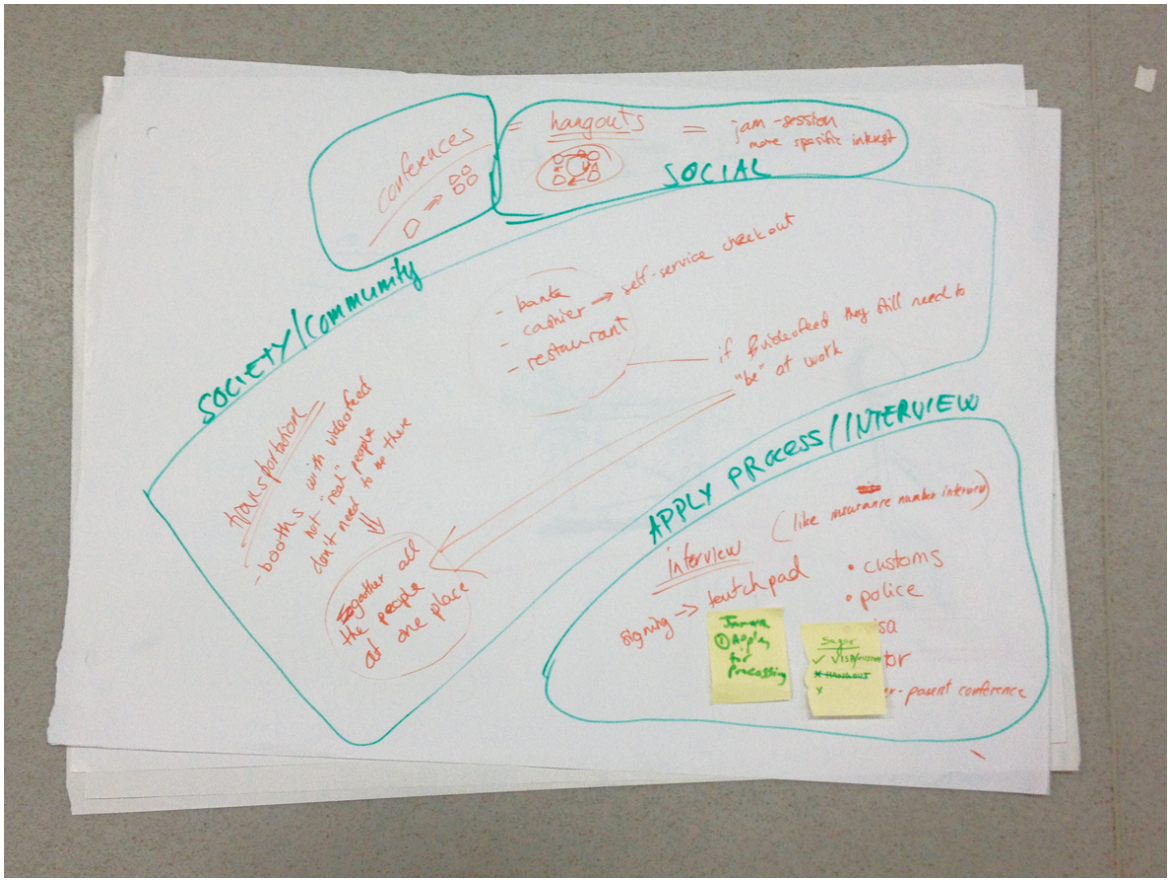

Figure 39: Pilot workshop brainstorm flip chart

They applied the final group exercise, which involved the keep change lose technique (D. Frohlich, Lim, & Amr, 2011; D. M. Frohlich, Lim, & Ahmed, 2014) in order to design their device for online video connectivity in their particular scenario.

Although the pilot workshop took place with students, rather than with a mixture of stakeholders, it was invaluable to conduct the pilot workshop to gauge how long group exercises took and the range of ideas I could expect for the scenarios.

6.2 Design workshop summary report

Design workshop: The future of the Teletalker

Executive summary

Marianne Markowski, PhD candidate at the Art and Design Research Institute at Middlesex University, held a participatory design workshop to develop and discuss the future of her research tool the Teletalker. This constitutes the final part in her employment of the constructive design research methodology. The workshop took place on 11th July 2013 at Middlesex University. Academics researching older people, organisations working with older people, designers, and older people were invited to take part and contribute with their perspectives to collectively re-design the Teletalker. The workshop achieved its aims to generate discussions and 3 high-level designs for future applications of the Teletalker concept, which were:

- Virtual hospital visits
- Shared shopping
- Connected learning

Awareness levels on how to design for older people were raised with those participants, who were not directly involved in research with older people.

The British Society for Gerontology kindly funded the catering for the workshop.

Acknowledgements

Marianne Markowski would like to thank all the participants and people involved in making this workshop happen. In particular to Dr Magnus Moar for taking fantastic photos and Dr Ralf Nuhn for excellent time keeping as well as John Miles for supporting this event through the BSG small events fund and raising awareness about gerontology education.

Figure 1: Participants during in the design workshop

Thanks to Eleanor van den Heuvel and Felicity Jowitt from Brunel University, who helped to submit the BSG application for the small events grant and for being pro-active. A special thank you to Dr Shailey Minocha for contributing with her perspective through her research on older people being online. A particular big thanks to Lisa Dubow, Age UK Barnet, and to Jeremy Morris, KITuk.org, for helping with the field research in the first place and for contributing with their perspectives on the day.

Introduction

This summary report aims to be easy to read, visual and informative. It intends to provide a feeling "of having been" at the participatory design workshop held on 11th July at Middlesex University. The workshop functioned as a vehicle to explore the efficacy of Teletalker design principles and to generate discussion.
This workshop was more satisfactory than the trial one conducted with 8 Middlesex students on 19th June 2013[12].

The report explains background and workshop format. It further describes discussions and outcomes. The participants were specifically selected to bring different perspectives to the group activities. The participants' biographies are included as an appendix.

Figure 2: Jeremy Morris from KITuk.org Skype calling into the workshop

[12] This appears to be due to a re-ordered structure of the workshop format and to differences in maturity and experience of participants and their familiarity with older people.

Background

Constructive design research as a methodology places the creation of the artefact into the centre of the design process and generates knowledge through this process (Koskinen 2011).

Marianne Markowski has developed the Teletalker, a live online video system connecting two places with a simple mechanism to control the volume, to demonstrate the benefits of online connectivity to older people. It is her research tool to investigate the question of how to design online social interaction for older people (teletalker.org). The Teletalker and its little sister the Telewalker (the latter has been specifically developed for use in care homes) were placed into real life context in order to gather reactions and observations from older people and anyone else involved.

Figure 3: Teletalker connecting Middlesex University with Age UK Barnet

It is pertinent to Marianne's methodology (Gaver 2012) to have a productive discussion about the Teletalker, which implies a discussion about the role and physical forms online technology for older people can take.

The participatory design workshop therefore has become Marianne's "show room" for the Teletalker (Koskinen 2011).

For this she invited a selected audience, to which she demonstrated the Teletalker and Telewalker and disseminated field research observations.

After presenting different perspectives, inventions and interventions that could be used for connecting people audio-visually online, she asked the audience to collectively re-design the Teletalker artefact by imagining scenarios of use and employing the "keep, change, lose" method (Froehlich 2011).

Figure 4: The Telewalker in use at Age UK East Finchley

Literature

Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J., & Wensveen, S. (2011). *Design Research Through Practice: From the Lab, Field, and Showroom*. Morgan Kaufmann.

Frohlich, D., Lim, C., & Amr, A. (2011). Supporting memory and identity in older people: Findings from a "Sandpit" process in *Include* London: include11.kinetixevents.co.uk

Gaver, W. (2012). What should we expect from research through design? CHI'12 (pp. 937 – 946). Austin, Texas.

Format

The design workshop was advertised on the ADRI website and in other relevant Middlesex and BSG publications. Workshop participants were invited by individual selection in order to keep a balance in the mixture of expertise, but also to share diverse perspectives.
In total 16 participants took part:

- 3 were representing the group of designers
- 4 were representing the group of older people
- 3 were academics researching older people
- 6 participants were from organisations working with older people

The goal of the day was to collectively discuss future applications and the design of the Teletalker / walker by being as hands-on (e.g. drawing on flipchart) as possible.

The schedule of the day was as follows:

10:00	Arrival
10:15	Welcome & Introductions *Your first memory of your TV*
10:30	John Miles: Introducing the BSG
10:45	Marianne: Why was the Teletalker designed?
11:30	Dr Shailey Minocha: Older people's accounts of their online social interactions
11:50	Coffee break
12:05	**Group exercise 1:** "Imagine you had a magic Teletalker / Telewalker: Where would it be? What would it be like? When would you use it? And with who?"
12:20	Marianne: Examples of other projects involving online video connectivity
12:40	**Group exercise 2:** "Imagine you're a number of years older, how do you think the concept of the Teletalker / walker would be useful for you?" *Note: In each group is one designer, one older person, one researcher, one person from an organisation*
13:00	Lunch
13:30	Group exercise feedback
14:30	Prioritisation activity
14:45	**Group exercise 3:** "How would you re-design the Teletalker / walker? Make the Teletalker / walker applicable to your chosen scenario e.g. Teletalker visits to your GP By employing the keep / change / lose method."
15:15	Coffee break
15:30	Group exercise feedback
15:45	Wrap-up & questions
16:00	End

Figure 5: John Miles introducing the BSG

Figure 6: Dr Shailey Minocha reporting from her research on older people being online

Workshop design process

The UK design council describes the general design process as “a double diamond”.

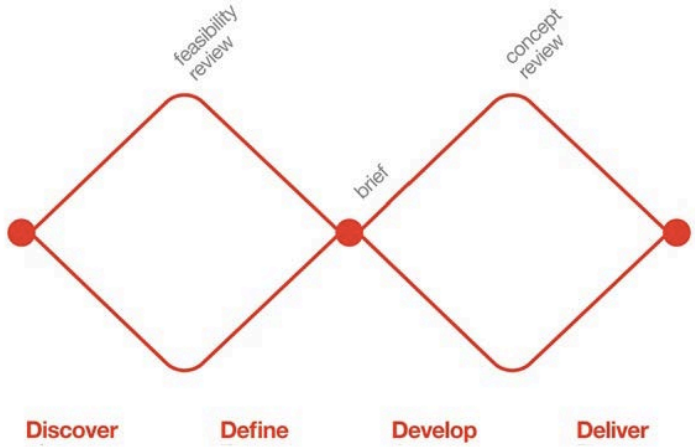

Figure 7: UK design council process diagram: The double diamond maps the divergent and convergent stages of the design process. The four distinct phases Discover, Define, Develop and Deliver are the different modes of thinking that designers use. (Accessed on 1st Feb 2013)

There is a limit to what can be achieved in one day and the same process wasn’t expected in this workshop.

However it was important that participants were given enough stimulation and background information to elicit an informed response. In short, allowing enough time for participants to think, diverge and converge.

The process of the design workshop can be described in 2 parts: 1.) divergent and 2.) convergent in order to achieve high-level designs as an outcome.

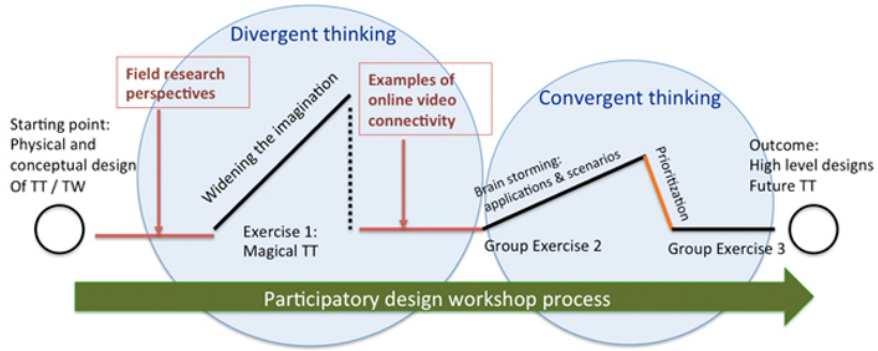

Figure 8: Participatory design workshop process: The physical and conceptual design of the Teletalker (TT) and Telewalker (TW) is the starting point for the re-design challenge. Presenting observations from empirical research and giving participants the exercise to imagine a magical TT that can do whatever they want widens their thinking. Providing them with real examples of applications narrows the thinking into forming realistic scenarios (convergent).

The workshop was a vehicle to validate the efficacy of the following design principles applied during the Teletalker research:

- Understand older people's needs
- Understand older people's current (non)-use of online connectivity
- Build a design proposition i.e. the Teletalker
- Place the design proposition in context (field research) and collect feedback, observations & narratives
- "Show room" the design proposition and context material to a larger group of 'stakeholders' for discussion
- Take the design proposition and dream of potential future features, but also compare to similar real design propositions
- In specifically composed groups (one designer, one representative of an organisation, one academic, and one older person) consider scenarios and applications for online video connectivity
- Prioritise scenarios & applications within the larger group
- Modify, reject or completely re-design the design proposition, but keep it simple, inclusive and age-neutral
- Achieve an increased awareness level for designing for older people and application design ideas based on group consensus (which can be built and tested in context)

Workshop discussions

This report does not list all the discussions exhaustively, but aims to address the main ones:

Group older people by ability

When introducing the second group exercise Marianne suggested that the three different working groups could imagine to be from different age groups, such as in their 60s, 70s and 80s. This idea was rejected since it seemed to be more logical to group older people by ability (such as wheelchair users) or by health issues (e.g. incontinence, dementia). A participant suggested that “the soul continues after life” and another explained that “the trick about the word ‘older’ is that it doesn’t define the detail”. One of the designers immediately picked up the idea and suggested a ‘Teletalker after death’ – where people can use it to leave a legacy or talk about the things one regrets. This product idea was not further developed.
The 3 working groups continued their exercise by imagining the age and ability of their choice.

Brainstorm results group 1

Figure 9: Group 1: Frances, Rachella, Peter, Felicity

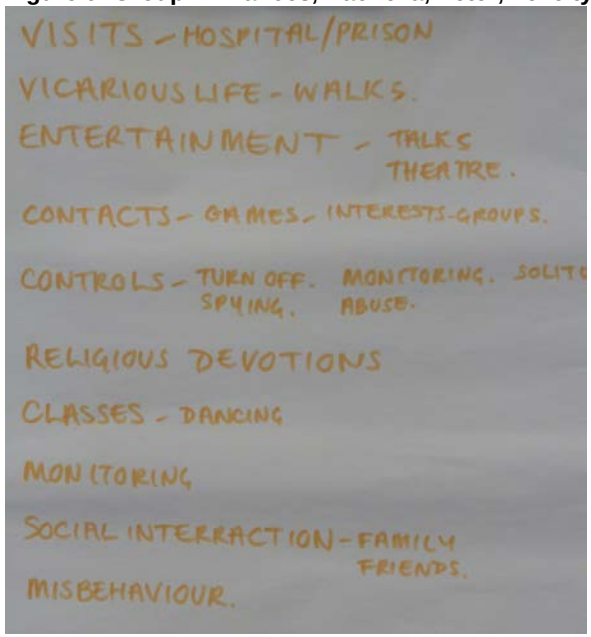

Figure 10: Output of group 1

This group discussed places where people can't attend or don’t like to go to, such as hospitals and prisons. With this they considered aspects of privacy and that one needed to be able to switch the Teletalker off or to give it other types of controls. They reviewed situations where the Teletalker could support activities that couldn’t be performed anymore such as walks or theatre visits. They debated

whether monitoring could be seen as an invasion of privacy and an abuse of the desire for solitude. The question of misbehaviour and abuse of the system was also considered.

Fixed Teletalker versus mobile Teletalker

One participant commented on how the Teletalker being fixed or mobile could be combined in variations depending on the context of use. Her suggestion was similar to a mobile library where you'd have a Teletalker fixed in a van, driving into areas where online access could be needed.

Brainstorm results group 2

Figure 11: Group 2: Teresa, Gordon, Shailey, Moji, John

This group discussed how to approach the design process. One approach was to start with the question "Where are the hassles?" "Filling in forms" was given as an example. A second approach was to look at 'cycles of time' such as the daily, monthly, yearly cycles and family event cycles and to see where the design fitted in with the routine. In their view it's important to the design process to draw out ideas very early so they can be discussed, improved or rejected.

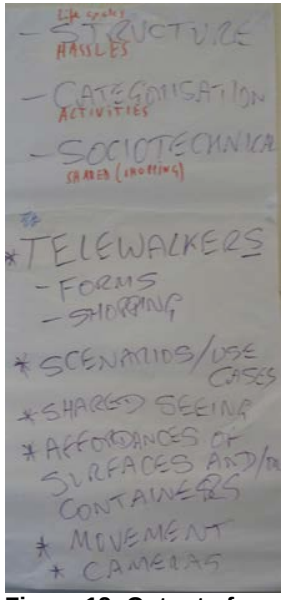

Figure 12: Output of group 2

Another part of the design process is the socio-technical aspect, where technology affects society. The example of a "weekly Friday Telewalker shopping" for residents in a care home was given. A socio-technical aspect would be that residents who have been taken shopping with "remote seeing", might want products that they would otherwise not have thought of.
Another example was a Teletalker desk for remote online form filling with a second camera pointing towards the surface where the form would be placed. When the person had a question they would be able to interact with another person via online video, after meeting virtually via the form filling.

Need for worldwide guidelines

One participant commented on how there is a need for worldwide guidelines, on how technology should be combined with people using it for other people's daily routines. She was particularly concerned about how people, more often 'the shopper' in the example "shared shopping, could be exploited in different parts of the world. The discussion continued around having pilot projects as proof of concept versus global thinking for the implementation right from the start of the design process.

Brainstorm results group 3

Figure 13: Group 3: Suzette, Stephen, Jerome, Mark, Maria

Group 3 discussed the aspects of portability versus fixed devices and how this determined a different physical form of the device. The idea of society & community building was considered. In their view society is fragmenting and the Teletalker concept could possibly help to rebuild communities.

It could support cultural diversity, for example, when an older person with dementia would like to speak in his mother tongue. A feature to directly translate into another language would be interesting.

A learning forum could be established with the Teletalker.

The online video transmission could also be particularly useful in the built environment such as town squares or supermarkets since it would provide a sense of being there. A possible application could be video tours to certain locations.

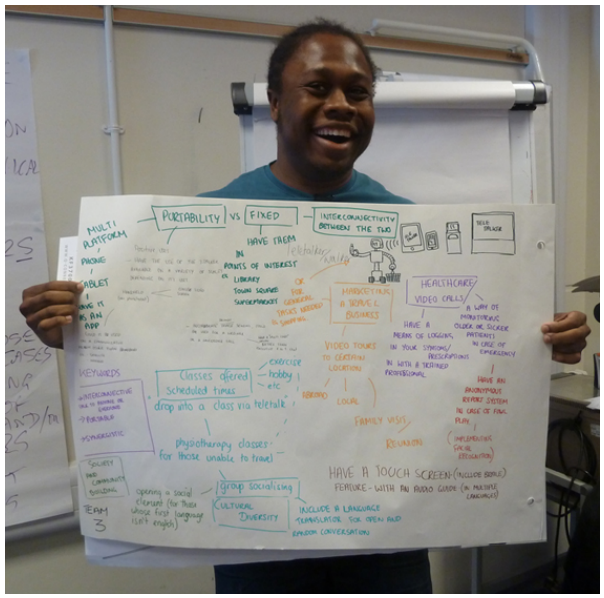

Figure 14: Output of group 3

They discussed the concept "health care come to you" with the Teletalker as a monitoring device, additional sensor technology could inform carers.

The Teletalker concept may also be useful in "keeping the will to be active" alive in a person. Older people in a care

home would be able to connect by being involved in remote activities.

Not all older people are in care homes

One participant pointed out that only a minority of older people (about every 10th person over 65 years) are in care homes. She clarified this in response to many previous examples referring to older people in care homes. In her view not enough is done to maintain independence of an older person at home.

Virtual reality replacing human contact

One participant highlighted the dangers of virtual reality with machines replacing humans, and how children are learning to take this as a given. It was pointed out how the Teletalker concept is not about replacing human contact with virtual reality but about being a means for people to connect where they otherwise would not be able to.

Prioritization activity

Participants were asked to write their names on a post-it note and number their preferred ideas (1-3), then stick them on the flip charts.

Figure 15: Participants prioritise the ideas on the flip charts.

Figure 16: Marianne looks for clusters of interest, where most participants marked their preferred idea

High-level design outcomes

After the prioritization of ideas groups were formed based around the clusters of postit notes indicating the most preferred ideas.

Group: “Virtual hospital visits”

Frances, Peter, Felicity, Mark

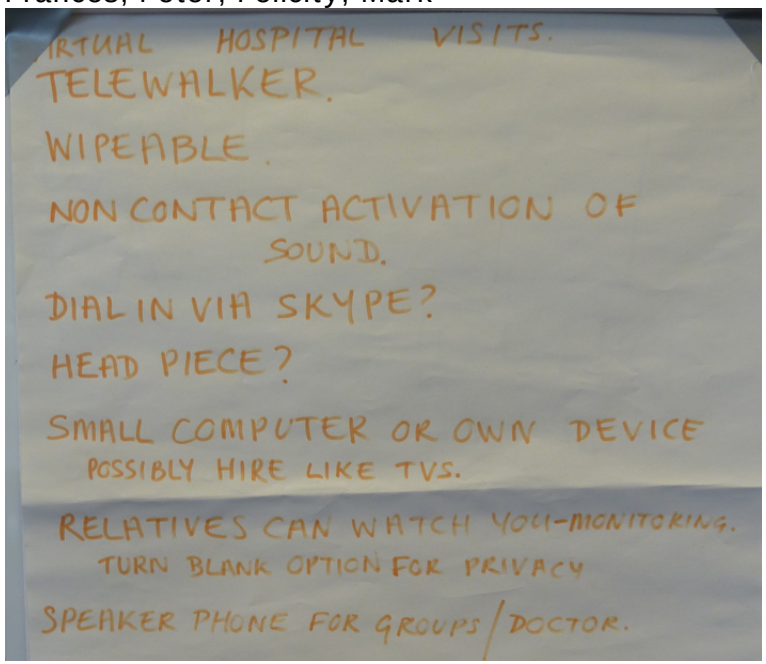

Figure 17: Output of the virtual hospital visits group

Group “Virtual hospital visits” decided early on that it has to be a Telewalker, which can be moved to the bed and out of the way and can be easily cleaned. They thought it made more sense to “dial in” rather than have it constantly on and planned to provide headpieces for privacy and noise levels. At the same time a speaker phone option was necessary to be able to have conversations in groups or so that relatives could speak with the doctor when she / he is around. They discussed the option of having a scheme like “renting the TV” for the Telewalker.

Group: “Shared shopping”

Gordon, Moji, John, Rachella

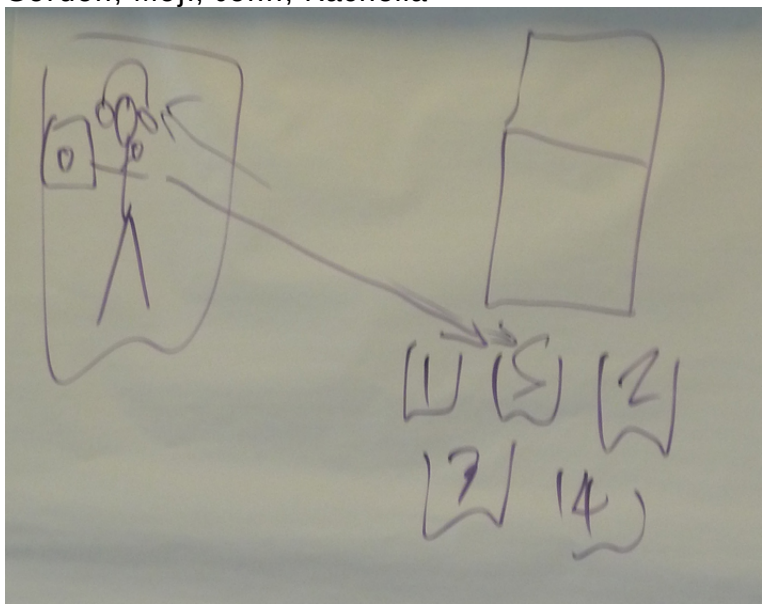

Figure 18: Output of the shared shopping group

The group “shared shopping” decided to concentrate on the design for the basecamp as opposed to the abled shopper that walks around the supermarket. In their view this shopper could simply have a tablet device around his neck and headphones with a microphone to receive and respond to instructions.

For the basecamp (up to 5 people could be placed in front of the Teletalker). They had discussions around:

- What type of microphone should be used?
- Who gives commands?
- How stressful would it be for the shopper?
- Problem of accidentally ‘filming’ people
- Checking out ingredients (on the food packet)
- Pilot project for a Super market – it must have consistent Wi-Fi connection

Group: “Connected learning”

Maria, Jerome, Teresa, Suzette, Stephen

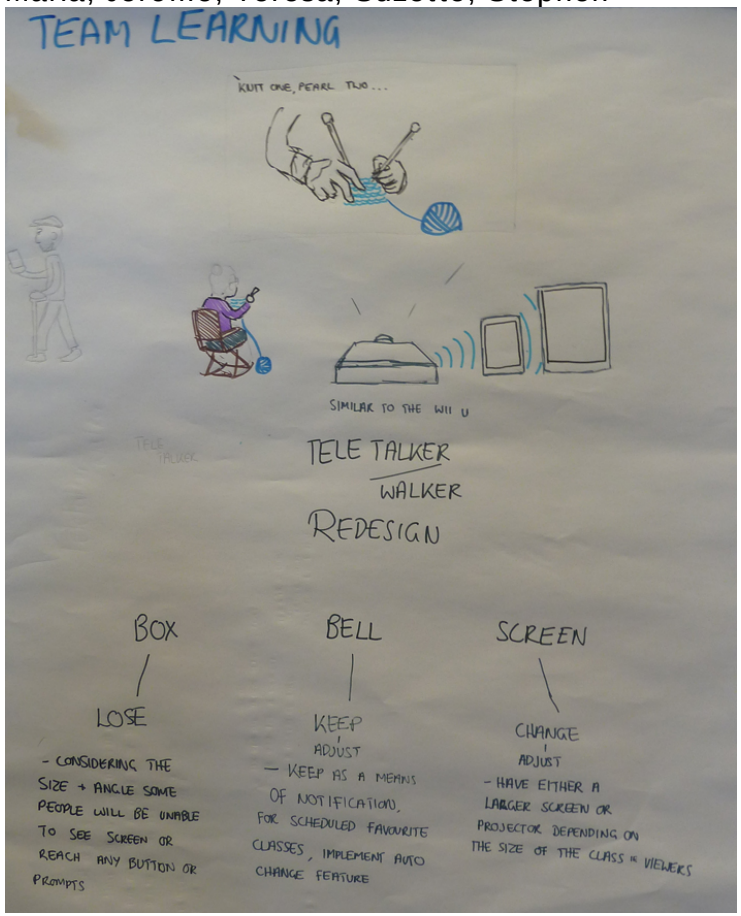

Figure 19: Output of the connected learning group

Group “connected learning” started by employing the “keep change lose” method for the Teletalker box, bell and screen. They soon established that the screen size depended on the group size and this could be designed to be variable by, for example, using a Wii U. Using something similar to a Wii U where you have a main unit connected to a screen and a game pad – a smaller touch screen communicating with the main unit - which allows you to work with two screens or even a large projection onto the wall when people gather in large groups in one room. The main unit could be connected to a TV, computer screen, an ipad or to a projector. They decided to lose the big brown box of the Teletalker in favour of making the unit more flexible and portable. This allows 'learning on the move' to be possible with a small screen.

Conclusions

Workshop participants embraced the idea that the role of technology for social interaction is not about replacing human contact, but about compensating potentially lost contacts or activities with technological mediated experiences. The social interaction taking place could be between one person connecting to a group via the Teletalker or small groups connecting to other small groups. Social interactions are likely to also take place within the group around a Teletalker.

The key features of the Teletalker concept such as:

- Connecting two places audio-visually
- A bell
- Simple volume mechanism
- Age neutral

were kept within each of the high-level designs, but through the scenarios placed into a specific context and items were added (e.g. head phones).

In all 3 high-level designs the re-designed Teletalker still connects places but the screen would not always be on, which is in contrast to the current TT / TW.

The physical form of the technology will depend on the specific context. For example, the screen size may vary depending on the group size.
In the hospital context the Teletalker has wheels, but this may not be necessary in the home context where any other home screen could be used. It was widely accepted to keep the controls as simple as possible.

Overall, this workshop format worked well in validating the design principles developed for constructive design research in regards to the Teletalker research. Ideally, there would be follow-up activities such as realising one of the high-level design ideas, placing it into real-life context and to show case its effects in another design workshop for discussion. In the long term this methodology would create a community of 'high-level' designers with a good awareness of older people's needs. This community could develop a range of consensus based design ideas, in which the role of technology is 'to serve' (in the example of the Teletalker 'to connect') people rather than leading digital developments where people are expected to adapt[13].

The form of the technology, an important, but secondary aspect as long as it is simple and inclusive, will be determined by the specific application design.

[13] For example the UK government has a digital strategy with 'a digital by default' standard aiming to provide more services digitally. http://publications.cabinetoffice.gov.uk/digital/strategy/

Appendix

Participants who attended 11th July 2013

Lisa Dubow (Age UK Barnet)

Jerome Hanciles (Multimedia designer)

Frances Hershman (retired, custom jewelry trader)

Felicity Jowitt (Industrial designer)

Dr Suzette Keith (Volunteer Hackney silver surfers)

Peter Leanse (Volunteer at KIT)

Teresa LeFort (Ransackers Organisation)

Rachella Michaels (Psychotherapist)

John Miles (Intergenerational research)

Dr. Shailey Minocha (research: older people online)

(http://crc.open.ac.uk/Projects/OlderPeople-BeingOnline)

Jeremy Morris (founder KIT UK)

(http://www.kitorguk.com)

Maria Nash (Enfield age 55 forum)

Moji Olusesan (Care home manager)

Dr. Gordon Rugg (design research)

Dr. Mark Springett (inclusive technology design)

Stephen Taylor (retired, import - export business)

Organising team:

Marianne Markowski is in her third year fulltime PhD studies at Middlesex University, Art & Design Research Institute, London. Her research is on the design of online social interaction for older people. For this she has designed a physical research tool - the Teletalker - that facilitates online face-to-face interaction for older people. Prior to returning to academia Marianne has been working in user research for over 8 years. She has evaluated a wide range of software and platforms starting from kiosk, desktop, interactive television to mobile applications and handsets. She led and worked on UX projects B2C and B2B in the retail, banking, education, mobile and government sectors.

Magnus Moar (Marianne's Director of Studies): Dr Magnus Moar is a Senior Lecturer in Digital Technologies at Middlesex University and is where he is a Programme Leader for MA/MSc Creative Technology BA 3D Animation and Games. He has been involved in teaching and developing interactive media since the late '80s and has worked on projects for the National Maritime Museum, the BBC and the Open University, among others. His research is concerned with:

- How new technologies may be used in learning
- Locative narratives and games
- Spacialisation of information.

Ralf Nuhn (Marianne's Supervisor) is a German-born intermedia artist who has exhibited and performed internationally. Since 2003 he has developed a shared artistic practice with Cécile Colle.
Cécile Colle}{Ralf Nuhn regard art to be inherently relational. Their approach is informed by parasitic strategies, adapting to the specificities of the "host" context while aiming at destabilising and transforming existing relationships. Thus, their work does not only communicate established issues and problems but might also act as a generator for new perspectives, if not solutions.

7 Additional Bibliography

AAL. (2008). Ambient assisted Living Joint Programme - ICT for ageing well. *Website*. Retrieved October 9, 2014, from http://www.aal-europe.eu/

Amichai-Hamburger, Y., Kingsbury, M., & Schneider, B. H. (2013). Friendship: An old concept with a new meaning? *Computers in Human Behavior*, *29*(1), 33–39. doi:10.1016/j.chb.2012.05.025

ANEC. (2014). Design for All - Priorities - ANEC: The European consumer voice in standardisation. Retrieved October 6, 2014, from http://www.anec.eu/anec.asp?p=design-for-all&ref=01-01.02-01&ID=8

Arent, B. (2008). *A practical Framework to enhance the experiences for the late majoritie's adoption within social communication*. Middlesex University.

Baltes, P. B., Sowarka, D., & Kliegl, R. (1989). Cognitive training research on fluid intelligence in old age: What can older adults achieve by themselves? *Psychology and Aging*, *4*(2), 217–221. doi:10.1037/0882-7974.4.2.217

Baltes, P. B., Staudinger, U. M., & Lindenberger, U. (1999). Lifespan psychology: theory and application to intellectual functioning. *Annual Review of Psychology*, *50*, 471–507. doi:10.1146/annurev.psych.50.1.471

Barlow, J., & Hendy, J. (2009). Adopting integrated mainstream telecare services: Lessons from the UK. *Chronic Disease Management*, *15*(1).

BBC. (2007). BBC Memoryshare - About Memoryshare. *BBC website*. Retrieved March 18, 2014, from http://www.bbc.co.uk/dna/memoryshare/lincolnshire/about

Beer, J. M., & Takayama, L. (2011). Mobile remote presence systems for older adults. In *Proceedings of the 6th international conference on Human-robot interaction - HRI '11* (pp. 0–19). New York, New York, USA: ACM Press. doi:10.1145/1957656.1957665

Birmingham Post. (2007). Web life. *Birmingham Post*.

Bouwhuis, D. G., Sponselee, A. A. G., & Meesters, L. M. J. (2012). Telecare adoption and technology acceptance. *Gerontechnology*, *11*(2), 4017. doi:10.4017/gt.2012.11.02.075.00

Buxton, W., & Moran, T. (1990). EuroPARC's Integrated Interactive Intermedia Facility (iiif): Early Experience. In S. Gibbs & A. A. Verrijn-Stuart (Eds.), *FIP WG 8.4 Conference on Multi-user Interfaces and Applications*. Heraklion.

Carpenter, B. D., & Buday, S. (2007). Computer use among older adults in a naturally occurring retirement community. *Computers in Human Behavior*, *23*(6), 3012–3024. doi:10.1016/j.chb.2006.08.015

Carroll, J. M. (2013). Human Computer Interaction - brief intro. In *The Encyclopedia of Human-Computer Interaction, 2nd Ed.* The Interaction Design Foundation.

Clarkson, P. J., Coleman, R., Keates, S., & Lebbon, C. (2003). *Inclusive Design: design for the whole population*. Springer.

Clews, M.-L. (2009). Heyday collapse exposes flaw in age-led targetting. *Marketing Week*.

Coleman, D. P. G. (1986). *Ageing and Reminiscence Processes: Social and Clinical Implications*. John Wiley & Sons.

Coughlan, S. (2009). BBC NEWS | Education | Museum lovers' social networking. *BBC news*. Retrieved March 18, 2014, from http://news.bbc.co.uk/1/hi/education/7902323.stm

Cross, N. (2007). *Designerly Ways of Knowing*. Birkhäuser GmbH.

Czaja, S. J. (2003). The Impact of Aging on Access to Technology. *ACM SIGACCESS Accessibility and Computing*, (83), 7–11. doi:10.1145/1102187.1102189

Dickinson, a, & Gregor, P. (2006). Computer use has no demonstrated impact on the well-being of older adults. *International Journal of Human-Computer Studies*, *64*(8), 744–753. doi:10.1016/j.ijhcs.2006.03.001

Dijksterhuis, A., & Nordgren, L. F. (2006). A Theory of Unconscious Thought. *Perspectives on Psychological Science*, *1*(2), 95–109. doi:10.1111/j.1745-6916.2006.00007.x

Eccles, A. (2013). The Complexities of Technology-Based Care: Telecare as Perceived by Care Practitioners. *Issues in Social Science*, *1*(1), 1. doi:10.5296/iss.v1i1.4464

European Commission. (2014). Robin the robot helps take care of 94 year old Italian Grandma Lea. *Press Release*.

Fisk, A. D., Rogers, W. A., Charness, N., Czaja, S. J., & Sharit, J. (2009). *Designing for Older Adults*. CRC Press.

Flechter, H. (2006). *The principles of inclusive design.*

Frohlich, D., Lim, C., & Amr, A. (2011). Supporting memory and identity in older people: Findings from a "Sandpit" process. In *Include*. London: include11.kinetixevents.co.uk.

Frohlich, D. M., Lim, C. S. C., & Ahmed, A. (2014). Keep, lose, change: Prompts for the re-design of product concepts in a focus group setting. *CoDesign*, *10*(2), 80–95. doi:10.1080/15710882.2013.862280

Gaver, W. (1992). The Affordances of Media Spaces for Collaboration. In *CSCW* (pp. 17–24).

Gill, J. (1997). *Access prohibited? Information for Designers for Public Access Terminals*.

Glück, J., & Bluck, S. (2007). Looking back across the life span: a life story account of the reminiscence bump. *Memory & Cognition*, *35*(8), 1928–39.

Goodman, J., & Syme, A. (2003). Older Adults' Use of Computers: A survey. In *BCS* (pp. 12–15).

Graf, P., Li, H., & Mcgrenere, J. (2005). Technology Usability across the Adult Lifespan. In *HCI* (pp. 0–3).

Greere, D. (2009). simplicITy PC unveiled for the elderly - Pocket-lint. Retrieved March 6, 2014, from http://www.pocket-lint.com/news/100397-simplicity-pc-for-the-elderly-unveiled

Grudin, J. (1994). Computer-supported cooperative work: History and focus. *IEEE Computer*, *27*(5).

Guide Video Conferencing. (2014). History of Video Conferencing. *video-conferencing-guide.org*. Retrieved May 6, 2014, from http://www.video-conferencing-guide.org/history-of-video-conferencing.html

Guizzo, E. (2010). How I became a Texi Robot and went Partying. *IEEE blog*. Retrieved from http://spectrum.ieee.org/automaton/robotics/robotics-software/052710-how-i-became-a-texai-robot-and-went-partying

Häikiö, J., Isomursu, M., Wallin, A., Ailisto, H., Matinmikko, T., & Huomo, T. (2007). Touch-based user interface for elderly users. *Proceedings of the 9th International Conference on Human Computer Interaction with Mobile Devices and Services - MobileHCI '07*, 289–296. doi:10.1145/1377999.1378021

Hanington, B. (2003). Methods in the Making: A Perspective on the State of Human Research in Design. *Design Issues*, *19*(4), 9–18. doi:10.1162/074793603322545019

Hanson, V. L. (2008). Age and Web Access : The Next Generation. *World Wide Web Internet And Web Information Systems*, *44*(0), 7–15.

Harwood, J. (2007). *Understanding Communication and Aging: Developing Knowledge and Awareness*. Sage Publications, Inc; 1 edition.

Helen, A. (2010). *Support for elderly clients to live at home via caring TV*.

Hill Country Disabled Group. (n.d.). What is disability? Retrieved from http://hcdg.org/definition.htm

Hollinworth, N. (2009). Improving computer interaction for older adults. *ACM SIGACCESS Accessibility and Computing*, (93), 11–17. doi:10.1145/1531930.1531932

Holtzblatt, K., & Beyer, H. R. (2013). Contextual Design. *The Encyclopedia of Human-Computer Interaction, 2nd Ed.*

ISO. (n.d.). ISO 13407:1999 - Human-centred design processes for interactive systems. *1999*. Retrieved October 30, 2014, from http://www.iso.org/iso/catalogue_detail.htm?csnumber=21197

ISO. (2010). ISO 9241-210:2010 - Ergonomics of human-system interaction -- Part 210: Human-centred design for interactive systems. Retrieved October 30, 2014, from http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=52075

John Clarkson, P., & Coleman, R. (2013). History of Inclusive Design in the UK. *Applied Ergonomics*, 1–13. doi:10.1016/j.apergo.2013.03.002

Johnson, M. L., Bengtson, V. L., Coleman, P. G., & Kirkwood, T. B. L. (2005). *The Cambridge Handbook of Age and Ageing (Cambridge Handbooks in Psychology)*. Cambridge University Press.

Jones, B. D., Winegarden, C. R., & Rogers, W. A. (2004). Supporting Healthy Aging with New Technologies. *Interactions*, 2–5.

Keates, S., & Clarkson, P. J. (2003). *Countering Design Exclusion: An introduction to inclusive design*. Springer.

Kelly, H. (2013). Robots: The future of elder care? *CNN*.

Koskinen, I., Battarbee, K., & Mattelmaki, T. (2003). *Emphatic Design User experience in Product Design*. IT Press Finland.

Kumar, R. (2011). *Research Methodology, a step-by-step guide for beginners*. Sage.

Kvale, S., & Brinkmann, S. (2008). *InterViews: Learning the Craft of Qualitative Research Interviewing*. Sage Publications, Inc.

Langdon, P., & Thimbleby, H. (2010). Inclusion and interaction: Designing interaction for inclusive populations. *Interacting with Computers*, *22*(6), 439–448. doi:10.1016/j.intcom.2010.08.007

Lawson, B. (2005). *How Designers Think: The design process demystified* (4th ed.). Taylor & Francis Ltd.

Lawton Henry, S., Abou-Zahra, S., & Arch, A. (2009, September). Older Users Online: WAI Guidelines Address Older Users Web Experience. *User Experience Magazine*.

Lee, Y., & Denny Ho, K. L. (2010). “ Teaching the teachers ” Investigating new inclusive design experience to enable secondary school students to think creatively. In *PDC*. Sydney.

Lester, H., Mead, N., Graham, C. C., Gask, L., & Reilly, S. (2011). An exploration of the value and mechanisms of befriending for older adults in England. *Ageing and Society*, *32*(02), 307–328. doi:10.1017/S0144686X11000353

Lundell, J., & Morris, M. (2006). Design Research Techniques for Elders with Cognitive Decline: Examples from Intel ' s Digital Health Group. In *CHI* (pp. 1–6).

Massimi, M., Baecker, R. M., & Wu, M. (2007). Using Participatory Activities with Seniors to Critique, Build, and Evaluate Mobile Phones. In *Assets* (Vol. 6185, pp. 155–162).

McCreadie, C., & Tinker, A. (2005). The acceptability of assistive technology to older people. *Ageing and Society*, *25*(1), 91–110. doi:10.1017/S0144686X0400248X

Mcdonough, L. (2014). MS instant messenger.

Melenhorst, A.-S., Rogers, W. A., & Bouwhuis, D. G. (2006). Older adults' motivated choice for technological innovation: evidence for benefit-driven selectivity. *Psychology and Aging*, *21*(1), 190–5. doi:10.1037/0882-7974.21.1.190

Merriam-Webster. (2013). Theory - Definition and More from the Free Merriam-Webster Dictionary. Retrieved January 15, 2013, from http://www.merriam-webster.com/dictionary/theory

Mikkonen, M., Väyrynen, S., Ikonen, V., & Heikkilä, M. O. (2002). User and Concept Studies as Tools in Developing Mobile Communication Services for the Elderly. *Personal and Ubiquitous Computing*, *6*(2), 113–124. doi:10.1007/s007790200010

Morris, A., Goodman, J., & Brading, H. (2006). Internet use and non-use: views of older users. *Universal Access in the Information Society*, *6*(1), 43–57. doi:10.1007/s10209-006-0057-5

Moser, C. A., & Kalton, G. (1971). *Survey methods in social investigation* (2nd ed.).

National Disability Authority. (2014). Guidelines for Public Access Terminals Accessibility. Retrieved October 20, 2014, from http://www.universaldesign.ie/useandapply/ict/itaccessibilityguidelines/publicaccessterminals/guidelines/guidelinesforpublicaccessterminalsaccessibilityprinta

Newell, A. F., Dickinson, A., & Smith, M. J. (2006). Designing a Portal for Older Users: A Case Study of an Industrial / Academic Collaboration. *ACM Transactions on Computer-Human Interaction*, *13*(3), 347–375.

Newell, A. F., Gregor, P., Morgan, M., Pullin, G., & Macaulay, C. (2010). User-Sensitive Inclusive Design. *Universal Access in the Information Society*, *10*(3), 235–243. doi:10.1007/s10209-010-0203-y

Nielsen, J. (1993). *Usability Engineering*. Morgan Kaufmann.

O'Brien, L. (2013). Saga Zone: Social website for elderly shut down over "racist, homophobic and anti-Semitic" comments. *The Independent Online*.

Ofcom. (2014). *Adults' Media Use and Attitudes Report 2014*.

ONS. (2010). *Internet Access 2010*.

Oppenheim, A. (1975). *Questionnaire Design and Attitude Measurement*. Heinemann Educational Publishers; New e. edition.

Oxford Dictionaries. (2014). definition of robot. *Oxford Dictionaries*. Retrieved November 22, 2014, from http://www.oxforddictionaries.com/definition/english/robot

Perry, M., Dowdall, A., Lines, L., & Hone, K. (2004). Multimodal and ubiquitous computing systems: supporting independent-living older users. *IEEE Transactions on Information Technology in Biomedicine : A Publication of the IEEE Engineering in Medicine and Biology Society*, *8*(3), 258–70.

Pfeiffer, D. (1993). The Problem of Disability Definition. *Journal of Disability Policy Studies*, *4*(2), 77–82.

Pollack, M. E., Engberg, S., Matthews, J. T., Dunbar-jacob, J., Mccarthy, C. E., & Thrun, S. (2002). Pearl : A Mobile Robotic Assistant for the Elderly. *Architecture*.

Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S., & Carey, T. (1994). *Human Computer Interaction (ICS)*. Addison Wesley.

Raij, K., & Lehto, P. (2008). Caring TV as a Service Design with and for Elderly People. *Studies in Computational Intelligence*, *148*, 481–488.

Read, S. (2009). Conversations » Many Happy Returns. Retrieved March 20, 2014, from http://www.manyhappyreturns.org/conversations/

Rice, M., Newell, A., & Morgan, M. (2007). Forum Theatre as a requirements gathering methodology in the design of a home telecommunication system for older adults. *Behaviour & Information Technology*, *26*(4), 323–331. doi:10.1080/01449290601177045

RNIB. (2009). Guidelines for the design of accessible information and communication technology (ICT) systems. Retrieved October 30, 2014, from http://www.tiresias.org/research/guidelines/index.htm

Rogers, Y., Sharp, H., & Preece, J. (2011). Interaction Design - beyond Human-Computer Interaction. Retrieved May 1, 2014, from http://www.id-book.com/

Rubin, D. C., Rahhal, T. a, & Poon, L. W. (1998). Things learned in early adulthood are remembered best. *Memory & Cognition*, *26*(1), 3–19.

Rugg, G., & Petrie, M. (2006). *A Gentle Guide to Research Methods*. Open University Press; 1 edition.

Saga website. (2010). Welcome to Saga. Over 50s Insurance, Holidays, Magazine and More. Retrieved January 14, 2010, from http://www.saga.co.uk/

Sayago, S., & Blat, J. (2009). About the relevance of accessibility barriers in the everyday interactions of older people with the web. In *Proceedings of the 2009 International Cross-Disciplinary Conference on Web Accessibililty (W4A) - W4A '09* (pp. 104–113). New York, New York, USA: ACM Press. doi:10.1145/1535654.1535682

Sayago, S., Camacho, L., & Blat, J. (2009). Evaluation of techniques defined in WCAG 2.0 with older people. *Proceedings of the 2009 International Cross-Disciplinary Conference on Web Accessibililty (W4A) - W4A '09*, 79. doi:10.1145/1535654.1535673

Schoen, D. A. (1991). *The Reflective Practitioner: How Professionals Think in Action*. Ashgate Publishing Limited.

Selwyn, N., Gorard, S., Furlong, J., & Madden, L. (2003). Older adults' use of information and communications technology in everyday life. *Ageing and Society*, *23*(5), 561–582. doi:10.1017/S0144686X03001302

Sennett, R. (2008). *The Craftsman*. London: Penguin Books.

Shneiderman, B. (1997). *Designing the User Interface, Strategies for effective human computer interaction* (3rd ed.). Addison Wesley; 3 edition.

SimplicITy. (2013). Simplicity - Computers made easy - Simple, secure and green. Retrieved March 6, 2014, from https://www.simplicitycomputers.co.uk/simplesecuregreen/

Smith-Atakan, S. (2006). *Human-Computer Interaction*. Middlesex Univsersity press.

Sokoler, T., & Svensson, M. S. (2007). Embracing ambiguity in the design of non-stigmatizing digital technology for social interaction among senior citizens. *Behaviour & Information Technology*, *26*(4), 297–307. doi:10.1080/01449290601173549

Stuart-Hamilton, I. (2006). *The Psychology of Ageing: An Introduction* (4th ed.). Jessica Kingsley Publishers;

Sustar, H., & Zaphiris, P. (2007). Emotional interaction as a way of communication. In *Proceedings of the 2007 conference on Designing pleasurable products and interfaces - DPPI '07* (p. 438). New York, New York, USA: ACM Press. doi:10.1145/1314161.1314202

Svensson, M. S., Sokoler, T., & Svensson, M. S. (2008). Ticket-to-Talk-Television: Designing for the circumstantial nature of everyday social interaction. In *NordicCHI* (pp. 334–343).

Swider, M. (2013). Microsoft highlights 299M Skype users. *Techradar.Computing*.

Telecare Services Association. (2014). What is Telehealth? Retrieved May 13, 2014, from http://www.telecare.org.uk/consumer-services/what-is-telehealth

The Center for Universal Design. (1997). The 7 Principles. North Carolina: Centre for Excellence in Universal Design.

Thimbleby, H. (2008). Understanding user centred design (UCD) for people with special needs. *Computers Helping People with Special Needs.*, 1–17.

Tinker, A. (1997). *Older People in Modern Society*. Longman.

Trotto, A., Hummels, C., & Restrepo, M. C. (2011). Towards design-driven innovation. In *Proceedings of the 2011 Conference on Designing Pleasurable Products and Interfaces - DPPI '11* (p. 1). New York, New York, USA: ACM Press. doi:10.1145/2347504.2347506

Trowbridge, C. (2010). Ivy Bean, world's oldest twitter user, dies at 104. Retrieved January 5, 2012, from http://digitaljournal.com/article/295231

Turkle, S. (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other*. Basic Books.

University of Cambridge. (2013). Inclusive Design Toolkit Home. Retrieved October 30, 2014, from http://www.inclusivedesigntoolkit.com/betterdesign2/

V-connect. (2014). v-connect: connecting care with vision. Retrieved May 23, 2014, from http://www.v-connect.co.uk/

W3C Web Accessibility Initiative. (n.d.). Evaluating Websites for Accessibility: Overview. *2013*. Retrieved October 30, 2014, from http://www.w3.org/WAI/eval/Overview.html

W3C Web Accessibility Initiative. (2014). Designing for Inclusion. Retrieved October 6, 2014, from http://www.w3.org/WAI/users/Overview.html

Wadhwa, K. (2011). *Bridging Research in Ageing and ICT Development: D1.3 Technology & Market Baseline & Trends* (Vol. 44).

Wagner, N., Hassanein, K., & Head, M. (2010). Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior*, *26*(5), 870–882. doi:10.1016/j.chb.2010.03.029

Wikipedia. (2014). Age Concern. Retrieved March 5, 2014, from http://en.wikipedia.org/wiki/Age_Concern

Zajicek, M. (2001). Interface Design for Older Adults. In *WUAUC* (pp. 60–65).

Zaphiris, P., Ghiawadwala, M., & Mughal, S. (2005). Age-centered Research-Based Web Design Guidelines. In *Gerontology* (pp. 1897–1900).

Ziegler, D. J. (1992). *Personality Theories: Basic Assumptions, Research and Applications* (3rd ed.). McGraw-Hill Publishing Co.